E4812

ENERGY AND ELECTRICITY DISTRIBUTION IN LIBERIA

UPDATED ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

FOR

LIBERIA ELECTRICITY SECTOR ENHANCEMENT PROJECT,

LIBERIA ACCELERATED ELECTRICITY EXPANSION PROJECT (LACEEP)

AND LACEEP ADDITIONAL FINANCING

(LACEEP AF)

Final Report

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EXECUTIVE SUMMARY

- The Environmental and Social Management Framework (ESMF) seeks to institute a consistent and effective environmental and social screening process for application to World Bank-funded projects at the local and national levels in the energy and electricity distribution sector. This ESMF is prepared to address potential environmental and social impacts and provide mitigation measures for activities associated with the implementationof the Liberia Electricity Sector Enhancement Project (LESEP), Liberia Accelerated Electricity Expansion Project (LACEEP) and LACEEP Additional Funding (LACEEP AF), which include: the expansion of the electricity transmission and distribution system in Greater Monrovia ;
- the construction of the main electricity transmission and distribution infrastructure of the Paynesville-Kakata corridor, Monrovia-Bomi corridor, extending from Monrovia to Kle, Bomi County and then from Kle to Tubmanburg in Bomi County, to Bopolu in Gbarpolu County, and to Robertsport and Bo Waterside in Grand Cape Mount County as well as the connection of approximately 12,500 customers under LACEEP and about 30,000 customers under LACEEP AF ;

- supporting LEC's efforts to strengthen commercial management and operations and build local capacity within the utility to ensure sustainability of the company's efficient operations in the long term.the construction of the HFO off-loading facility and HFO pipeline and storage near the National Port Athority (NPA) jetty; and,
- the construction of fuel tanks in LEC Bushrod yard.

LEGAL FRAMEWORK

A number of legislations, policies and instruments available to support environmental management and the environmental impact assessment process in Liberia are reviewed in Section 2. The Environmental Protection and Management Law and other sectoral sections in other legislations are the key instruments that cover environmental management in all the sectors of development in Liberia. The Environmental Impact Assessment Guidelines prescribe the process, procedures and practices for conducting an EIA and preparing the EIA reports. In addition to these instruments, there are sector specific policies and legislations that prescribe the conduct for managing the environment.

The EPA is the principle authority in Liberia for the management of the environment and coordinates, monitors, supervises and consult with relevant stakeholders on all activities in the protection of the environment and sustainable use of natural resources. In addition to being responsible for the provision of guidelines for the preparation of Environment Assessments and Audits, and the evaluation of environmental permits, the EPA is mandated to set environmental quality and ensure compliance for pollution control.

The main functions of the EPA are as follows:

- Co-ordinate, integrate, harmonize and monitor the implementation of environmental policy and decisions of the Policy Council by the Line Ministries,
- Propose environmental policies and strategies to the Policy Council and ensure the integration of environmental concerns in overall national planning;
- Collect, analyze and prepare basic scientific data and other information pertaining to pollution, degradation and on environmental quality, resource use and other environmental protection and conservation matters and undertake research and

prepare and disseminate every two years a report on the state of the environment in Liberia;

- Encourage the use of appropriate environmentally sound technologies and renewable sources of energy and natural resources;
- Establish environmental criteria, guidelines, specifications and standards for production processes and the sustainable use of natural resources for the health and welfare of the present generation, and in order to prevent environmental degradation for the welfare of the future generations.

Section 3 presents a thorough review of the World Banks Safeguards Policies. The triggered policies for LACEEP are :

- OP 4.01 Environmental Assessment
- OP 4.11 Physical Cultural Resources
- OP 4.12 Involuntary Resettlement

It should be noted that each individual sub-project to be conducted under the LESEP and LACEEP must be registered and subjected to environmental screening and environmental assessment conducted professionally by experts and reviewed by mandated institution.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The potential environmental impacts that may be associated with the implementation of several power supply alternatives for the purpose of electricity generation can be minimized by careful site or right of way selection, planning and staging of construction activities, adopting proper management practices during operation and relying on effective environmental monitoring and training to support management decisions. Several potential mitigation or control measures can be recommended to earn the proposed projects more acceptability, by reducing or eliminating to the extent possible many adverse project impacts. Mitigation measures are intended to reduce potentially significant adverse project impacts on the environment and human health. Thus, they are highly dependent on the significance of the predicted impacts, the nature of the impacts (permanent vs. temporary), or the phase of the project (construction vs. operation).

It should be noted that the mitigation measures referred to in this section are generic measures, meaning they will only require action once specific projects are identified and assessed. Similarly, the cost of the mitigation activities would be assessed as part of the rehabilitation or construction works to be conducted by the contractor under the specific project.

INSTITUTIONAL ARRANGEMENT AND FRAMEWORK

In order for the Environmental and Social Management Framework (ESMF) to be effectively implemented, the availability of a proper social and environmental management planat the national level is helpful. Although environmental regulations have been evolving in the country, the main problem remains that of monitoring and enforcement, which is in turn related to the country's institutional and technical capacity for environmental management. There are many organizations involved in energy-related and activities at the national level. However, the main institutions with key responsibilities for environmental and social management in the energy sector are the MLME, EPA and LEC including the latter's Environmental and Social Management Unit (ESMU).

The role of the ESMU will be to screen for and identify the nature and magnitude of sub-projects' potential environmental and social impacts and categorize them according to level of impact assessment study required. The ESMU will also be responsible for supervising the contractor during implementation of the sub-projects and ensuring that the contractor is correctly implementing the sub-projects' environmental and social management plan (ESMP).

INSTITUTIONAL STRENGTHENING AND CAPACITY BUILDING

The objective of the training program is to ensure appropriate environmental awareness, knowledge and skills for the implementation of environmental management plans as well as environmental and process monitoring. In an effort to strengthen institutional capacity and environmental awareness, training sessions should be conducted for individuals from the EPA, LEC (particularly the ESMU), and other concerned administrative or governmental ministries and agencies. Appraisal will be done following every training session for feedback with a view to improving the training program.

1 INTRODUCTION

1.1 BACKGROUND

This ESMF, which is a generic Environmental and Social Management Plan (ESMP) for the power sector, is a screening tool to identify the potential environmental and social impacts and mitigation actions to be taken for project and sub-project activities within the context of the Liberia Electricity Sector Enhancement Project (LESEP), and Liberia Accelerated Electricity Expansion Project (LACEEP), LACEEP AF and any other energy sector programs, projects or sub-projects funded by the World Bank, taking into account Liberia's relevant sector legislation as well as World Bank's safeguard policies

Activities to be considered are: expansion and rehabilitation of distribution networks, expansion or rehabilitation of transmission lines, rehabilitation or construction of substations, rehabilitation of facilities for fuel oil off-loading, transport (pipeline) and storage of HFO (such as the fuel oil tanks in LEC Bushrod Island yard), and PCB (polychlorinated biphenyl) issues arising from the rehabilitation or demolition of suspected PCB-containing old facilities..

1.2 LEVEL OF ENVIRONMENTAL WORK

This ranges from no environmental work being required or the application of simple mitigation measures to the preparation of comprehensive ESIA reports. The process is consistent with Liberia's environmental policies and laws as discussed below (Chapter 2).

Environmental and social screening procedures will enable implementers to identify, assess and propose mitigation measures for potential negative environmental and social impacts reported in an ESIA, and and the preparation of the requisite RAP
(Resettlement Action Plan) and OSRP (Oil Spill Response Plan) where required.

1.3 THE ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK: OBJECTIVES AND PREPARATION

This ESMF is intended to be used as a framework guide to the implementation of current Government Policy regulations for environmental and social processes and the observance of World Bank's safeguard policies. This ESMF is being updated to include activities associated with the implementation of LACEEP AF

The objectives of this ESMF are as follows:

- To establish clear procedures and methodologies for the environmental review, approval and implementation of projects in the energy and electricity sector;
- To determine the environmental management capacity building needs for the EPA and the LEC's Environmental and Social Management Unit (ESMU);
- To specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for screening, managing and monitoring environmental concerns related to projects;
- To determine the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMF;
- To identify who will be responsible for preparation of the TORs for ESIAs, ESMPs and RAPs;
- To determine the institutional arrangements needed to satisfactorily screen subprojects including identification of the safeguard instruments to be prepared, the hiring of the consultants who will prepare them, and the identification of who will supervise the work of the consultants and contractors;
- To determine the project funding required to implement the ESMF requirements; and,
- To provide resources for implementing the ESMF.

The implementation of the ESMF will help ensure that activities under the proposed project will:

- protect human health;
- enhance positive environmental outcomes; and,

- prevent or minimize or eliminate wherever feasible negative project environmental impacts.

1.4 REPORT FORMAT

The ESMF report is organized as indicated below.

Section 1 – Introduction: provides the introduction to the ESMF;

Section 2 – Legal and Administrative Framework: presents the legal framework within which LESEP, LACEEP and LACEEP AF will operate.

Section 3 – World Bank Safeguard Policies: discusses the safeguard policies of the World Bank and the applicability ofthose policies.

Section 4 – Project Description: presents a summary of the LESEP, LACEEP and LACEEP AF.

Section 5 – Impact Assessment and Identification: describes impacts of the projects.

Section 6 – Mitigation Measures, Environmental Management and Monitoring Plan: describes the proposed environmental and social mitigation and monitoring measures.

Section 7 – Institutional Arrangements: presents the environmental and social screening process for subprojects, and provides the institutional setup for environmental and social monitoring and institutional capacity building and training within the electricity sector to ensure efficient implementation of the ESMF.

Section 8 – Public Consultation: presents the public consultation process carried out during the preparation of the ESMF and summarizes the outcomes.

2 LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

This chapter describes the applicable international standards and relevant Liberian regulatory framework that set the context within which the projects will be implemented. The Environmental Protection Agency (EPA) is the environmental regulatory authority in charge of issuing environmental guidelines and reviewing environmental and social impact assessment (ESIA) reports

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2.1 LIBERIAN ENVIRONMENTAL ADMINISTRATIVE FRAMEWORK

2.1.1 Government Organization

2.1.1.1 National Government

Liberia's government comprises three branches, namely, the executive, legislative and judicial branches. The legislative branch consists of two chambers – the Senate (30 seats) and the House of Representatives (now 73 members) The country has a dual legal system of statutes passed by the Legislature and approved by the President of the Republic and customary law based on customary practices of r the country's indigenous people.

2.1.1.2 Local Government

Liberia comprises 15 administrative political subdivisions known as counties, each of which is headed by a Superintendent and further divided into districts, each under a District Commissioner. Each district is sub-divided into chiefdoms headed by a Paramount Chief, and each chiefdom is divided into clans headed by Clan Chiefs. Towns are headed by Town Chiefs.

2.1.2 Environmental Institutional Framework

2.1.2.1 National Level

2.1.2.1.1 Environmental Protection Agency

The Environmental Protection Agency (EPA) is an autonomous statutory body established under the Act Creating the Environmental Protection Agency of the Republic of Liberia 2003 (GOL, 2003a), hereafter referred to as the EPA Act to address the country's environmental problems. Its mandate was subsequently confirmed when the EPA became a fully functioning entity in 2006, with the appointment of a board of directors and the establishment of a Policy Council.

The EPA was established to "coordinate, monitor, supervise and consult with relevant stakeholders on all activities in the protection of the environment and sustainable use of natural resources" and as the lead national environmental agency is charged with executive authority for all environmental activities and programs relating to environmental management in Liberia. The EPA also has a key responsibility for matters relating to the issuance of environmental impact assessment licenses and for monitoring and enforcing compliance with environmental laws, regulations, guidelines and standards.

The EPA is an autonomous agency whose Executive Director is appointed by and reports directly to the President of Liberia with a Policy Council chaired by the Minister of Lands, Mines and Energy (MLME).

2.1.2.1.2 Ministry of Lands Mines and Energy

The Ministry of Lands, Mines and Energy has the statutory responsibility for the development of mineral, water and energy resources in Liberia; it is in charge of land surveys in all parts of the country and coordinates, administers and regulates the use of public and private lands in Liberia, including mineral resources through granting of operation licenses, and regulates beach sand mining. It works along with the Ministry of Agriculture and the University of Liberia to conduct training and research on land rehabilitation. Energy provision is administered through the same Ministry by the

Assistant Minister for Energy while water resources are the responsibility of the National Hydrological Service.

2.1.2.1.3 Ministry of Agriculture

The Ministry of Agriculture regulates the forestry as relate to plant quarantine, agro-forestry and food crop related plantations; fishery and agriculture sectors and has specific responsibilities for soil conservation. Some water resource matters used to be managed by the National Water Resources and Sanitation Board prior to the civil war, and proposals have recently been made for its re-establishment. It plans, executes, administers, manages and supervises agriculture programs and provides extension services, trains local farmers in improved cultural practices, and supplies farm inputs to enhance food security.

2.1.2.1.4 Forestry Development Authority

The Forestry Development Authority (FDA), established in 1976, was historically the government agency with primary responsibility for environmental management in Liberia. Now an autonomous body, and mandated by the National Forestry Reform Law of 2006, the

FDA has responsibility for the protection, management and conservation of governmentowned forests and wildlife on a sustainable basis. It manages commercial, conservation and community uses of Liberia's forest estate. It provides long- and middle-range planning in the forestry sector as well as preparing forestry policy, law and administration. It exercises control of the commercial use of state-owned forests through the granting of concessions, supervises adherence to forest legislation and concession agreements, calculates and determines forestry fees, evaluates investment proposals, executes reforestation and forest research and training and monitors activities of timber companies. The 2006 law revised the institutional framework of the FDA and created a Department of Conservation which is made up of the Division of National Parks and the Division of Wildlife with the responsibility for development and management of protected areas and wildlife respectively.

2.1.2.1.5 Ministry of Planning and Economic Affairs

The Ministry of Planning and Economic Affairs (MPEA), now merged with the Ministry of Finance and collectively known as the Ministry of Finance and Development Planning,is responsible for intersectoral coordination of the development of policies, plans and programs for the economic, financial, social, cultural and physical development of Liberia.

In fulfilling its various duties

it serves as the direct coordination link between implementing Ministries and Agencies, NGOs, private voluntary organizations, civil society organizations and the international community. Coordination occurs at the national, sectoral and regional planning levels and also involves the implementation of cross-cutting initiatives.

2.1.2.1.6 Liberia Electricity Corporation (LEC)

The Liberia Electricity Corporation was created in 1973 to generate, transmit, distribute, and sell electricity throughout the country at reasonable rates. In July 2006, electricity was restored to parts of Monrovia for the first time in fifteen years because of the civil war of 1989-2003..

2.1.2.1.7 Ministry of Public Works (MPW)

The MPW is responsible for the design, construction and maintenance of roads and highways, bridges, storm sewers, public buildings and other civil works in the country. Additionally, it has responsibility for the administration of urban and town planning as well as provision of architectural and engineering services for all government ministries and agencies. In principle, it is responsible for the installation of the entire infrastructure required for waste management delivery services including the construction of sanitary landfill facilities.

2.1.2.1.8 Ministry of Health and Social Welfare (MHSW)

The MHSW coordinates and administers all general health services in Liberia, including providing preventive services, collecting health statistics, ensuring drug availability and monitoring events and conditions affecting public health. It also maintains statistics from birth and death registrations. Through its Division of Environmental and Occupational Health, the Ministry assesses the environmental health of the population and regulates and monitors environmental impacts resulting from pollution of air, water, food/feed and soil, as well as occupational health and chemical safety. The Division had a water quality laboratory prior to the civil war, but it no longer exists.

2.1.2.1.9 Ministry of Internal Affairs

The Ministry of Internal Affairs administers the affairs of all government functionaries in Liberia, oversees the activities of all local bodies, such as chiefdoms and clans, and supervises all county superintendents.

2.1.2.1.10 National Port Authority

An act of Legislature established the National Port Authority (NPA) in 1967. The National Port Authority is the government agency responsible for the management, operation and maintenance of the seaports of Liberia. The Authority manages four ports namely Freeport of Monrovia, Port of Buchanan, the Port of Greenville and the Port of Harper.

2.1.2.1.11 Liberia Institute of Statistics and Geo-Information Services (LISGIS)

LISGIS was established by Law by the National Transitional Legislative Assembly (NTLA) on July 22, 2004. LISGIS is headed by a Director-General, and supervised and monitored by a twenty-one (21) member Board of Directors. Both the Director-General and the Board of Directors have been initially appointed by the President but thereafter, the Director-General and the Board will subsequently be appointed by the Board to minimize the involvement of Government and secure the support of all stakeholders, particularly development partners.

LISGIS:

- Advises on all initiatives to collect data at all levels locality/village/town, clan, districts, county, regional and national) in the context of an integrated National Statistical and Geo-Information System;

- Conducts censuses and surveys;
- Collects, analyzes and disseminates social, economic, environmental and national accounts statistics of internationally acceptable standard as and when required;
- Creates, establishes and manages the integrated National Statistical and Geo-Database;
- Supports sectoral capacity to acquire, access, use and contribute to the National Statistical System and the integrated National Statistical Database.

2.1.2.2 Local Level

2.1.2.2.1 County and District Environmental Committees

To decentralize environmental management, the Environmental Protection Agency Act authorizes the establishment of County and District Environmental Committees and directs the National Environmental Policy Council to provide guidelines for their establishment.

Each County Committee is composed of county and district officials, traditional leaders, private citizens, and two local representatives to the national legislature. The Committee is staffed by a County Environment Officer, hired by the EPA, but responsible to the County Committee.

The District Environment Committees are to be established by and report to the relevant County Environment Committee. They are charged with promoting environmental awareness and mobilizing the public to manage and monitor activities within the district to ensure that they do not have any significant impact on the environment. The District Committees are composed of district officials, mayors, chiefs, and private citizens and are staffed by a District Environment Officer hired by the EPA.

In addition to assisting the County and District Committees in the fulfillment of their responsibilities, the County and District Environment Officers are responsible for compiling reports to the EPA, promoting environmental awareness, and conducting public hearings on environmental impact assessment in the County and the District.

At present, two County Environmental Committees have been established; One in Sinoe County and another in Nimba County. However, EPA has established outstation offices in eight counties. The offices are staffed by Environmental Inspectors. As the County

Environment Committees are established, some of the Inspectors may be reassigned as County Environment Officers.

2.1.3 Environmental Inspectors and Courts

To provide for enforcement of environmental requirements and standards, the Environmental Protection Agency Act provides for the appointment of Environmental Inspectors and the establishment of an Environmental Court system.

2.1.3.1 Environmental Inspectors

The Act authorizes the EPA to "designate its officers and duly qualified public officers/civil servants … to be environmental inspectors within such Counties and District limits." Thus, Environmental Inspectors do not have to be EPA employees, but can also be designated officers or civil servants in other branches of the government. Environmental Inspectors are authorized to enter premises, inspect activities, take samples, and review records to ensure compliance with environmental rules and regulations. The exact nature of the inspector's enforcement authority is not defined in the Act, but the Act does state that the EPA is to "…establish the conditions, rules and regulations governing the qualifications, performance, powers and duties of the Environmental Inspectors." The EPML confirms that Environmental Inspectors can write Restoration Orders to correct an activity deemed to be noncompliant with environmental rules and regulations.

2.1.3.2 Environmental Courts

The Environmental Protection Agency Act defines a two-tiered court system to hear and pass on cases relating to compliance with environmental rules and regulations.

The first tier is the Environmental Administrative Court. This court is to hear and rule on complaints relating to the environment. The complaints may be about the actions or decisions of the EPA or an Environmental Inspector, or may be brought by the public to stop activities they believe are damaging the environment.

The second tier is an Environmental Appeals Court, established at the Judicial Circuit level.

At present, the Environmental Court system has not been formally established. EPA's five-year strategic plan (starting July 2011) provides for an administrative court to handle

environmental issues for an intermediate period before the full establishment of an environmental court under the judicial system.

2.2 LEGISLATIVE FRAMEWORK

Table 2-1 describes the main categories of legislation in Liberia and Table 2-2 and Table 2-3 provide a summary of relevant Liberian environmental legislation and Multilaterall Environmental Agreements (MEAs) or Conventions signed or ratified by the Government of Liberia.

Table 2-1: Categories of Legislations in Liberia.

	Laws are passed by the National Legislature of Liberia comprising the Senate and the House of Representatives. Any citizen or group of citizens, Cabinet Ministers, Managing Directors of public corporations or agencies can propose a bill to the National Legislature for enactment. The draft bill is first passed over to the appropriate Steering Committee of the Legislature. In case of environmental bill, this committee is generally the Committee on Natural Resources and the Environment. The Committee reviews, assesses and presents the bill to the Legislative Plenary with appropriate amendments for debate, public hearing and subsequent enactment by the Legislature.
Executive Order	The Executive Branch of government headed by the President can issue Executive Order without the approval of the National Legislature. The Executive orders have the power of a law provided that they do not contravene the existing law. The power of such orders has a limited time of existence.
Regulations	The national Legislature has empowered Cabinet Ministers and Managing Directors of public corporations and agencies to issue regulations for their respective functionaries without legislative approval or supervision, provided that such regulations are not inconsistent with the statutory Laws and the Constitution of Liberia.

Table 2-2: Relevant Environmental Laws.

Title	*Year*	*Description*
Conservation of the Forests of the Republic of Liberia	1953	This Law provided the framework for the use of forest and wildlife resources and allowed for the creation of government reserves, native authority reserves, commercial forests, national parks and wildlife refuges.
This Supplementary Law also provided the framework for the use of		

Supplementary Act for the Conservation of Forests	1957	forest and wildlife resources and allowed for the creation of government reserves, native authority reserves, commercial forests, national parks and wildlife refuges.
The Act that created the Forestry Development Authority (FDA)	1976	The Act established and defined the responsibilities of the FDA, outlined forest offences and penalties; made provision for an Advisory Conservation Committee and specified powers of forest officers with regard to trees in reserve areas.
Public Health Act	1976	It contains provision for the protection of drinking water resources and the inspection of potential sources of pollution.
The Natural Resources Law of Liberia	1979	This Law includes chapters on forests, fish, and wildlife, soil, water, and minerals.
Wildlife and National Parks Act	1988	The Act identifies a number of protected areas; specifies policies and objectives regarding wildlife and conservation in the country.
The Environment Protection Agency (EPA) Act	2002	The Act provides the Agency with the authority of government for the protection and management of the environment in Liberia. It provides for an Environmental Administrative Court to hear from aggrieved parties. It requires that an Environmental Impact Assessment (EIA) be carried out for all activities and projects likely to have an adverse impact on the environment.
The Environment Protection and Management Law	2002	The Act enables the Environment Protection Agency to protect the environment through the implementation of the Law. It arranges the rules, regulations, and procedures for the conduct of EIA. It establishes regulations for environmental quality standards, pollution control and licensing, among others.
The National Environmental Policy Act	2002	It defines policies, goals, objectives, and principles of sustainable development and improvement of the physical environment, quality of life of the people and ensures coordination between economic development and growth with sustainable management of natural resources.

Title	***Year***	***Description***
National New Forestry Reform Law	2006	The administration of this Act provides for the Forestry Development Authority to exercise the power under the Law to assure sustainable management of the Republic's forestland, conservation of the forest resources, protection of the environment, sustainable economic development with the participation of and for the benefit of all Liberians and to contribute to poverty alleviation in the country.

Table 2-3: International Environmental Conventions Signed/Ratified by the Government of Liberia.

Convention	*Status*	*Year*	*Objectives*
African Convention on Conservation of Nature and Natural Resources	Ratified	NA	To encourage individual and joint action for the conservation
Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Ratified	1981	To prevent trade of endangered or threatened species
Convention Concerning the Protection of the World Cultural and Natural Heritage	Signed	2002	To recognize and protect cultural and natural heritage for future generations
Framework Convention on Climate Change and the Kyoto Protocol	Signed	2002	• To achieve stabilization of green house gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climatic system • To strengthen the commitment of developed country parties with a view to reduce their overall emissions
Stockholm Convention on Persistent Organic Pollutants (POP)	Signed	2002	□ To strengthen National Capacity and to enhance knowledge and understanding Amongst decision makers, managers, industry and the public at large on POPs □ To develop a National implementation Plan (NIP) to manage the elimination of POPs.
Ramsar Convention on Wetlands of International Importance	Signed	2003	• To manage wetland systems so that the human uses of these areas are undertaken in such a way as to retain their natural capital for future generations. □ To encourage and support countries to develop and implement national policy and legislative frameworks, education and awareness raising programs, as well as inventory, research and training projects.

Convention on Biological Diversity (CBD)	Ratified	2000	Promote Conservation of Biological Diversity. Sustainable use of its components. Fair and equitable sharing arising out of the utilization of genetic resources.
Convention on the Conservation of Migratory Species of Wild Animals	Ratified	2004	Aims to conserve terrestrial, marine and avian migratory species throughout their range
The Cartagena Protocol on Biosafety	Ratified	2003	To contribute to ensuring an adequate protection in the field of living modified organisms resulting from modern biotechnology
Convention on Desertification	Signed	1998	To combat desertification and mitigates the effect of drought in countries experiencing serious droughts and/or desertification
International Tropical Timber Agreement	Ratified	2008	Requires sustainable management of timber resource base, simultaneously encouraging the timber trade and the improved management of
Convention	***Status***	***Year***	***Objectives***
			the forests
Vienna Convention for the Protection of the Ozone Layer	Signed	1996	States agreed to cooperate in scientific research on the ozone problem, to exchange information, and to adopt “appropriate measures” to prevent activities that harm the ozone layer. The obligations are general and contain no specific limits on chemicals that deplete the ozone layer.
Montréal Protocol on Substances that Deplete the Ozone Layer	Signed	1996	A protocol to the Vienna Convention for the Protection of the Ozone Layer, it is designed to protect the ozone layer by phasing out the production of numerous substances believed to be responsible for ozone depletion
International Convention on Oil Pollution Preparedness, Response, and Cooperation (OPRC), London, 1990	Signed	1995	To strengthen the legal framework for the control of environmental pollution by oil, in general, and marine pollution by oil in particular.

International Covenant on Economic, Social and Cultural Rights	Ratified 2004	ICESCR commits to work toward the granting of economic, social, and cultural rights to individuals, including labor rights and rights to health, education, and an adequate standard of living. ICESCR is part of the International Bill of Human Rights, along with the Universal Declaration of Human Rights (UDHR) and the International Covenant on Civil and Political Rights (ICCPR)

2.2.1 Constitution of the Republic of Liberia

Article 7 of the 1986 Constitution of the Republic of Liberia sets the fundamental basis for the constitutional, legislative, and institutional frameworks for the protection and management of the environment. It also encourages public participation in the protection and management of the environment and the natural resources in Liberia.

2.2.2 The Environmental Protection Agency Act

"An Act to establish a monitoring, coordinating and supervisory authority for the sustainable management of the environment in partnership with regulated Ministries and organizations and in a close and responsive relationship with the people of Liberia; and to provide high quality information and advice on the state of the environment and for matters connected therewith".[1]

Thus, the Environmental Protection Agency of Liberia (EPA) was created by the Act creating the Environmental Protection Agency of the Republic of Liberia, known as the Environment Protection Agency Act. The Act was approved on November 26, 2002 and published on April 30, 2003. The establishment of the EPA marked a significant step forward in the protection and management of the environment of Liberia.

Section 5 of the Act designated the EPA as the principal Liberian authority for environmental management which shall co-ordinate, monitor, supervise, and consult with relevant stakeholders on all the activities for environmental protection and the sustainable use of natural resources. Section 6 (b) of the Act stipulates that the EPA should propose environmental policies and strategies to the Policy Council and ensure the integration of

[1] Ministry of Foreign Affairs. Monrovia, Liberia. April 30, 2003. Act Creating the Environment Protection agency of the Republic of Liberia. Section 1

environmental concerns in the overall national planning. Moreover, the EPA is empowered to carry out, among other things, the following aspects of environmental protection and management in Liberia:

- Establish environmental criteria, guidelines, specifications, and standards for production processes and the sustainable use of natural resources for the health and welfare of the present generation, and in order to prevent environmental degradation for the welfare of the future generations;
- Identify projects, activities, and programs for which environmental impact assessment must be conducted under this Law
- Review and approve environmental impact statements and environmental impact assessment submitted in accordance with this Act;
- Monitor and assess projects, programs, and policies including activities being carried out by relevant ministries and bodies to ensure that the environment is not degraded by such activities and that environmental management objectives are adhered to and adequate early warning and monitoring on impending environmental emergencies is given;
- Review sectoral environmental laws and regulations and recommend for amendments and to initiate proposals for the enactment of environmental legislations in accordance with this Act or any other Act;
- Encourage the use of appropriate environmentally sound technologies and renewable sources of energy and natural resources;
- Function as the national clearinghouse for all activities relating to regional and international environment-related conventions, treaties and agreements, and as national liaison with the secretariat for all such regional and international instruments.

2.2.3 Act Adopting the Environmental Protection and Management Law of the Republic of Liberia

"An Act to establish a legal framework for the sustainable development, management and protection of the environment by the Environmental Protection Agency in partnership with regulated Ministries and organizations and in a close and responsive relationship with the

people of Liberia; and to provide high quality information and advice on the state of the environment and for matters connected therewith".[2]

Section 15 of the EMPL states that business investors should present an environmental mitigation plan to the EPA, which should include the following sections:

- Objectives
- Description of activities to be carried out by the project to mitigate any adverse effects on the environment
- Period within which the mitigation measures shall be implemented
- Proven efficacy of the mitigation measures of indicating their experimental nature

Section 12 of the EPML requires environmental review for projects or activities that may have significant impact on the environment. The project proponent shall submit to the EPA their plans for improving environmental performance including:

- Identification of the major environmental effects; and
- A comprehensive mitigation plan in accordance with section 15 of this Law.

Section 6 of EPML requires an Environmental Impact Assessment license or permit for the commencement of such projects, and Section 13 requires the preparation of an environmental impact study for such a project.

Section 24 of the EPML requires that the EPA should ensure that projects comply with their environmental mitigation plan through monitoring of its operations. Where evidence of non-compliance occurs, the EPA shall impose remedial measures and may bring action before the Environmental Court or through the Ministry of Justice to enforce compliance.

Section 25 of the EPML gives responsibility to the EPA carrying out periodic environmental audit of activities or projects that are likely to have adverse effects on the environment

Section 58 of the EPML requires that a license must be obtained from the EPA for any type of effluent discharge into the sewage system, also in case of operation of a sewage system. This license is provided by the EPA for a period that does not exceed 1 year.

[2] Ministry of Foreign affairs. Monrovia, Liberia. April 30, 2003. Act adopting the Environment Protection and Management Law of the Republic of Liberia. Section 1.

Section 61 of the EPML prohibits pollution of all Liberian Waters. In case of water pollution, a sentence and/or a fine is/are imposed on the polluting party. The latter is also responsible for the cost of the removal of the pollutant and the restoration, restitution or compensation as determined by a law court.

Section 62 of the EPML bans pollution by solid waste of any land, coastal zone or water surface, street, road or site in or on any place to which the public has access, except in a container or at a place which has been specially indicated, provided or set apart for such purpose. In case of such pollution, a fine or a prison term is imposed on the polluting party. The latter is also responsible for the clean-up of the solid waste pollution it caused.

Section 64 of the EPML requires the acquirement of a "Solid and Hazardous Waste Disposal License" in case of generation, storage, handling, transport or disposal of hazardous waste, or else ownership or operation of a waste disposal site. The EPA provides this license for a period of not more than one year. This license entails the party who is generating the waste to take up waste management measures such as treatment, determination or recycling and re-mediation.

Section 71 of the EPML requires the acquirement of a "Pollution Emission License" for any project or activity which is likely to pollute the environment in excess of any standards or guidelines issued under the EPML. This license is provided by the EPA for a period of not more than one year.

Section 75 of the EPML prohibits the below activities in relation with a river, lake or wetland that are declared as protected areas by the EPA. These activities include:

- Use, erect, construct, place, alter, extend, remove or demolish any structure in, on, under, or over the bed;
- Excavate, drill, tunnel or disturb the bed otherwise;
- Introduce or plant any part of a plant, plant specimen or organism whether alien or indigenous, dead or alive in a river, lake or wetland;
- Introduce any animal or micro-organism whether alien or indigenous, dead or alive in a river, lake or wetland;
- Deposit any substance in a river, lake, or wetland or in or under its bed, which is

likely to have adverse environmental effects on the river, lake or wetland;

Direct or block a river, lake or wetland from its natural and normal course; and

- Drain any river, lake or wetland.

Section 91 of the EPML, states that the EPA may impose on the party that has caused or is likely to cause harm to the environment an "Environmental Restoration Order" requiring it to remedy/prevent the harm within 21 days of the service of the order. Section 92 allows the party to request the Agency to reconsider that order by giving reasons in writing within the same period. Section 107 states that non compliance with the restoration order convicts the responsible party to imprisonment and/or a fine.

2.2.4 National Energy Policy

In February 2007, the GOL, through the Ministry of Lands, Mines and Energy (MLME), with the support of the United States Agency for International Development (USAID) published the National Energy Policy (NEP). The principal objective of the NEP is to ensure universal access to modern energy services in an affordable, sustainable and environmentally-friendly manner in order to foster the economic, political, and social development of Liberia.

The NEP recognizes the fact that energy is essential towards GOL Poverty Reduction Strategy (PRS) and the achievement of the Millennium Development Goals (MDGs).

The NEP assumes the implementation of proposed energy sector reforms founded on three essential features: (1) demonstrating the Government's resolve for good governance and ensuring financial transparency in all sector transactions; (2) overcoming the significant obstacles to private sector investment in energy supply; and (3) creating the requisite institutional and legal framework and an independent regulatory regime. In undertaking energy sector reform, the Government will also be addressing a key component of Liberia's commitment to the World Bank and other donors for debt relief under the program for Highly Indebted Poor Countries.

2.2.4.1 Key Policy Issues

The NEP addresses the following strategic issues that are implied in the principal policy objective – access, quality, cost and institutional framework. These issues refer to the need for the various technologies and delivery options for energy products and services to be available, acceptable, affordable and adequate.

2.2.5 National Environmental and Occupational Health Policy

The Ministry of Health and Social Welfare has a Division of Environmental and Occupational Health; however, the Division lacks standards and policies that specifically speak to industrial hazards occupationalsafety and health. The National Environmental and Occupational Health Policy (NEOHP) was developed in 2007 to provide a framework for identifying policy needs and actions to improve occupational health and safety. It supplements the National Health Policy, which focuses on public health and health systems. The NEOHP identified the following key environmental and occupational health needs:

1. Environmental Sanitation
2. Food Safety Services
3. Water Quality and Safety
4. Vector Control and Chemical Safety
5. Waste Management
6. Disaster Management
7. Health Promotion
8. Occupational Health Services
9. Port Health
10. Pollution Control
11. Sanitary Engineering

2.2.6 Public Health Law

This Law provides a framework for the management of public health and health systems in Liberia. The 1976 Law is currently being updated in order to govern effectively a decentralized health sector and accommodate the changes that have taken place since its promulgation. For example, in 2010 a new chapter was added to the Law to manage HIV / AIDS.[3]

LEC shall observe policy and regulatory requirements and implement measures to safeguard public health and safety.

[3] Liberia Ministry of Health and Social Welfare. 2010. An Act to Amend the Public Health Law, Title 33, Liberian Code of Laws Revised (1976). Accessed from the GOL website: http://legislature.gov.lr/sites/default/files/Public%20Health.pdf

2.2.7 National Health Policy and National Health Plan[4]

The document, published in 2007, is a framework for health sector reforms in Liberia. The goal of the policy is to make health care delivery services throughout the country effective and efficient, thereby improving the quality of life of the population.

2.2.8 Liberia Land Commission Act of 2009

The objective of this act is to propose, advocate and coordinate reforms of land policy, laws and programs in Liberia. It does not have adjudicatory or implementation role. The goal of the commission is "to develop comprehensive national land tenure and land use system that will provide equitable access to land and security of tenure so as to facilitate inclusive sustained growth and development, ensure peace and security and provide sustainable management of the environment"[5].

2.3 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS IN LIBERIA

An EIA Process Flow Chart has been included as Appendix A. The main steps in the process are:

- Prepare Application for Environmental Impact License
- Prepare Notice of Intent (NOI)
- Submit Project Brief (allow 14 working days for EPA to review and give feedback)
- Conduct Scoping Process:
    1. Publish NOI in Media
    2. Prepare Terms of Reference (TOR)
    3. Conduct Meetings with EPA Environmental Committee and District Environmental Committees, as needed.
    4. Conduct Public Meetings with Potentially Affected Communities
    5. Submit Scoping Report to EPA
- Prepare Environmental Review
- Obtain EPA Approval of TOR and Environmental Review
- Prepare Environmental Impact Study and Report (included in EIA)

[4] Liberia Ministry of Health and Social Welfare. 2007. National Health Policy and National Health Plan. Accessed from the ILO website: http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/--ilo_aids/documents/legaldocument/wcms_126728.pdf [5] Liberia Land Commission Act of 2009.

- Prepare Environmental Impact Statement (EIS) (included in EIA)
- Develop Comprehensive Environmental Mitigation Plan and Implementation Strategy (included in EIA)
- Agency Review of EIA (within 3 months)
- Public Consultation on EIA (within first 30 days of 3 months)
- Public Hearings (EPA to decide whether to hold these)
- Liberia's Line Ministries Comment on EIA
- Review by EPA Environmental Assessment Committee
- Approval or Rejection by EPA (within three (3) months of receiving EIA report)

2.3.1 Public Consultation Requirements of the EIA Process

Involvement of the public in the EIA commences with the launch of the EIA process and continues throughout its course. Detailed below are the different requirements of the public involvement throughout the EIA process:

1. After the submission of an application for an environmental impact assessment permit, the project proponent should publish a "notice of intent" that states the information that may be necessary to allow the stakeholders or any interested party to identify their interest in the proposed project or activity. This information should include: the nature of the project, its related activities, its timeframe and its site of operation and the area that may be impacted.
2. Before preparing the EIA document, the project proponent should conduct public consultations with the potential affected stakeholders. This procedure is called the "scoping process" which aims to: 1) inform the stakeholders about the project's details, its potential impacts on the physical, biological and socio-economic environments, and the mitigation measures that can be taken in order to minimize these impacts, and 2) get the stakeholders' input on the various related issues. By achieving this, the scoping process is also a guiding tool for the project proponent and its consultants. It helps them in identifying the project's impacts, mitigation measures and alternatives, which will form the essential part of the EIA document. The scoping process consists of publishing the project's details in the affected district's media, holding public meetings to consult directly with the affected communities and stakeholders, and incorporating the views of these stakeholders in

the scoping report which is submitted to the EPA.

3. On the completion of the EIA study report, the public is invited again to participate in the EIA review through public consultation meetings. The public's views on the EIA are taken into consideration by the EPA when deciding about approving or rejecting the project.
4. In some cases, the EPA also decides to hold a public hearing about the project in order to fortify the public participation. These cases include but are not limited to: requests by the public for a public hearing, controversy about the project or expiry of the period stipulated for receipt of comments.

3 THE WORLD BANK'S SAFEGUARD POLICIES

This section discusses the safeguard policies of the World Bank and their applicability. The World Bank's environmental and social safeguard policies are fundamental to its support to sustainable poverty reduction. These policies provide guidelines in the identification, preparation and implementation of programs and projects funded by or supported by the Bank.

The safeguard policies provide the opportunity for building ownership among local populations for programs and projects that are being implemented; they have often set the platform for the participation of stakeholders in project design. The World Bank's Safeguard policies include:

1. Environmental Assessment (OP4.01, BP 4.01, GP 4.01)
2. Natural Habitats (OP 4.04, BP 4.04, GP 4.04)
3. Forestry (OP 4.36, GP 4.36)
4. Pest Management (OP 4.09)
5. Physical Cultural Resources (OP 4.11)
6. Indigenous Peoples (OP 4.10)
7. Involuntary Resettlement (OP/BP 4.12)
8. Safety of Dams (OP 4.37, BP 4.37)
9. Projects on International Waters (OP 7.50, BP 7.50, GP 7.50)
10. Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)

The fact that the project is expected to have a nationwide geographic coverage, several of the Bank's policies may apply. Considering the type and nature of the many projects proposed, the baseline data presented in Section 2, and the requirements of the Bank's safeguard policies, the following Bank's policies are most likely to be triggered by the activities associated with the implementation of LESEP, LACEEP and LACEEP AF:

1. OP 4.01 Environmental Assessment
2. OP 4.11 Physical Cultural Resources
3. OP 4.12 Involuntary Resettlement

Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)

This policy requires environmental assessment (EA) of projects proposed for World Bank financing to ensure that these projects are environmentally sound and sustainable, and that decision-making is improved through appropriate environmental screening, analysis of actions and mitigation of their likely environmental impacts and monitoring.

This policy is triggered if a project is likely to have potential adverse environmental and social impacts in its area of influence. As a result, the EA process usually takes into account parameters related to natural environment (air, water, and land), human health and safety, social aspects (involuntary resettlement, indigenous people, and cultural properties) and transboundary and global environmental aspects.

The construction and rehabilitation of various types of sub stations and distribution lines are likely to have some adverse environmental and social impacts. However, the locations of these sub projects are not identified yet. Therefore, the EA requires that an Environmental and Social Management Framework is established.

As a condition for the Bank appraisal of the power sector project, the policy obligates the Bank and Government of Liberia to disclose the ESMF report as a separate and stand alone document. The disclosure must precede the appraisal of the project. The disclosure should also be both in Liberia at a location accessed by the general public and local communities, and at the Infoshop of the World Bank.

Physical Cultural Resources OP 4.11

Cultural property includes sites having archaeological (prehistoric), palaentological historical, religious and unique natural values. The Bank will normally decline to finance a sub project that will significantly damage non-replicable cultural property, and will assist only those sub projects that are sited or designed so as to prevent such damage.

It is not anticipated that the World Bank projects will adversely affect sites having archeological, paleontological, historical, religious, or unique natural values as defined under the OP 4.11. However, a screening mechanism is proposed to ensure that any such sites are identified and avoided or impacts are mitigated, in line with the cultural resources policy. Awareness of possible chance finds will be raised among the public, the project contractors and operators, and chance-find procedures will be included in construction contracts.

Involuntary Resettlement (OP/BP 4.12)

The objective of this policy is to avoid and minimize involuntary resettlement, and ensure that the displaced populations are compensated by improving their former living standards. The involuntary resettlement is an integral part of project design and should be dealt with at the earliest stages of the project preparation. It encourages community participation in planning and implementing resettlement and in providing assistance to affected people, regardless of the legality of the title of land. This policy is triggered not only if physical relocation occurs, but also by any loss of land resulting in: relocation or loss of shelter; loss of assets or access to assets; loss of income sources or means of livelihood, whether or not the affected people must move to another location.

The Resettlement Policy Framework (RPF) was prepared and is being updated in compliance with OP 4.12. The RPF outlines the principles and procedures to be applied in the event that any World Bank funded projects/subprojects involve land acquisition and thus require the mitigation of potential adverse social impacts. The OP 4.12 is not usually triggered because people are being affected by physical displacement; it is triggered because the program activity causes land acquisition, whereby a physical piece of land is needed and people may be affected because they are cultivating on that land, they may have buildings on the land, they may be using the land for water and grazing of animals or they may otherwise access the land economically, spiritually or any other way which may not be possible during and after the sub project is implemented. Therefore, people are in most cases compensated for their loss (of land, property or access) whether in kind or in cash or both. Where there is land acquisition, impact on assets, and/or loss of livelihood, the RPF guidelines must be followed and a RAP completed prior to sub-project implementation.

In order to ensure that the displacement or restriction of access does not occur before necessary measures for resettlement and compensation are in place, the policy also requires that the resettlement plan is implemented before the start of the construction. The taking of land and related assets may take place only after compensation has been paid, and where applicable, resettlement site, new homes, related infrastructure and moving allowances have been provided to displaced persons. All displaced persons should benefit from the resettlement policy regardless of the total number affected, the severity of the impact and

whether or not they have legal title to the land. Special attention should be given to the needs of the vulnerable groups among those displaced.

OP 4.12 also requires the RPF to be disclosed both in Liberia and at the infoshop of the Bank before appraisal. Where there are differences between the Laws of Liberia and the Bank OP4.12, the latter must take precedence if the Bank is to fund this project.

Table 3-1: Summary of Bank Safeguard Policies Triggered By LESEP, LACEEP AND LACEEP AF Project Activities and Their Requirements.

Triggered Bank Safeguard Policy	*Triggered Policy Requirement*	*Party*	*Timeframe of Implementation Action*
OP 4.01: Environmental Assessment	• Preparation o ESMF • Preparation o ESIAs for sub projects	• LEC to prepare ESMF • Sub project sponsors to prepare ESIA	• ESMF to be approved by Bank and disclosed in Liberia and Bank Infoshop prior to program appraisal date. • Sub project ESIA's to be approved by EPA and disclosed in Liberia before license is granted.
OP 4.12: Involuntary Resettlement	• RPF preparation RAPs • Sub project preparation	• LEC to prepare RPF • RAPs by Sup project sponsors	• RPF to be approved by Bank &disclosed in Liberia & Bank Infoshop prior to program appraisal date. • Sub project RAPs to be approved by the respective District officials & disclosed in Liberia before lincense is granted by the

			Regulator.
OP 4.11: Physical Cultural Resources	Cultural property	ESMF by LEC In construction contracts	Before appraisal Before contract award

4 PROJECT DESCRIPTION

The fourteen year civil war destroyed much of the electricity generation plants in Liberia. The rehabilitation and restoration of the energy infrastructure is an original component of the Poverty Reduction Strategy (PRS) of the Government of Liberia. Originally, two major activities were proposed, Catalyzing New and Renewable Energy in Rural Liberia, which included plans for setting up the Rural and Renewable Energy Agency (RREA), and the Liberia Electricity Sector Enhancement Project (LESEP).

A third project was formulated to continue support to the development of the electricity sector in Liberia: The Liberia Accelerated Electricity Expansion Project (LACEEP) and is being extended to include LACEEP AF whose implementation activities are described in this updated ESMF.

The general development objectives of all these projects are to improve the quality and efficiency of the provision of electric service, and to establish a sustainable basis for access expansion.

The objective of the Liberia Electricity Sector Enhancement Project (LESEP) is to improve and increase access to electricity in Liberia.

The objective of the Liberia Accelerated Electricity Expansion Project (LACEEP) is to continue these activities, particularly the expansion of transmission and distribution networks, construction of facilities for off-loading, transport and storage of heavy fuel oil (HFO), and to ensure that there is a clear framework for observance of environmental and social safeguards during implementation of sub-projects. This operation will be managed by the Liberia Electricity Corporation (LEC) and financed by the World Bank.

Project activities under LACEEP are the following:

Component 1: Extension of electricity transmission and distribution systems *(estimated cost: US$ 20 million)*

This sub-component will provide access to electricity to about 18,000 new customers. The new customers will represent a diverse mix of residential users (from low to higher

income), small business, institutional consumers, and a few agro-industrial customers. Connecting businesses and institutions, whose demand is larger than that of residential users, will contribute to improving LEC's financial performance.

The scope of work under this component is based on the short-term investment program defined by MLME and LEC. In particular, the proposed project will finance the transmission and distribution investments for the corridor of Monrovia-Kakata and the investments for extending the services in Monrovia at the distribution level. The component is divided into three sub-components, as follows:

Sub-component 1-A. Extension of the transmission and distribution system to Kakata. The sub-component will finance (i) the construction of a 66 kV sub-transmission line between the Paynesville substation in Monrovia and the town of Kakata; (ii) the construction of a 66/22 kV substation in Kakata; and (iii) the construction of both 22 kV and low-voltage distribution lines, including the connections to new consumers along

the Monrovia-Kakata corridor and in the town of Kakata. The length of the 66-kV line from Paynesville Substation to Kakata is about 56km ; however, the length of the distribution system is yet to be determined.

Sub-component 1-B. Extension of the distribution system in Monrovia. This sub-component will finance the extension of electricity services within the service area of the management contractor. This will include the infrastructure for distribution lines from Paynesville and its surrounding in about nine communities, as well as the connection of 40 to 50 large customers in various parts of the city.

Sub-component 1-C. Technical assistance to support the implementation of the component. This includes the detailed design, safeguard documents, and other preparatory consultancies for the transmission and distribution investments. This also includes the hiring of consultants with financial and procurement expertise to strengthen the Project Implementation Team in LEC. Finally, the sub-component will finance the preparation of a transition plan for LEC at the end of the management contract in 2016 and transition arrangements including contracting selected experts for the remaining project implementation period. Identified in the transition plan. .

Component 2: Construction of facilities for off-loading, transport, and storage of heavy fuel oil (HFO) and support for optimization of HFO procurement *(estimated cost: US$ 11 million)*

This component supports the GoL's decision to replace current expensive diesel-based generation with less costly HFO-based thermal generation. There are both physical and commercial aspects to optimizing the supply of fuel. Firstly, more reliable HFO supply will require physical investments in HFO off-loading, transport and storage. Secondly, it requires improving HFO procurement practices.

This component supports both aspects of the process. On the physical side, the component finances the construction of offload, storage, and pumping HFO facilities from tanker ships, in order to minimize the unit price of freight. Construction of a large storage tank in Bushrod Island, on LEC's premises, and a 1.5 kilometer pipeline connecting the BMC pier of the China Union concession to the storage tank to will enable the GoL to buy in bulk at lower cost and store large quantities of HFO. On the commercial side, the component provides technical assistance to the government to optimize its procurement of fuel in the international markets and to define the most adequate fiscal regime for importing and selling HFO used in electricity generation for LEC.

This component is thus composed of the following activities:

Sub-component 2-A. Construction of HFO transport and storage facilities. This subcomponent will support: (i) construction (supply and installation) of a pump station to transport HFO to the storage tanks located at the Bushrod Island site; (ii) construction of a pipeline connecting the Bong Mining Company and the Bushrod Island HFO storage tanks; and (iii) construction of a new storage tank at the Bushrod Island site, with a

capacity of approximately 16,200 cubic meters, equivalent to the consumption of generating plants totaling 30MW at base load over a three month period (180 meter^3/day x 90 days).

Sub-component 2-B. Detailed design and supervision of HFO infrastructure investments. This sub-component will finance the consultancy services needed to prepare the component, such as the detailed engineering design, preparation of bidding documents, and the contract of the owner's engineer who will supervise construction works.

Sub-component 2-C. Technical assistance to the government for optimizing the procurement of HFO. The project will finance technical assistance to the government to (i) bid out the acquisition of HFO in international markets; and (ii) define a pricing regime for HFO used in electricity generation, and (iii) define a fiscal regime for HFO imports and sales.

Component: Support for the expansion of supply options and for the strengthening of the sector's institutional capacity *(estimated cost: US$ 4.00 million)****.***

This component will support the overall strengthening of MLMEs' institutional capacity to plan and implement electricity access programs. There are a number of important skills and competencies gaps already identified in the "Gap Analysis", carried out under the umbrella of Sustainable Energy for All. In particular, this component supports the government's decision to attract private investments into generation as a way of addressing the need for significant public funds to develop transmission and distribution. The nature of such specific transactions may include the independent power producers deals for lowest cost generation options defined in the LCPDP. This component also provides institutional support to MLME to strengthen its capacity to fulfill its core responsibilities and implement the project. It will include the following specific activities:

Sub-component 3-A. Technical assistance for several activities led by MLME, including support to attract private investment for electricity generation and studies needed for the medium-term development of supply options, notably in hydroelectricity. Activities under this component include an initial market sounding analysis to test the private interest for options outlined in the LCPDP and the support to MLME with the legal, technical, and commercial structuring of the transaction. This support will also include advice on the use of credit and risk mitigation mechanisms.

Sub-component 3-B. Project management. This will include the cost of managing the project, including the audit and the hiring of different experts such as a senior financial management expert and a senior procurement specialist. This subcomponent will also provide the resources needed based on the financial and procurement assessment of MLME to implement the components under its management. It will also finance the financial project audit.

Additional financing credit (AF) in the amount of US$ 60 million from IDA resources will be provided to the Republic of Liberia for the Liberia Accelerated Electricity Expansion Project (LACEEP, P133445).

The proposed AF would help finance the costs associated with *scaled-up activities to enhance the impact of a well-performing project*. The AF is requested by the Government of Liberia (GOL) to finance consulting services, works, goods and operating costs to: (1) scale up of the electrification component of the LACEEP by connecting new users (including commercial and industrial consumers) in the Greater Monrovia (Northwest) and Bomi corridor, which will also help the Government to deal with the impact and aftermath of the Ebola crisis; and (2) enhance support to strengthen sector institutional capacity under LACEEP by supporting the national electricity company Liberia Electricity Corporation (LEC) to improve its operational and financial performance and the long term sustainability.

Development objectives of LACEEP AF remain the same as those of LACEEP.

LACEEP AF components remain the same as in LACEEP. The scope of the two components will be expanded by including additional activities under each of them: the expansion of access to electricity (LACEEP's component 1) and the strengthening of the sector's institutions (LACEEP's component 3). As a result the cost of each of these components will increase.

LACEEP AF components are described in following sections.

Component 1: Extension of electricity transmission and distribution systems and connection of new users (US$53 million, IDA Credit):

Financing will help to increase access to electricity in the Northwest of the Greater Monrovia area, as the capital has the highest density of population as well as in Bomi and Grand Cape Mount Counties, a region with an important economic potential :

Component 1 will scale up to include financing the expansion of the electricity transmission and distribution system in Greater Monrovia to the Monrovia-Bomi corridor (US$53 million). The component will finance the provision of electricity services to new users (including industries) in high-density communities and other areas with key facilities (water treatment plant) in the Greater Monrovia. It will also expand access between Monrovia and Bomi Hills, a county with a significant economic potential. This expansion of the transmission and distribution network will support MLME's agenda to increase access to electricity country wide, and will support the GOL's efforts to promote economic and social recovery in the aftermath of the Ebola crisis.

To this end, the AF will finance the construction of a 66-kV transmission line and 33-kV and 22-kV distribution lines , upgrade of several substations, construction of new substations in Kle and Bomi Hills, and the connection of new customers. This expansion of the network will enable connecting 30,000 new customers in all categories, including 13 industrial plants in the areas served by the Gardnersville, Stockton Creek and Virginia Substations. The AF will also finance the construction of the main electricity transmission and distribution infrastructure of the Monrovia-Bomi corridor as well as the connection of approximately 6,800 customers in the economic zone of Bomi County. Those customers will include households, small businesses and several large businesses such as palm oil plantations and mines.

(i) ***Sub-component 1-A. Electrification of Greater Monrovia (North-West).*** The component will finance the provision of electricity services to new users (including industries) in various communities in the Greater Monrovia area. This will include the construction of new and rehabilitation of existing transmission and distribution networks (substations and lines). The additional financing will also enable connection of 30,000 new customers in all categories, including 13 industrial plants in the areas served by the Gardnersville, Stockton Creek and Virginia substations. This sub-component will also finance the necessary preparatory and safeguards studies, bid preparation and the costs of supervising the works.

The length of the 66-kV line from Paynesville Substation to Gardnersville Substation is about 4.6km ; Gardnersville to Stockton Creek, about 9.4km ; Stockton Creek to Bushrod, 3.1km and Bushrod to Virginia, 5.1km. The TL for

this corridor is approximately 22.2 km.

(ii) ***Sub-Component 1-B. Electrification of the Monrovia- Kle-Tubmanburg Corridor.*** This sub-component will finance the construction of the main electricity transmission and distribution infrastructure of the corridor as well as the connection of about 6,800 new users in the economic zone of Bomi County. Those customers will include households, small businesses and several large businesses such as large palm oil plantations and mines. This sub-component will enable access to cheaper electricity for the large consumers in the Monrovia-Bomi corridor that currently rely on their own expensive diesel generators[5]. LEC could therefore broaden its customer base by incorporating these medium and large users into its customers' portfolio, if the utility is able to provide reliable and good quality services. The electrification of the Monrovia-Bomi corridor is also expected to connect in the future a 10-15 MW hydropower plant (to be financed by the SREP program) to the national grid.

The length of the 66-kV line from Virginia Substation to Kle, Bomi County is approximately 46km ; from Kle to Robertsport, Grand Cape Mount County, about 71km ; Kle to Bo Waterside, Grand Cape Mount County, about 40km ; and from Kle to Tubmanburg, Bomi County, 23km. This represents a total of 180 km of new transmission line to be constructed.

(iii) ***Sub-Component 1-C Project Management.*** This sub-component will cover the cost of preparing, managing and auditing the project. It will include the financing of the necessary preparatory and safeguards studies, bid preparation and the costs of supervising the works. It will also provide the resources needed by LEC to manage and implement the components, based on the financial and procurement assessment of the utility.

Component 3: Support for the strengthening of LEC's commercial capacity (US$7 million):

This component will support LEC to strengthen commercial management and operations and build local capacity within the utility to ensure sustainability of the results.

(i) ***Sub-Component 3-A: Incorporation by LEC of modern management information systems.*** This sub-component will help LEC improve its operational performance in the key areas of commercial management and attention and resolution of incidents in electricity supply to its customers. This will be achieved through the incorporation of two state-of-art commercial information systems: a customer management system (CMS), and an incidents management system (IMS).

[5] This is because LEC is expected to shift towards a greater share of HFO-based thermal energy and also of more hydroelectricity, as the new HFO-based generation plants and Mt. Coffee become operational in the coming two to three years.

(ii) ***Sub-Component 3-B: Technical assistance to LEC.*** This technical assistance will help to build local management capacity within LEC at the medium and top levels to ensure the sustainability of its operations once the management contract ends. In particular, it will support the appointment of young Liberian professionals to form the counterpart teams of the contractors that will implement the CMS and IMS and become in the future the members of a new management team that will run LEC with efficiency, transparency and accountability using those tools.

Greater Monrovia (North-West) Project

The project will entail the re-configuration or modification of the existing Bushrod sub-yard, which is operated as a step-up substation whose current installed transformer capacity of 40 MVA will be augmented by another 40 MVA. At present there are two circuits radiating from the existing 22-kV bus supplying power to the Bushrod Island area. The existing arrangement is not reliable because faults on the 22-kV distribution lines may shut down the whole generation station or result in total system blackout.

To enhance the reliability of the system, LEC intends to utilize this substation as a step-up switchyard or substation only and transform the Stockton Creek switching station into a full substation (66/22-kV Stockton Creek Substation) to connect customers of all categories on Bushrod Island including CEMENCO, Flour Mill, Monrovia Breweries, Inc., the National Port Authority and Sethi Brothers industrial complex.

The Gardnersville Substation will be rehabilitated and a distribution network constructed along the Somalia Drive to connect customers in Paynesville up to the Pipeline Road and S. K. D. Boulevard as well as in Barnersville, New Georgia, Caldwell, Johnsonville, Peace Island, Nikley Town, Nizoe, Jacob Town, St. Francis Chicken Farm, Lone Star Gas Station, Amegashie, Black Jinna, Bassa Town and Borbor Island.

Virginia Substation is where Greater Monrovia ends. This substation will be rehabilitated and a distribution network will be constructed to connect customers in the Virginia zone including Hotel Africa, Brewerville, Virginia, Clay Ashland, Arthington, Millsburg and communities on both sides of the Po River.

Under this arrangement the project stands to connect a total of 18,134 in Greater Monrovia (North West)

BOMI Corridor Project

The LEC intends to extend the transmission network in the Western Region of Liberia with substations in Kle, Tubmanburg, Robertsport and Bo Waterside. This corridor covers one of the economic zones of the country. Upon implementation of the project, the Agriculture (Palm Oil) Concession area of Sime Darby will be connected to the LEC grid at 33 kV. The construction of a 66-kV transmission line to Tubmanburg is necessary because the load center is situated there. This will also enable the extension of the 33-kV distribution network to Bopolu, Gbarpolu County.

A study for the selection of the optimum line route and substation sites will be required for this project. The necessary ESIA and RAP studies will be conducted. Feasibility studies, engineering design and bid document preparation for the project will be required. The cost of this project is estimated at **59,200,000.00USD. See Appendix I.**

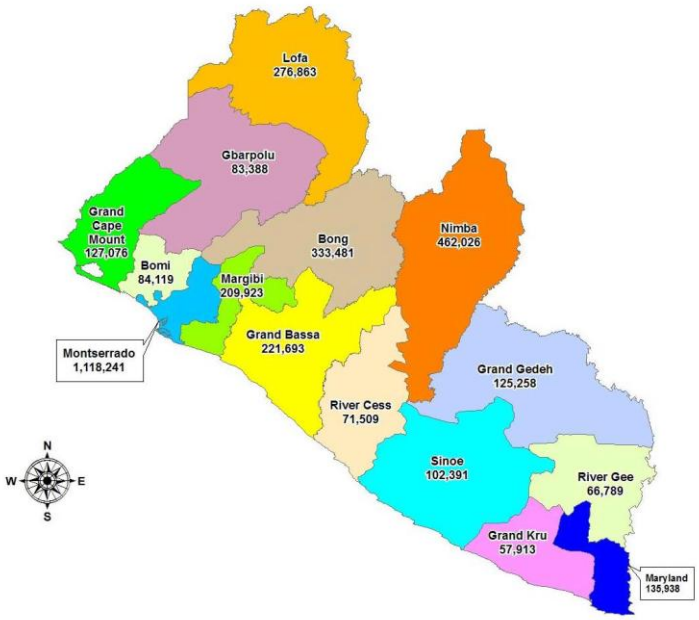
Distribution and Customer Connections

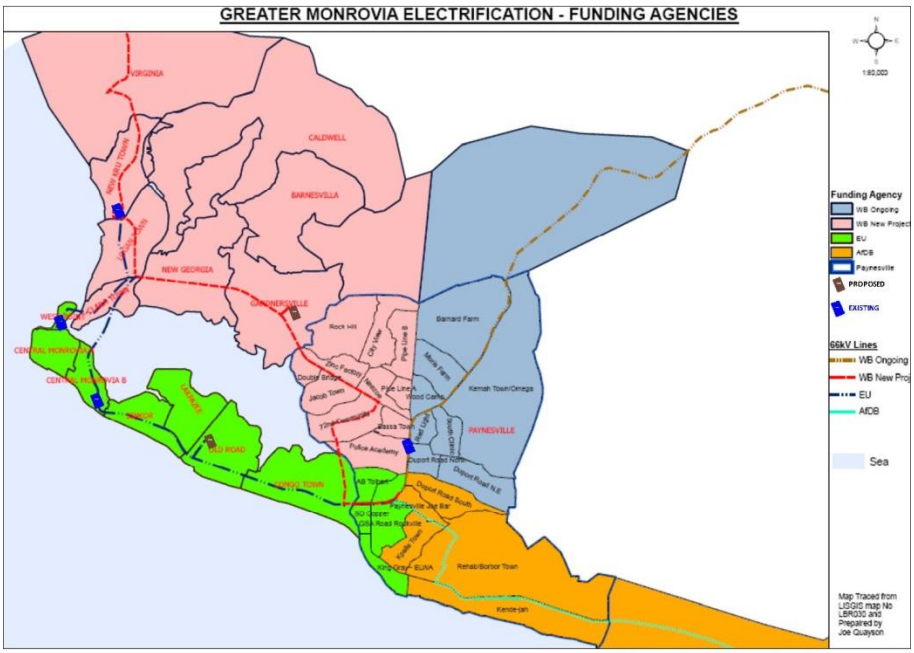
Under this arrangement, the project is envisaged to connect a total of 12,475 customers along the Bomi Corridor.

The total number of customers to be connected under LACEEP AF will be 30,609 customers

Project Location

The economic corridor between Monrovia and Kakata goes through Montserrado and Margibi counties. LACEEP AF will be implemented in Greater Monrovia located in Montserrado County and in Bomi and Grand Cape Mount Counties. The following paragraphs describe the general socio-economic profile in these counties. The subsequent RAP will contain a detailed socio-economic baseline of the affected people. The likely categories of people affected by the project through potential land acquisition and/or loss of assets such as trees or crops are either small-scale farmers engaging in subsistence agriculture or persons with family-owned rubber plantations.





Montserrado County

Montserrado County is one of the smallest counties in the country. The greater Monrovia area does not fall under its political jurisdiction, although it is geographically within the county. Without counting the population of greater Monrovia, Montserrado has about 145,000 inhabitants while greater Monrovia has 970,000 people. Montserrado County is the most densely packed county, where the population density is over 1,500 persons per square

mile. This can be much higher in Monrovia and its environs. Both Montserrado and greater Monrovia are considered highly diverse and representative of the ethnic composition of the country in general. Dominant religion is Christianity (68%), while Muslims are second largest group (32%).

Rural areas:

In terms of livelihoods, the population outside of the urban areas is mostly engaged in subsistence agriculture, with main products being cassava, rice, and vegetables. Rural areas lack adequate health care services and access to sanitation infrastructure. Piped water is very rare and although there are water pumps, these are often poorly maintained, which can lead to water-borne diseases. School facilities in the rural areas do exist, but for many children the distance can be difficult to overcome. Difficulty of getting qualified teachers to settle in remote areas continues to be a challenge. In general, the literacy rate is around 56% but in Montserrado county, the rate is much higher at 70%, due to the fact that Monrovia has several educational institutions, including the University of Liberia.

Urban areas:

In the greater Monrovia area, the livelihood sources are more varied than solely depending on subsistence agriculture. People have small scale businesses, and salaried employment in addition to agricultural activities and selling produce in the markets. A large part of the population in urban Montserrado County is engaged in trade activities and Greater Monrovia is the center of the country's industrial and commercial activities.

Margibi County

Margibi County has a total population of 240,996 based on the census of 2008; with 53% women. Kakata, which is one of the four districts in Margibi, has approximately 33 945 inhabitants. Kakata is a meeting point between urban and rural Liberia: many of Kakata's inhabitants either travel to Monrovia to bring goods to Kakata to sell, or travel to the rural areas, to bring produce back to Kakata to sell. The city is surrounded by small rubber plantations. The Firestone Rubber Plantation is nearby. The ethnic composition in Margibi is dominantly Bassa (48%), followed by Kpelle (44%). Roughly 90% of inhabitants are Christians while the remaining 10% are either Muslims or Animists.

In terms of livelihoods, agriculture and in particular subsistence farming is dominant in the rural areas. Small-scale farming is the most common form of livelihood found in the area.

Food crops production is not as widespread as elsewhere in Liberia. Agricultural production is mainly focused on cassava, rice and corn. Commercial or cash crops include rubber, cocoa, coconuts, sugarcane and pineapple, plantains/bananas, palm and cola nuts. Livestock is usually goats and poultry. Agriculture is considered to be a major potential source of economic revitalization and poverty alleviation in the county. However, there are some constraints. Biggest issue is the lack of capital for purchasing the missing inputs necessary for increased production. Lack of access to credit hampers farmers from increasing their potential.

Health services in the county are provided by two government hospitals, one in Kakata and another in Marshall city. These facilities however suffer from lack of equipment and are in need of renovation. These problems are alleviated somewhat by the Firestone rubber plantation's medical facilities which are open to the surrounding communities. Various smaller clinics also exist in the county.

Access to public infrastructure such as water, energy and sanitation is not well developed in Margibi. Many public institutions rely on their own generators for electricity. Prior to the war, most parts of Margibi county had functioning water and sewage systems but these were destroyed or broke down.

Education facilities include upper secondary schools, high school, university college, teacher training institute, vocational/technical schools and among others. The Firestone school system caters to over 15,000 children within the rubber plantation concession area. However, despite these well-developed facilities, children in more remote areas of Margibi still lack access to schools because of bad road conditions, damaged facilities and lack of qualified teachers.

The Bomi Corridor

The topography of the Bomi corridor is similar to that of the Paynesville-Kakata corridor, which is relatively flat within the coastal belt with many rolling hills beyond that belt. Most of the economic activities along the Monrovia-Tubmanburg and Monrovia-Bo Waterside Highway involve the cultivation of food and tree crops including vegetables, rice, cassava, citrus and rubber trees. A major Malaysian oil palm and rubber plantation, Sime darby, is located along the Kle-Madina section of the Monrovia-Bo Waterside Highway. Many persons in this corridor earn their livelihood by producing and selling charcoal.

Bomi County

Bomi County's capital is Tubmanburg. The town is populated predominantly by the Gola ethnic group, which hails from Bomi County. The town also has a significant Mandingo and Vai population. One of the Ebola treatment centers was built in Tubmanburg. Overall, the four largest ethnic groups in the county are the Gola, Vai, Kpelle and Mandingo, although all sixteen of Liberia's main ethnic groups (Dey, Belle, Gola, Gio, Vai, Kpelle, Mende, Bassa, Gbee, Grebo, Kru, Krahn, Mandingo, Sapo, Lorma, Kissi and Gbandi) are thought to be represented. The Golas are in the majority, followed closely by the Vai and the Kpelle, who are mainly settled in the boundary region between Bomi and Gbarpolu. The Mandingos are found inr various clans. The religion of Bomi County can be roughly sub-divided into two groups: Christians, estimated at 40% of the population, and Muslims, estimated at 60%.

In terms of livelihoods, before the civil war, Bomi was essentially an agricultural zone, with 70% of the population actively engaged in subsistence agriculture and related activities. It is estimated that rice, the staple food crop, was grown by 20% of households, while cassava and sweet potatoes/eddoes were produced by 60% and 3% respectively. About 3% of households produced corn, while 5% produced vegetables. Despite the county's great potential for agricultural production, the recent Comprehensive Food Security and Nutrition Survey points out that Bomi as one of the counties with the highest vulnerability to food insecurity and chronic child malnutrition. Majority of the crops grown in the county include rubber, oil palm plantains, vegetables, cassava etc.

Regarding basic services, the status of the health care sector was poor even prior to the Ebola outbreak: there was no proper pharmacy and only seven medicine stores to serve the entire County. There is no grid electricity power anywhere in Bomi County. The very few consumers with access to electricity are serviced by small private generators.

The 2008 National and Population and Housing Census (2008 NPHC) Report contains a number of interesting socio-economic statistics, which need to be projected to reflect today's situation in the county. Of 20,508 households in 2008, 5280 used streams for drinking and 7946 used piped/outdoor pump water. As regards lighting, 4649 used candle, 5848 used kerosene, while 7945 used palm oil lamps and only 325 had access to electricity. In respect of cooking fuel, 16060 used wood and 3445 used charcoal while about 800 could afford electricity, gas and kerosene.

Grand Cape Mount County

Robertsport, at 50km of Monrovia, is the capital of this county, which has five districts in the northwestern part of Liberia. The inhabitants are mostly fishermen and rice farmers.

The five major ethnic groups in the County are the Vai, Gola, Mende, Mandingo and Kissi. Other minority ethnic groups include Bassa, Gbandi, Grebo, Kru, Lorma, Kpelle and Mano. The Vai vernacular is widely spoken, followed by the Gola, with percentage distributions of 60% and 23% respectively. Mende, Mandingo and Kissi languages are also spoken by sizeable minorities. The two main religions in the County are Islam and Christianity. It is estimated that 70% of the population in Cape Mount are Muslims, while 25% are Christians and a smaller minority are practitioners of traditional religions. The relationship between the two major religious communities is largely harmonious.

In terms of livelihoods, most of the rural households in the county are engaged in agricultural activities at subsistence level. Farmers cultivate various crops including oil palm, rubber, cocoa and coffee and food crops such as rice, cassava, yam sand vegetables including pepper, bitter ball, okra, potato leaves, cabbages and others.

Agricultural production remains low due to limited access to extension services, traditional methods of farming, late supply of seeds, lack of capital and credit, lack of tools and other farm inputs. Besides agriculture, fishing is another means of survival in the county. According to statistics about 11% of households were engaged in Ocean fishing, while 15% fished in rivers, 81% in creeks and 2% in swamps. However, the fishing industry remains underdeveloped. Fishing provides employment to about 30 per cent of the population of Robertsport and its environs. Currently most fishing is carried out by the Fanti and Kru people who have trained many local youth. However, lack of cold storage facilities, coupled with a lack of capital continues to constrain growth in the sector. There is a need to organize fishing cooperatives and provide inputs to local fishermen to engage in commercial fishing as well as smoking and cooling.

Regarding basic services**,** there is one hospital (the St. Timothy Government Hospital) located in Robertsport and some 32 functional health facilities-30 clinics, one health center and one health post. This situation and information may have changed because of the Ebola outbreak. The African Humanitarian Agency (AHA), the Medical Teams International (MTI) and International Medical Corps are playing a pivotal role in supporting the health section. Only 20% of the communities in the county have access to clean water facility. The poor water and sanitation problem has contributed immensely to the poor health of the inhabitants. Only about 35% of the pre-war wells and hand pumps have been rehabilitated to date which is inadequate. There are about 124 functional educational facilities in Grand Cape Mount County. Of this number, 107 are elementary schools, 14 are junior highs and three are senior high schools.

Of 23,950 households in 2008, 8705 used streams for drinking and 6051 used piped/outdoor pump water. As regards lighting, 3366 used candle, 11941 used kerosene, while 5482 used

palm oil lamps and only 352 had access to electricity. In respect of cooking fuel, 19701 used wood and 2741 used charcoal while about 1200 could afford electricity, gas and kerosene.

5 ENVIRONMENTAL IMPACT ASSESSMENT AND ANALYSIS

This chapter identifies the potential environmental and social impacts that may arise from several alternative activities applicable in the Liberian context for the purpose of electricity generation, with particular attention being paid to expansion of distribution networks, as well as offloading, transport and storage of heavy fuel oil (HFO).

The reform of the electricity sector in Liberia started with a phase of rehabilitation and construction intended to repair the massive damage inflicted by the civil war to the existing power supply structures, and to expand the existing facilities and auxiliary infrastructure based on the most viable alternative in the rural and urban contexts, respectively.

5.1 GENERAL CONSTRUCTION AND/OR REHABILITATION ACTIVITIES

Below is a discussion of the impacts associated with the rehabilitation and construction phases. The latter impacts are generally consistent for all power generation, power distribution, and fuel supply and storage activities due to the similarity of the works involved. Activity-specific impacts are also outlined whenever applicable. Due to the localized and temporary nature of construction works, fast recovery is likely to take place especially if the project is small or if field activities are accomplished in stages, where only small parcels are disturbed at a time. Most of the project activities will be using existing RoWs and supporting infrastructure. In some cases new works will be undertaken, but on established sites or RoWs.

5.1.1 Air Emissions

Construction and rehabilitation activities are usually associated with the release of fugitive particulate matter (PM) generated from land clearing, excavation and movement of earth materials, cut and fill operations, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. The use of construction equipments and power generators is expected to release exhaust related pollutants such as carbon monoxide (CO), nitrogen oxides (NOx), sulfur oxides (SOx), particulate matter (PM) and hydrocarbons (HCs). The cleaning and rehabilitation of fuel oil tanks in oil supply facilities may generate volatile organic compound (VOC) emissions. Air emissions during the rehabilitation and construction phases tend to be confined to the immediate vicinity of the rehabilitation or construction site.

5.1.2 Noise

During construction and rehabilitation activities, noise may be caused by the operation of pile drivers and demolition machines, earth moving and excavation equipment, generators, concrete mixers, cranes as well as fuel oil tank erection and pipe laying works. In-stream foundations for hydropower projects may involve underwater detonations from blasting.

The increased noise level will impact construction workers and nearby residential areas. Nevertheless, the latter impact will be limited to the works' implementation phase and will cease when the works are complete. Table 5-1 shows typical noise levels encountered during construction activities.

Table 5-1: Noise levels during rehabilitation and construction works.

Equipment	*Typical maximum noise level at 15 m (dBA)*	*World Bank Guideline for acceptable noise leve*[6]
Concrete pouring trucks	87	Residential / Institutional / Educational Daytime: 55 dBA Nighttime: 45 dBA Industrial / Commercial Daytime and nighttime: 70 dBA
Cranes	86	
Air compressors	89	
Excavation equipment	90	
Welders	73	
Diesel locomotives	97	
Dump trucks	87	

5.1.3 Solid Waste

Large amounts of waste materials including cleared solid waste debris, backfill earthwork and other construction wastes will be generated during the rehabilitation and construction period. If the piling and transportation of these waste materials are not managed properly, they will block the traffic and contaminate the environment. Long term random piling may also deteriorate the air quality due to the flying dust and could result in respiratory problems to the people living in proximal areas. Used lubricants, paints, oils and other chemicals may also pose risks if improperly handled and / or disposed including soil and groundwater contamination and health and safety hazards.

Rehabilitation of power generation facilities will generate wastes loaded with polychlorinated biphenyls (PCBs). PCBs are a mixture of chlorine substituted biphenyl compounds used in transformers and capacitors of the power industry due to their thermal stability,

[6] Source: World Bank, 2007; General EHS Guidelines.

inflammability and excellent dielectric properties. PCBs contain impurities with reported toxic effects such as polychlorinated dibenzofurans and chlorinated napthalenes. Commercial preparations used in the electricity industry contain approximately 65% PCBs and 35% polychlorinated benzenes. PCBs are reported to cause mutation in plants, decline in some bird populations and reduced reproduction in sea mammals. Potential health effects in human beings exposed repeatedly to PCBs for prolonged hours include skin and eye irritation, liver damage, reduced immune response, reduced fertility and cancer. There is however less evidence available for low level exposure on human health. Certain PCBs have been associated with dioxin like toxicity and increased carcinogenicity.

On the other hand, rehabilitation of fuel storage facilities may involve the removal of contaminated soils around fuel dispensers, piping, and tanks. Depending on the type and concentration of contaminants present, the latter soils may need to be managed as hazardous wastes. In addition, bulky, inert and contaminated solid waste items are likely to be generated during the rehabilitation of fuel storage facilities such as damaged tanks and sunken barges. The latter wastes may constitute an environmental burden if improperly managed.

5.1.4 Water Quality

Surface water pollution may result from uncontrolled discharges into rivers or seawater, accidental spills of oil, runoff, erosion, and sediment transport. The latter impact is particularly significant when rehabilitation and / or construction activities occur within or in close proximity to surface water such as in the case of the construction of hydropower structures or the rehabilitation and / or construction of heavy fuel oil supply facilities on the coastal strip. Polluted water flowing into surface water bodies could impact the aquatic organisms and affect the quality of life of downstream users when river waters are involved. Groundwater contamination may occur from percolation of oil and lubricants in soil. Nevertheless, waters disturbed by rehabilitation and construction activities are likely to recover when sediment is controlled and natural processes are permitted to replenish stream life.

5.1.5 Soil

During construction activities, soil erosion may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. Improper grading of plant and sub-station sites and tower locations may also cause drainage and erosion problems. The resulting soil particles may be transported into surface drainage networks affecting thus the quality of natural water systems and ultimately the biological systems using the waters. Water may accumulate in excavated pits potentially leading to the breeding of insects and other infectious organisms. Accidental spill of oil or lubricant may infiltrate soil and enter surface or groundwater.

5.1.6 Flora and Fauna

Stream pollution by sediments from rehabilitation and construction activities often consists of suspended and settlable solid particles that may coat, bury, suffocate or abrade living organisms such as eggs, larvae, fish, etc. Many aquatic invertebrates and fish may undergo changes in population density and community composition if high concentrations of suspended solids are encountered. Aquatic vegetation may be adversely affected by a reduction in photosynthesis due to high turbidity. Dredging may also increase turbidity and sediment load and reintroduce into suspension bottom sludge trapping toxic precipitates. The toxic sludge may be ingested or concentrated in marine plant and animal species and biologically magnified in food chains. Detonations from blasting for in-stream foundation excavations may produce underwater shock waves potentially injuring or killing fish in sphere of influence.

The installation of power transmission lines and towers in forest areas necessitates the clearing of tall trees of 4.5 m or more within the rights-of-way to prevent power outages through contact of branches with transmission lines and towers, ignition of forest fires, corrosion of steel equipment, blocking of equipment access and interference with critical grounding equipment. The construction of power generation facilities and sub-stations also requires the clearing of trees and vegetation. Therefore, construction activities may result in loss of forests and plant cover, disturbance and loss of fauna habitats, weakening and degradation of soils, disturbance of the natural landscape and morphology. Thus, the adequate selection of the location of a facility or the right of way of transmission/ distribution lines can significantly reduce impacts on biodiversity.

5.1.7 Traffic

The main impact on road traffic will be during clearing of solid waste debris and excavation of soil for construction. Longitudinal excavation will cause narrowing of the road, while the lateral crossing of roads may block them completely.

5.1.8 Health and Safety

Safety issues may arise during the rehabilitation and construction phases if community's access to works' site is not controlled. People may be injured by construction machinery or may fall in open trenches. The rehabilitation and / or construction of fuel supply facilities are associated with the risk of release of flammable material due to accidental damages to the fuel tanks from works-induced landslide or collapse of tall structures such as cranes, and broken pipelines from works-induced vibration.

5.1.9 Socio-Economics

Although the rehabilitation and construction phase will generate several short term job opportunities for the local people, negative implications on the socio-economics will prevail and will be related to potential loss of land or land use, interruptions to means of livelihood, disturbances to cultural resources, and influx of workers.

The installation of power transmission lines and towers in agricultural lands during harvest period may cause a temporary damage to the cultivated crops. The construction of solar and thermal power stations and electricity transmission sub-stations may necessitate the acquisition of lands and is therefore potentially associated with social problems such as the loss of houses and structures on the land, loss of access to common resources and facilities, and the potential change in the livelihoods of the communities who lived on the land or used it for cultivation.

5.1.10 Physical Cultural Resources

Improperly sited projects can damage physical cultural resources and diminish its value. Moreover, unregulated and careless excavation works may destroy potential buried archeological remains. Damage to physical cultural resources constitutes a threat to social cohesion and eliminates the potential for its use in tourism. If properly planned and sited, developments related to the power generation and distribution components will have no impact on the country's physical cultural resources.

5.2 POWER TRANSMISSION AND DISTRIBUTION

The electricity power transmission system includes the transmission line, its right of way (ROW), switchyards, sub-stations and access or maintenance roads. The principal structures of the transmission line include the line itself, conductors, towers and supports etc. The width of the ROW ranges from 12 to 100 meters depending on voltage. Below are the major environmental and social impacts associated with the operation of power transmission and distribution structures.

5.2.1 Land Resources

Electric power transmission systems have a great impact on land resources. Although ROWs are generally not very wide, they can interfere with, or fragment, existing land uses along the ROW particularly if a strip of around 3 meters should be kept clear for maintenance purposes. Further, transmission lines can open up more remote lands to human activities such as settlement, agriculture, hunting, recreation etc. These effects can be significant if natural areas such as wetlands or wild lands are in the project area.

On the other hand, land contamination by oil leakages through the joints of sub-station transformers may occur due to defective packing and improper tightening.

5.2.2 Noise

Unusual noise from transformers may occur due to loss of core-bolts, core plates, coil clamps, loose external fittings and mechanical forces due to short circuits.

5.2.3 Fauna and Flora

Clearing of vegetation from ROWs using broadcast aerial spraying of herbicides affords no selectivity and releases unnecessarily large amount of chemicals into the environment that may potentially lead to the elimination of desirable species and direct poisoning of wild life. However, properly managed ROWs can provide feeding and resting sites for birds and mammals. Power lines and structures can serve as nesting sites and perches for many birds. On the other hand, avian collisions with power lines can occur in large numbers if located within daily flyways or migration corridors, or if groups are traveling at night or during low light conditions (e.g. dense fog).

5.2.4 Health and Safety

The use of broadcast aerial spraying of herbicides for the purpose of ROW clearing may result in the contamination of surface waters and terrestrial food chains. Placement of lines near human activity increases the risk for electrocution. Additionally, the electric power transmission lines create electromagnetic fields (EMF) which may pose health hazards depending on the lines' voltage strength. However, power frequency EMF typically has a frequency in the range of 50 – 60 Hertz (Hz), and is considered Extremely Low Frequency (ELF). Although there is public and scientific concern over the potential health effects associated with exposure to EMF, there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment. However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern (World Bank 2007d). Fire hazards may also occur due to ignition of insulating oil in the oil filled switchgears and transformer units. Unchecked growth of tall trees and accumulation of vegetation within ROWs may also result in the ignition of forest fires.

5.2.5 Aircraft Safety

Power transmission towers can impact aircraft safety directly through collision or indirectly through radar interference.

5.2.6 Socio-Economics

When a power line passes parallel to telecommunication lines, electrical interferences are caused to telecom lines due to electromagnetic inductions. Besides, the installation and operation of power transmission and distribution structures may result in the depreciation of the price of immediately adjacent lands and properties. Nevertheless, the increased availability of power supply in areas facing previously electricity shortage and / or absence of supply will open up the latter areas for new settlements and economic developments and improve the standard of living and well-being of their residents.

The safeguard studies required for the construction activities of LACEEP AF, particularly those associated with the 66-kV line, 66/22-kV substations and 66/33-kV substations are environmental and social impact assessment (ESIA) and resettlement action plan (RAP). The scoping sessions with affected and interested parties will identify and select the most significant issues to be considered in the safeguard studies. The estimated cost of the ESIA is

150,000.00USD and that of the RAP is 150,000.00USD, subject to negotiation with the hired consultants to prepare the safeguard studies. These costs are expected to be defrayed from Component 1-C of LACEEP AF.

5.3 OPERATION OF FUEL OIL STORAGE TERMINALS

Fuel oil storage terminals are designed to receive and dispatch large shipments of fuel oil. They are often located at the sea coast although some facilities in this project may also be situated inland and along watercourses. Following are the key environmental and social issues potentially arising from the operation of such terminals, which include oil pipelines and storage tanks.

5.3.1 Air Quality

Emissions of VOCs may result from fuel oil storage facilities and are related to three types of losses including storage, working and fugitive losses. Storage losses are evaporative losses resulting from changes in temperature and pressure causing vapor to be forced out of the tank through vents. Working losses are those resulting from operational activities such as filling, withdrawal, additive blending, and loading / unloading of transport links. Fugitive losses are due to leaks from seals, flanges, and other types of equipment connections. VOCs such as styrene and limonene may react with nitrogen oxides or with ozone to produce new oxidation products and secondary aerosols, which contribute to smog formation and may cause sensory irritation symptoms and respiratory symptoms in humans.

5.3.2 Solid Waste

Wastes generated at terminals may include tank bottom sludge as well as spill cleanup materials and soils contaminated with oil. Typically, sludge is composed of water, hydrocarbons, and various solids including sand, scale and rust and may pose ecological problems if improperly managed.

5.3.3 Water Quality

Process wastewater consists mainly of tank bottom draining and contaminated storm water runoff, including water from tank leaks and spills that collects in hydrocarbon contaminated

secondary containment areas. Other possible sources of wastewater include oil contaminated water from washing tanker trucks and railcars, and wastewater from vapor recovery processes.

Depending on the type and quality of fuel product stored at the terminal, effluents from tank bottom water, storm water, and other sources may contain separate phase and dissolved petroleum hydrocarbons such as benzene, toluene, ethylbenzene, and xylene (BTEX) and oxygenates (e.g. MTBE). Wastewater may also contain caustics, ammonia, metals and phenols, in addition to common wastewater contaminants including total suspended solids (TSS), and Fecal Coliforms. The release of the latter constituents into the environment can impact surface and groundwater quality and surrounding marine environment if not treated properly prior to disposal.

5.3.4 Spills and Leakages

The storage and transfer of liquid materials in crude oil and petroleum product terminals creates the potential for leaks or accidental releases inland or in the marine environment from tanks, pipes, hoses, and pumps during loading and unloading of products. Examples of accidental oil spills involve vessels that come in distress or collide, oil well blowouts, pipeline ruptures, and explosions at storage facilities. Hydrocarbons entering the ecosystem through spills may eliminate vegetation due to their phytotoxic properties, and can become dangerous especially if they enter the food-chain since several of the more persistent compounds like polycyclic aromatic hydrocarbons are carcinogenic. Biological effects of oil spills on aquatic organisms include acute toxicity (lethal, sublethal, immediate effects), chronic toxicity (delayed effects), bioaccumulation (in mollusks like mussels) and tainting of seafood. The ability of animal and plant populations to recover varies among organisms. While abundant organisms with highly mobile young stages which are produced regularly in large numbers may repopulate a cleaned-up area rapidly, slow maturing, long-lived species with low reproductive rates may take many years to recover their numbers and age structure. Examples for the latter group are seals, otters, reptiles (turtles), whales and dolphins and some cold water fish. In general, the rate of recovery in tropical or regions is relatively fast due to the warm temperatures enhancing oil biodegradation and subsequent attenuation. The storage and transfer of fuel oil also poses a risk of fire and explosion due to its flammable and combustible nature.

5.3.5 Occupational Health and Safety

Chemical hazards may result from the dermal contact with fuels and inhalation of fuel vapors during fuel loading and unloading. Fire and explosion hazards at crude oil and petroleum product terminals may result from the presence of combustible gases and liquids, oxygen, and ignition sources during loading and unloading activities, and / or leaks and spills of flammable products. Possible ignition sources include sparks associated with the buildup of static electricity, lightning, and open flames. Other workspace hazards may result from unregulated access to confined spaces such as storage tanks, secondary containment areas, and storm water / wastewater management infrastructure.

5.3.6 Community Health and Safety

Community health and safety issues associated with the operation of terminal facilities may include potential exposure to spills, fires, and explosions. Road, rail, or water transport activities associated with fuel delivery and distribution also constitute a potential source of chemical hazard to the public. Adequate design and sound management of storage terminals are key considerations for the reduction of the probability of large magnitude accidental events.

5.4 SUMMARY OF IMPACTS

Table 5-2 presents a summary of the significance and frequency of occurrence of potential environmental and social impacts arising from the implementation of several power supply alternatives. The table clearly shows that different alternatives have distinct impacts, with renewable energy schemes and natural gas or biomass -fired power plants appearing to be particularly benign from an environmental and socio-economic perspective.

Table 5-2: Summary of positive and negative impacts of alternative activities for power generation in Liberia

Activity \ Emissions / Receptors	Impact significance and frequency of occurrence															
	Air emissions	Noise	Solid waste	Water consumption	Water quality	Land resources	Soil	Terrestrial fauna & flora	Aquatic fauna and flora	Vegetation and crops	Traffic	Labor health and safety	Community health and safety	Socio-economics	Visual intrusion	Physical Cultural Resources
Construction of power transmission and distribution facilities	-/0	- -	-/0	0	-/0	-	-	-	0	-/0	-/0	-/0	-/0	-/+	-	-/0
Operation of power transmission and distribution facilities	0	-/0	0	0	0	-	-/0	-/+	0	-/0	-	-	- -	++	-/0	-/0
Operation of distribution facilities	0		0	0	0	-/0	0	-/+	0	0	0	-	-	0/+	-/0	-/0
Construction of fuel oil storage terminals	-/0	- -	-		-	-	-	0	-	0	-/0	-/0	-/0	-/+	-	-/0
Operation of fuel oil storage terminals	-/0	0	-	0	-	0	- -/0	0	- -/0	0	-/0	-/0	-/0	++	-	-/0

*Key: 0: No significant impact; + + +: High positive impact; + +: Moderate positive impact; +: Low positive impact; - - -: High negative impact; - -: Moderate n
: Low negative impact;

Frequently occurring impact Rarely occurring or short-term impact

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6 IMPACT MITIGATION AND ENVIRONMENTAL& SOCIAL MANAGEMENT AND MONITORING PLAN

6.1 MITIGATION MEASURES

The potential environmental impacts that may be associated with the implementation of several power supply alternatives for the purpose of electricity generation can be minimized by careful site/ right of way selection, planning and staging of construction activities, adopting proper management practices during operation and relying on effective environmental monitoring and training to support management decisions. This chapter plan proposes several potential impact-mitigation or control measures that should earn the proposed projects more acceptability, by reducing or eliminating to the extent possible many of the impacts that have been discussed in Section 4. Mitigation measures are intended to reduce the effect of potentially significant impacts on the environment. Thus, they are highly dependent on the significance of the predicted impact, the nature of the impact (permanent vs. temporary), or the phase of the project (construction vs. operation). Accordingly, the mitigation measures presented below are generic to a certain extent, and need to be refined and adapted to each of the proposed energy projects, once the detailed project components are available.

Table [7]-1 to Table 6-3 presents a summary of the proposed mitigation measures for the potential environmental and social impacts arising from the implementation of several power supply alternatives. Implementation responsibility is also included. As for the cost of the mitigation, it will be allocated as such:

- During the design phase, mitigation cost will be included in the final design preparation
- During the construction phase, mitigation cost will be included with construction costs
- During operation, mitigation costs will be part of the operation costs
- The schedule of implementation of the mitigation measures will be consistent with the project execution phases.

It should be noted that the mitigation measures referred to in the below table are generic measures, meaning they will only require action once specific projects are identified and assessed. Similarly, the cost of the mitigation activities would be assessed as part of the rehabilitation or construction works to be conducted by the contractor under the specific project. The bidding documents of the contractor would be reviewed to ensure that the recommendations set forth herein are reflected and their implementation adequately
included in the overall price of the works. At present, it is not possible to assess specific mitigation measures or their cost as the potential future sub-projects to be implemented are unknown. As the future works become clear, the measures and their cost shall be reflected either in an updated ESMF or in specific Environmental Assessments and/or Environmental Management Plans, as well as the relevant bidding documents.

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Table 6-1: Summary of proposed mitigation measures for generic construction and/or rehabilitation activities.

Impact	*Mitigation Measures*	*Responsibility*
	GENERIC CONSTRUCTION AND/OR REHABILITATION ACTIVITIES	
Air quality	Watering of surfaces and/or chemical stabilization Reduction of surface wind speed with windbreaks or source enclosures Covering the road surface with a new material of lower silt content Grading of gravel roads Proper site enclosure through appropriate hoarding and screening; On-site mixing and unloading operations; Proper handling of cement material; Maintaining minimal traffic speed on-site and on access roads to the site; Covering all vehicles hauling materials likely to give off excessive dust emissions; Ensuring adequate maintenance and repair of construction machinery and vehicles; Avoiding burning of material resulting from site clearance; Covering any excavated dusty materials or stockpile of dusty materials entirely by impervious sheeting; The provision of water troughs at entry and exit points to prevent the carryover of dust emissions, beyond the construction site Proper truck maintenance The adoption of a traffic management plan while avoiding congested routes The adoption of proper maintenance procedures for on-site construction equipment and the use of diesel fuel of acceptable Turning off equipment when not in use	Consultant/ Contractor

Noise	Enclosing the site with barriers/fencing Effectively utilizing material stockpiles and other structures to reduce noise from on-site construction activities Choosing inherently quiet equipment Operating only well-maintained mechanical equipment on-site Keeping equipment speed as low as possible Shutting down or throttling down to a minimum equipment that may be intermittent in use Utilizing and properly maintaining silencers or mufflers that reduce vibration on construction equipment	Consultant/ Contractor

Impact	*Mitigation Measures*	*Responsibility*
	Restricting access to the site for truck traffic outside of normal construction hours Proper site logistics and planning Limiting site working hours if possible Scheduling noisy activities during the morning hours Informing the locals when noisy activities are planned Enforcing noise monitoring	
Solid waste (construction waste, chemical waste, general refuse)	Use of generated construction debris materials for reclamation purposes whenever applicable, after ensuring the absence of contamination and the adequacy of the physical and chemical properties of such material Minimization of construction and demolition wastes through careful planning during the design stage, whereby reducing or eliminating over-ordering of construction materials Sorting of construction and demolition wastes into various categories and adopting re-use/recycle on site whenever deemed feasible. Segregating chemical wastes and properly storing and disposing of it as hazardous waste. Storing chemical wastes in a separate area that has an impermeable floor, adequate ventilation and a roof to prevent rainfall from seeping Clearly labeling all chemical waste in English and Liberian, storing it in corrosion resistant containers and arranging so that incompatible materials are adequately separated Securing a prior agreement with the EPA for the disposal of hazardous waste generated on-site Drafting an agreement should with the solid waste collector in the county where the project is being implemented to identify collection sites and schedule the removal to minimize odor, pest infestation and litter buildup Prohibiting the burning of refuse on the construction site Promoting recycling and reuse of general refuse.	Consultant/ Contractor

	□ □	
PCB waste	□ Formulating and implementing a PCB Management Plan by the contractor to comprise of the following: Preparing a comprehensive inventory of transformers containing PCB-contaminated oil, PCB contaminated capacitors and other material prior to the initiation of the rehabilitation activities. Decontamination of PCB items to reduce the PCB concentration below 50 ppm by draining the item and then rinsing it with a solvent such as kerosene or turpentine Labeling decontaminated items "DANGER- HAD CONTAINED CHEMICAL WASTE" in both	Consultant/ Contractor

Impact	*Mitigation Measures*	*Responsibility*
	English and the local language	

		Filling PCB liquid waste in adequately sealed and properly labeled steel drums in good condition and marking the drums 'DANGER -CHEMICAL (PCB) WASTE' in both English and the local language along with the chemical waste label. Packing solid PCB waste in heavy duty and leak proof polythene sacks and placing them into new or good conditioned steel drums, fitted with removable lids, which are properly sealed and labeled 'DANGER CHEMICAL (PCB) WASTE' in both English and the local language along with the chemical waste label. Transport PCB waste by vehicles in good condition under the supervision of experienced personnel and in compliance with the following conditions: ▪ All loading & unloading operations should be carried out with care to avoid any damage which may result in leakage & spillage. ▪ The drums /equipments must be clearly marked 'DANGER CHEMICAL (PCB) WASTE' in both English and the local language along with the chemical waste label. ▪ The drums or equipment must be loaded and fastened securely so that they are in an upright position and do not move about or fall off the vehicle. ▪ Drain spouts, cooling tubes, and bushings of transformers should be adequately protected to prevent damage during transport. ▪ Vehicle should have hazard warning panels clearly marked with indelible ink against retro reflective background. ▪ Vehicles must be equipped with safety gear including an appropriate fire extinguisher for emergency use and a spill clean-up kit consisting of a spade, absorbent material and spare drums. ▪ The complete load should be covered with a tarpaulin to prevent rainwater from contact with drums/equipment. Suitable bundling could be provided by placing sand bags around the cargoes. Formulate emergency containment and cleanup procedures for accidental release of PCB into the environment due to a spill or fire that cover the following areas: ▪ spill response ▪ protective equipment ▪ cleanup procedures	

Impact	*Mitigation Measures*	*Responsibility*
	▪ storage and disposal of contaminated material ▪ staff training ▪ regulatory authorities emergency contacts PCB liquids do not bun easily but the vapor can be extremely irritating. Some decomposition products of PCBs are highly toxic. In the case of a fire outbreak, the fire department should be contacted immediately and informed that fire involves PCBs . Foam or dry chemicals should be used to extinguish the fire rather than water, to minimize contaminated run off Storage of PCB wastes before disposal arrangements are made in an indoor storage site having a noncorrosive atmosphere, good ventilation, normal room temperature of 25 C or less, dry surfaces and impermeable floor with no drains Disposal of low level contaminated wastes in a properly engineered and operated secure landfill, designed to prevent seepage by using a synthetic liner compatible with PCB waste with low permeability, durability and chemical resistance.	

Surface water	□ Provide channels, earth bunds or sand bag barriers to properly direct storm water to silt removal facilities □ Use adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins before discharge into the surrounding waters □ Maintain silt removal facilities by regularly removing deposited silt and grit □ Discharge rainwater pumped out from trenches or foundation excavations into storm drains via silt removal facilities and not directly to the aquatic environment □ Cover open stockpiles of construction materials on site with tarpaulin or similar fabric during rainstorm events to prevent the washing away of construction materials □ Compact earthworks as soon as the final surfaces are formed to prevent erosion especially during the wet season □ Collect and connect water used in vehicle and plant servicing areas to foul sewers via an oil/grease □ trap. Oil leakage or spillage should be contained and cleaned up immediately □ Collect spent oil and lubricants and store them for recycling or proper disposal □ Prepare guidelines and procedures for immediate clean-up actions following any spillages of oil, fuel or chemicals. □ Contain sewage from toilets, kitchens and similar facilities in sanitary cesspools before being transported by trucks to a nearby wastewater treatment plant	Consultant/ Contractor

Impact	*Mitigation Measures*	*Responsibility*
Soil and groundwater	□ Proper storage of chemicals on site □ The installation of natural or synthetic liners beneath chemical storage tanks □ Proper surface drainage during both the construction and operation phases □ Minimization of on-site water and chemical usage (oil, lubricants and fuel) □ Limiting the exposure of the soil to accidental releases of pollutants □ Use of non-toxic and readily biodegradable chemicals on-site □	Consultant/ Contractor

Flora and Fauna ***Erosion*** ***Dredging***	□ Scheduling construction/ rehabilitation to avoid heavy rainfall periods (i.e., during the dry season) to the extent practical □ Contouring and minimizing length and steepness of slopes □ Mulching to stabilize exposed areas □ Re-vegetating areas promptly □ Designing channels and ditches for post-construction flows □ Lining steep channel and slopes (e.g. use jute matting) □ Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical □ Restricting the duration and timing of in-stream activities to lower low periods, and avoiding periods critical to biological cycles of valued flora and fauna (e.g., migration, spawning, etc.) □ For in-stream works, using isolation techniques such as berming or diversion during construction to limit the exposure of disturbed sediments to moving water □ Adoption of construction sequencing and work procedures to minimize streambed disturbance □ Control of the rate of dredging to minimize the sediment loss rate □ Use of tightly closing grabs during dredging, to restrict the loss of fine sediment to suspension Careful loading of barges to avoid splashing of material □ □ □	Consultant/ Contractor
Land clearing	□ Use of barges for the transport of dredged materials that are fitted with tight bottom seals in order to prevent leakage of material during loading and transport □ Filling of barges to a level which ensures that materials do not spill over during loading and transport and that adequate freeboard is maintained to ensure that the decks are not washed by wave action □ Control of the speed of the trailer dredger within the works area to prevent propeller wash from stirring up the seabed sediments	

Impact	*Mitigation Measures*	*Responsibility*
	Building of suitable barriers to intercept the transport of SS away from the project area Scheduling dredging activity during periods that don't interfere with fish spawning or intense migration Select right-of ways to avoid important natural areas such as wild lands and sensitive habitats Utilize appropriate clearing techniques (hand clearing vs. mechanized clearing) Maintain native ground cover beneath lines Replant disturbed sites Manage right-of-ways to maximize wildlife benefits	
Traffic	Proper planning and development of a traffic control plan that takes into account the reservations and inputs of local communities Proper dissemination of information regarding the construction schedule Providing alternate routes when needed and when feasible during all phases of construction Ensuring safety of motorists through adequate warning, signing, delineation and channeling at least 500 m down and up-gradient from the construction site Limiting the movement of heavy machinery during the construction phase to off-peak hours and providing prior notification Providing a traffic re-routing plan for the construction phase at the bidding stage	Consultant/ Contractor

Health and safety	☐ Restriction of access to the construction site by proper fencing ☐ Establishment of buffering areas around the site ☐ Provision of guards on entrances and exits to the site ☐ Installation of warning signs at the entrance of the site to prohibit public access ☐ Provision of training about the fundamentals of occupational health and safety procedures ☐ Provision of appropriate personal protective equipment (PPE) (impermeable latex gloves, working overalls, safety boots, safety helmets, hearing protecting devices for workers exposed to noise levels exceeding 90 dBA[8], and lifesaving vests for construction sites near water bodies) ☐ Ensuring that workers can swim and that lifesaving rings are available at the worksite, near water ☐ Ensuring that the protective material is being used wherever it is required ☐ Ensuring that especially sensitive or dangerous areas (like areas exposed to high noise levels, areas for	Consultant/ Contractor

Impact	*Mitigation Measures*	*Responsibility*
	especially hazardous work etc.) are clearly designated ☐ Ensuring that all maintenance work necessary for keeping machines and other equipment in a good state will be regularly carried out. ☐ Ensuring that the workers are qualified, well trained and instructed in handling their equipment, including health protection equipment. ☐ Provision of adequate loading and off-loading space ☐ Development of an emergency response plan ☐ Provision of on-site medical facility/first aid	

[8] The maximum allowable 8-hour occupational noise standard set by OSHA

	□ Provision of appropriate lighting during night-time works □ Implementation of speed limits for trucks entering and exiting the site □ Ensuring that hazardous substances are being kept in suitable, safe, adequately marked and locked storing places □ Ensuring that containers of hazardous substances are clearly marked, and that material safety data sheets are available □ Ensuring that all workers dealing with hazardous substances are adequately informed about the risks, trained in handling those materials, and trained in first aid measures to be taken in the case of an accident □ Designating an area where contaminated materials and hazardous waste can be stored for proper disposal according to environmental guidelines □ The adoption of good housekeeping practices for ensuring hygiene on site □ The elimination of pools of stagnant water, which could serve as breeding places for mosquitoes □ The provision of bednets for workers living on site. □ The appropriate elimination of waste of all types, including wastewater □ The provision of a safety specialist responsible for the preparation, implementation and maintenance of a comprehensive safety program □ For the rehabilitation and/or construction of fuel supply facilities, provision of fire-fighting equipment such as dry powder extinguishers □ Conducting fire fighting and leak checks training drills for the construction staff □ Prohibition of smoking as well as litter or weed build up in the area as these may pose fire risks	
Socio-economics	□ Select project site and rights-of-way (ROW) to avoid important social, agricultural, and cultural resources and avoid areas of human activity	Consultant/ Contractor

Impact	*Mitigation Measures*	*Responsibility*
	□ Utilize alternative designs to reduce land and ROW width requirements and minimize land use impacts □ Ensure a high rate of local employment to minimize influx of foreign contract workers □ Manage resettlement in accordance with World Bank Procedures.	
Landscape and visual impacts	□ Enclose the site with non-transparent fencing to minimize the visual impacts on nearby areas □ Prohibit the parking of construction equipment, construction materials, and transport vehicles outside the fenced boundary of the construction site	Consultant/ Contractor
Physical cultural resources	□ Conduct appropriate project siting at the planning stage to avoid physical cultural resources and touristic sites □ Adopt, 'Archaeological Chance Find Procedures' particularly where excavation works will take place (Appendix F)	Consultant/ Contractor

Table 6-2: Summary of proposed mitigation measures for power transmission and distribution.

Impact	*Mitigation Measures*	*Responsibility*
	POWER TRANSMISSION AND DISTRIBUTION	
Land resources	Select the ROW to avoid important social, agricultural, and cultural resources; Route ROWs away from wild lands; Provide access control; Utilize alternative tower designs to reduce ROW width requirements and minimize land use impacts; Adjust the length of the span to avoid site-specific tower pad impacts; Manage resettlement in accordance with World Bank procedures.	Consultant/ Contractor
Noise	Locate ROWs away from human receptors, to the extent possible Use noise barriers or noise canceling acoustic devices	Consultant/ Contractor

Fauna and flora	□ Selecting transmission and distribution rights-of-way, access roads, lines, towers, and substations to avoid critical habitat through use of existing utility and transport corridors, whenever possible □ Installing transmission lines above existing vegetation to avoid land clearing □ Avoiding construction activities during the breeding season and other sensitive seasons or times of day □ Re-vegetating disturbed areas with native plant species □ Removing invasive plant species during routine vegetation maintenance □ Regular maintenance of vegetation within the rights-of-way to avoid disruption to overhead power lines and towers Removing invasive plant species, whenever possible, and cultivating native plant species □ Avoiding clearing in riparian areas □ Avoiding use of machinery in the vicinity of watercourses □ Manage herbicide application to avoid their migration into off-site land or water environments □ Monitoring right-of-way vegetation according to fire risk □ Removing blowdown and other high-hazard fuel accumulations □ Time thinning, slashing, and other maintenance activities to avoid forest fire seasons □ Disposal of maintenance slash by truck or controlled burning □ Planting and managing fire resistant species, such as hardwoods, within, and adjacent to, rights-ofway □ Establishing a network of fuel breaks of less flammable materials or cleared land to slow progress of fires and allow fire fighting access □	Consultant/ contractor

Impact	*Mitigation Measures*	*Responsibility*
	□ Aligning transmission corridors to avoid critical avian habitats (e.g. nesting grounds, heronries, rookeries, bat foraging corridors, and migration corridors)	

	□ Maintaining 1.5 meter spacing between energized components and grounded hardware or, where spacing is not feasible, covering energized parts and hardware □ Retrofitting existing transmission or distribution systems by installing elevated perches, insulating jumper loops, placing obstructive perch deterrents (e.g. insulated "V's"), changing the location of conductors, and / or using raptor hoods □ Considering the installation of underground transmission and distribution lines in sensitive areas □ Installing visibility enhancement objects such as marker balls, bird deterrents, or diverters	
Community health and safety	□ Utilizing mechanical clearing techniques, grazing and/or selective chemical applications □ Selecting herbicides with minimal undesired effects □ Not applying herbicides with broadcast aerial spraying □ Maintaining natural low-growing vegetation along the ROW □ Use of signs, barriers (e.g. locks on doors, use of gates, use of steel posts surrounding transmission towers, particularly in urban areas), and education / public outreach to prevent public contact with potentially dangerous equipment □ Grounding conducting objects (e.g. fences or other metallic structures) installed near power lines, to prevent shock □ Considering siting new facilities so as to avoid or minimize EMF exposure to the public □ Installation of transmission lines or other high voltage equipment above or adjacent to residential properties or other locations intended for highly frequent human occupancy, (e.g. schools or offices), should be avoided □ Evaluating potential exposure to the public against the reference levels developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) □ Application of engineering techniques to reduce the EMF produced by power lines, substations, or transformers	Consultant/ contractor

Occupational health and safety	Only allowing trained and certified workers to install, maintain, or repair electrical equipment Deactivating and properly grounding live power distribution lines before work is performed on, or in close proximity, to the lines Ensuring that live-wire work is conducted by trained workers with strict adherence to specific safety and insulation standards;	Consultant/ contractor

Impact	***Mitigation Measures***	***Responsibility***
	Where maintenance and operation is required within minimum setback distances, defining specific training, safety measures, personal safety devices, and other precautions in a health and safety plan When working at elevations, testing structures for integrity prior to undertaking work; Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers; Establishment of criteria for use of 100 percent fall protection Provision of an adequate work-positioning device system for workers. Connectors on positioning systems should be compatible with the tower components to which they are attached; Properly rate and maintain hoisting equipment and properly train hoist operators; Ensure that safety belts are not less than 16 mm two-in-one nylon or material of equivalent strength. Replace rope safety belts before signs of aging or fraying of fibers become evident; When operating power tools at height, use a second (backup) safety strap; Remove signs and other obstructions from poles or structures prior to undertaking work;	

	□ Identify potential exposure levels to electric and magnetic fields (EMF) in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities; □ Train workers in the identification of occupational EMF levels and hazards; □ Establish and identify safety zones where EMF levels are acceptable for public exposure; □ Implement action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels (limiting exposure time through work rotation, increasing the distance between the source and the worker, or the use of shielding material) □ Train personnel to apply pesticides and ensure that personnel have received the necessary certifications or equivalent training where such certifications are not required; □ Respect post-treatment intervals to avoid operator exposure during reentry to crops with residues of pesticides; □ Ensure hygiene practices are followed to avoid exposure of family members to pesticides residues.	
Airline traffic	□ Avoid the siting of transmission lines and towers close to airports and outside of known flight path envelopes □ Consult with regulatory air traffic authorities prior to installation; □ Adhere to regional or national air traffic safety regulations; □ Use buried lines when installation is required in flight sensitive areas □	Consultant/ contractor
Impact	***Mitigation Measures***	***Responsibility***

Socio-economics	- Extensive public consultation during the planning of powerline and power line right-of-way locations; - Accurate assessment of changes in property values due to power line proximity; - Siting power lines, and designing substations, with due consideration to landscape views and important environmental and community features; - Location of high-voltage transmission and distribution lines in less populated areas, where possible; Burying transmission or distribution lines when power must be transported through dense residential or commercial areas.	Consultant/ contractor
Physical cultural resources	- Proper siting of a hydropower plant to avoid loss of historic and cultural properties - Adopt, 'Archaeological Chance Find Procedures' particularly where excavation works will take place (Appendix F)	Consultant/ contractor

Table 6-3: Summary of proposed mitigation measures for the operation of fuel oil storage terminals.

Impact	*Mitigation Measures*	*Responsibility*
	OPERATION OF FUEL OIL STORAGE TERMINALS	
Air quality	Coordinating filling and withdrawal schedules, and implementing vapor balancing between tanks Reducing breathing losses by using white or other reflective color paints with low heat absorption properties on exteriors of storage tanks for lighter distillates or by insulating tanks Where vapor emissions contribute or result in ambient air quality levels in excess of health-based standards, installation of secondary emissions controls such as vapor condensing and recovery units, catalytic oxidizers, vapor combustion units, or gas adsorption media Use of gasoline supply and return systems, vapor recovery hoses, and vapor tight trucks / railcars / vessels during loading and unloading of transport vehicles Use of bottom loading truck / rail car filling systems Establishing a procedure for periodic monitoring of fugitive emissions from pipes, valves, seals, tanks and other infrastructure components with vapor detection equipment, and with subsequent maintenance or replacement of components as needed Routing tank degassing vapors to an appropriate emissions control device. Restricting activities to a season when the potential for ozone formation is reduced or to a time of the day when the potential for ozone formation is less; Periodically inspecting tanks internally, and establishing an inspection frequency based on the condition of the tank at the previous internal inspection (typically 10 years or less).	Consultant/ contractor Operator/ EPA

Solid waste	Re-processing of tank sludge and spill cleanup for product recovery or as a waste at a facility licensed to handle this type of material in an environmentally sound manner Manage small quantities of oil contaminated via land treatment or as a waste at a facility licensed to handle this type of material. Manage small quantities of soils or liquids as a hazardous waste Manage larger quantities of affected soils and other environmental media, including sediment and groundwater, according to guidance applicable to contaminated land. Removal operations of any tanks and connected piping should include the following procedures: Remove residual fuel from the tank and all associated pipes and manage it as a hazardous waste; Inert tanks before commencing tank removal operations the tanks so as to remove the risk of explosion (hydrophobic foam fill, nitrogen foam fill, nitrogen gas purging, water fill, dry ice, combustion of gas, and cleaning-degassing)	Operator/ EPA

Impact	*Mitigation Measures*	*Responsibility*
	Dismantle and/or cap off and clearly label all vent pipes and risers associated with the tank	

Water quality	Application of effective spill prevention and control Implementation of secondary containment procedures that avoid accidental or intentional releases of contaminated containment fluids Installation of storm water channels and collection ponds with subsequent treatment through oil / water separators Regular maintenance to locate and repair / replace tank roof, seals, or other sources of water infiltration Use of domes on floating roof tanks to reduce rainwater penetration Use of meters ("sight glasses") to determine water content in tank, as well as vortex eliminators / barriers to minimize product release during draw off. Pre-treatment of effluents via oil / water separators, with further on-site or off-site biological and chemical treatment and activated carbon systems, depending on the volume of contaminants present, and whether the facility is discharging the wastewater into a municipal system or directly to surface waters.	Operator/ EPA
Spills and leakages	Ensure that storage tanks and components meet international standards for structural design integrity and operational performance to avoid catastrophic failures provisions for overfill protection, metering and flow control, fire protection overfill protection equipment include level gauges, alarms, and automatic cutoff systems. the use of "breakaway" hose connections in fuel dispensing equipment which provide emergency shutdown of flow should the fueling connection be broken through movement Storage tanks should have appropriate secondary containment. use of double bottom and double wall containment, impervious linings underneath tanks, or internal tank liners Installation of impervious asphalt or concrete surfaces with polyethylene sheeting underneath in areas of potential petroleum leaks and spills, including below gauges, pipes, and pumps, and below rail and truck loading / unloading areas Perform periodic inspection of storage tanks and components Conduct loading / unloading activities by properly trained personnel according to pre-established formal procedures to prevent accidental releases and fire /explosion hazards For unloading / loading activities involving marine vessels and terminals, prepare and	Operator/ EPA

	□ implement spill prevention procedures for tanker loading and off-loading according to applicable international	

Impact	***Mitigation Measures***	***Responsibility***
	standards and guidelines which specifically address advance communications and planning with the receiving terminal □ Develop a spill prevention and control plan that addresses significant scenarios and magnitudes of releases □ Locate Above Ground Storage Tanks (ASTs) in a secure area, protected from potential collisions by vehicles, vandalism, and other hazards	

Occupational health and safety	Segregate corrosive, oxidizing and reactive chemicals from flammable materials and from other chemicals of incompatible class, store them in ventilated areas and in containers with appropriate secondary containment to minimize intermixing during spills Provide workers who are required to handle such chemicals with specialized training and with appropriate PPE (gloves, apron, splash suits, face shield or goggles, etc). Ensure qualified first-aid at all times. Design and operate crude oil and petroleum product terminals storage facilities according to international standards for the prevention and control of fire and explosion hazards, including provisions for distances between tanks in the facility and between the facility and adjacent buildings, provision of additional cooling water capacity for adjacent tanks, or other risk-based management approaches; Implement safety procedures for loading and unloading of product to transport systems including use of fail-safe control valves and emergency shutdown equipment; Prevent of potential ignition sources such as: Proper grounding to avoid static electricity buildup and lightning hazards Use of intrinsically safe electrical installations and non-sparking tools Implementation of permit systems and formal procedures for conducting any hot work during maintenance activities, including proper tank cleaning and venting Prepare of a fire response plan supported by the necessary resources and training Properly equip facilities with fire suppression equipment that meets internationally recognized technical specifications for the type and amount of flammable and combustible materials stored at the facility Provide confined spaces with permanent safety measures for venting, monitoring, and rescue operations, to the extent possible. Safety precautions should include Self Contained Breathing Apparatus (SCBA), life lines, and safety	Consultant/ contractor Operator/ EPA
Impact	***Mitigation Measures***	***Responsibility***

	watch workers stationed outside the confined space, with rescue and first aid equipment readily available	
Community health and safety	Prepare an emergency preparedness and response plan that considers the role of communities and community infrastructure as appropriate	Operator
Physical cultural resources	Proper siting of a hydropower plant to avoid loss of historic and cultural properties Adopt, 'Archaeological Chance Find Procedures' particularly where excavation works will take place (Appendix F)	Consultant/ contractor

6.2 MONITORING

Impact and compliance monitoring should be practiced during the construction and operation phases of the proposed project. Monitoring should be conducted to verify the predicted impacts, examine the implementation and effectiveness of mitigation measures, respond to unanticipated environmental impacts, and improve environmental controls. Monitoring should be conducted by trained individuals following monitoring and recordkeeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Note that the scale/nature of the project dictates that the level of the proposed monitoring plan, whereby small projects favor monitoring that is limited to visual observations and photographic documentation while large scale projects require quantitative assessment of several environmental parameters in addition to visual monitoring. Table 6-4-Table 6-6 present typical parameters that should be monitored along with monitoring means, frequency, and phase. The EPA, or an independent consultant hired by the EPA, will be responsible for the implementation of the monitoring. It should be stressed that the developed monitoring plan should be updated to reflect the specificities of each project (scale, location, etc.) and should

also incorporate an estimate of the total monitoring costs involved.

Table 6-4: Summary of monitoring activities during general construction and/or rehabilitation activities

Parameter	*Project scale*	*Location*	*Monitoring means*	*Frequency*	*Phase*
GENERAL CONSTRUCTION AND/OR REHABILITATION ACTIVITIES					
Air quality	Small-scale	Construction site	Inspection and measurement of PM level upon complaints	NA	Construction
	Large-scale	Construction site and selected receptors	Inspection and measurement of PM level at selected receptors	Monthly Upon complaints	Construction
Noise levels	Small-scale	Construction site	Inspection and measurement of noise level upon complaints	NA	Construction
	Large-scale	Construction site and selected receptors	Inspection and measurement of noise level (Leq) at selected receptors	Monthly and upon complaints	Construction
Wastes and disposal	Small-scale	Construction site Disposal site	Visual inspection and photographic documentation	Monthly	Construction
	Large-scale			Continuous	Construction
Surface water	Small scale	At nearby surface water body	Visual inspection	Monthly	Construction
	Large scale	At nearby surface water body	Water quality (Turbidity, suspended solids, total coliforms, fecal coliform, dissolved oxygen)	Quarterly	Construction
Soil and groundwater	Small-scale	At construction site	Visual inspection	Monthly	Construction

	Large-scale	At construction site Nearest water wells	Visual inspection Water quality (total coliforms, oil and grease)	Quarterly Quarterly	Construction
Flora and fauna	Small-scale	Project site and surrounding areas	Presence of key species	Before project execution	Construction
	Large-scale	Project site and surrounding areas	Occurrence of key species at start of the project and initiate annual follow-up	Before project execution and annual follow-up	Construction Operation
Traffic	Large-scale	Construction site and nearby road network	Inspection	Upon complaints	Construction
Health and safety	Small & large scale	Project site	Visual inspection and photographic documentation	Monthly	Construction
Socio-economic	Small-scale	Project site and surrounding areas	Jobs created for local people	Biannually	Construction
Parameter	***Project scale***	***Location***	***Monitoring means***	***Frequency***	***Phase***
	Large-scale	Project site and surrounding areas	Jobs created for local people The effectiveness of acquisition procedure and of compensation disbursement	Biannually Continuous	Construction
Landscape and visual intrusions	Small & large-scale	At site boundaries	Visual inspection and photographic documentation	Monthly	Construction

Physical cultural resources	Small-scale	All vulnerable sites adjacent to project and all unknown remains unearthed during construction	Disturbance of known sites Document chance findings	Annually	Construction
	Large-scale		Disturbance of known sites Document chance findings	Biannually	Construction

Table 6-5: Summary of monitoring activities for power transmission and distribution activities

Parameter	*Project scale*	*Location*	*Monitoring means*	*Frequency*	*Phase*
POWER TRANSMISSION AND DISTRIBUTION					
Land resources	Small and large scale	Along the constructed line	Visual inspection	As the line is being constructed	Construction
				Annually	Operation
Noise levels	Small and large scale	Constructed line	Inspection and measurement of noise level upon complaints	NA	Operation
Fauna and flora	Small and large scale	Project site and surrounding areas	Presence of key species	Before project execution and annual follow-up	Construction Operation
Surface water	Small and large scale	Nearby surface water bodies	Water quality (Herbicide residues)		Operation[1]
Community health and safety	Small and large scale	Project site and surrounding areas	Visual inspection and photographic documentation	Biannually	Operation
Occupational health and safety	Small and large scale	Project site	Visual inspection and photographic documentation	Continuous	Construction Operation
Avian traffic	Large-scale	Constructed lines	Inspection	Biannually	Operation
Socio-economic	Small-scale	Project site and	Jobs created for local people	Biannually	Construction

		surrounding areas			Operation
	Large-scale	Project site and surrounding areas	Jobs created for local people Increased production in sectors from project implementation The effectiveness of acquisition procedure and of compensation disbursement	Biannually Annually Continuous	Construction Operation Construction & Operation

[1] If herbicides are being used for ROW clearing

Table 6-6: Summary of monitoring activities for the operation of fuel oil storage terminals

Parameter	*Project scale*	*Location*	*Monitoring means*	*Frequency*	*Phase*
OPERATION OF FUEL OIL STORAGE TERMINALS					
Air quality	Small-scale	Storage terminal	Inspection and measurement of VOC level upon complaints	NA	Operation
	Large-scale	Storage terminal and selected receptors	Inspection and measurement of VOC level at selected receptors	Monthly Upon complaints	Operation
Solid waste	Small-scale	Storage terminal	Visual inspection and photographic	Monthly	Operation

	Large-scale	Disposal site	documentation	Continuous	Operation
Water quality	Small-scale	At receiving water body	Process effluent discharge quality (parameters to be tested are site specific)	Quarterly	Operation
	Large-scale	At receiving water body	Process effluent discharge quality (parameters to be tested are site specific)	Monthly	Operation
Spills and leakages	Small and large scale	At storage terminals and transfer sites	Visual inspection and photographic documentation Inspection and drilling on oil spill response plan	Continuous Annually	Operation
Occupational health and safety	Small-scale	Project site	Visual inspection and photographic documentation	Monthly	Construction Operation
	Large-scale	Project site	Visual inspection and photographic documentation Inspection and drilling emergency evacuation plan	Monthly Annually	Operation
Community health and safety	Small and large scale	Project site and surrounding area	Visual inspection and photographic documentation	Monthly	Operation
			Visual inspection and photographic documentation Inspection and drilling emergency response plan	Monthly Annually	Operation

7 INSTITUTIONAL ARRANGEMENT AND FRAMEWORK

In order for the Environmental and Social Management Framework (ESMF) to be effectively implemented, the presence of proper environmental management at the national level is helpful. Historically, environmental management in many developing countries has not been accorded the attention its evident importance merits leading to high costs in terms of adverse impacts on human health, productive resources, and ecosystems.

Although environmental regulations have been evolving in Liberia, the main problems that remain are that of monitoring and enforcement, which are in turn related to the country's institutional and technical capacity for environmental management.

The main institutions with key responsibilities for environmental and social management under the LACEEP are LEC and EPA including the LEC's Environmental and Social Unit (ESU).

The LEC's Environmental and Social Management Unit (ESMU) will be responsible for screening, to identify the nature and magnitude of LACEEP sub-projects' potential environmental and social impacts and determine the category to which such projects belong (A, B, or C). Additionaly, it will also determine the required level of environmental impact assessment required. The ESMU will also be responsible for implementing or assuring the implementation of any environmental and social management or mitigation plans including monitoring following clearance of the ESIA/ESMP by the EPA.

There are three possible outcomes of the screening processes:

(1) No request for additional environmental investigation;

(2) Need for a limited environmental study; and

(3) Necessity of an EIA to determine the extent and magnitude of a range of significant adverse impacts and to propose appropriate mitigation, monitoring and management measures.

An environmental audit may be required in cases where an existing site is being rehabilitated and in cases where PCBs are involved. A Resettlement Action Plan may be also required in accordance with OP 4.12, in the case of involuntary resettlement and/or the

disturbance of indigenous peoples. The different types of energy related subprojects within each category and the associated environmental and social assessments required are presented in Table 7-1; a checklist for screening is presented in Appendix G.

Table 7-1: Screening of World Bank projects

Projects	*Environmental screening category*	*Other requirements*
☐ Dams and reservoirs ☐ Electrical transmission 66-kV and above) ☐ Industrial plants (large scale) and industrial estates ☐ Land clearance and leveling ☐ Mineral development (including oil and gas) Pipelines (oil, gas, and water) ☐ Reclamation and new land development ☐ Resettlement ☐ Thermal and hydropower development ☐ Projects which pose serious accident risks	Category A- (Normally require environmental assessment (EA)) ▪ Carry out a project specific EA study ▪ Develop subproject specific EMPs and (Resettlement Action Plan) RAPs in the case of involuntary resettlement ▪ Apply environmental conditions in contract agreements	An Environmental Audit is required if the subproject involves rehabilitation of an existing site. An Environmental Audit is required if PCB handling is involved.
☐ Industries (small scale) ☐ Mini hydro-power ☐ Renewable energy ☐ Rural electrification ☐ ☐	Category B (Require limited environmental analysis) ▪ Develop and implement a subproject specific EMP ▪ Apply environmental conditions in contract agreements	

Electrical distribution networks (22kV and 33kV in Liberia) and connections	Category C (Environmental analysis normally unnecessary) • Develop generic mitigation and monitoring measures for subproject sectors • Apply environmental conditions in contract agreements	
□ Institutional development □ Technical assistance	Category C (Environmental analysis normally unnecessary) ▪ Develop generic mitigation and monitoring measures for subproject sectors ▪ Apply environmental conditions in contract agreements	

The LEC's Environmental and Social Management Unit (ESMU) will work with its Procuring Department to select and hire a consultant from a list of EPA certified Environmental Evaluators. The EPA's EIA guidelines require that the Environmental Consultant determines the TOR for the EIA during scoping and that the TOR is presented in the scoping report. The work of the consultant will be supervised by the ESU.

The work of the contractor during the implementation of the sub-projects will also be supervised by the ESU with the support of the Environmental Consultant when required. The ESU will ensure that the contractor is correctly implementing the sub-project ESMP and is meeting all conditions of the Environmental Permit issued by the EPA for the sub-project activities.

The EPA will perform two critically important and significant roles as follows:

(1) Review, Clearance and Approval of the operators' ESIA/ESMP process for energy sub projects. The EPA will be responsible for receiving, reviewing and commenting on, requiring revisions where necessary, and clearing of operators' completed ESIA's prior to issuance of the license from the regulator, thus ensuring that contractors and operators comply with Liberia's environmental laws and requirements, and that of the World Bank's triggered Safeguard Policies.

(2) Reviewing and commenting on Environmental Monitoring reports submitted by the ESU and issuing directives to the ESU based on report evaluations.

7.1 INSTITUTIONAL STRENGTHENING AND CAPACITY BUILDING

Capacity building is an essential component towards sustainable environmental management. The LEC as the implementing agency of energy projects, has established the Environmental and Social Unit, and is responsible for the training of individuals hired to work in the Unit, and capacity building of those individuals will be key.

In addition, though the EPA currently performs functions related to the ESMF roles mentioned above, the EPA staff are also in need of training and further capacity building.

The objective of the training program is to ensure appropriate environmental awareness, knowledge and skills for the implementation of environmental management plans as well as environmental and process monitoring. In an effort to strengthen institutional capacity and environmental awareness, training sessions will be opened for individuals from the EPA and the LEC, and other concerned ministries and governmental authorities. Appraisal will be conducted following a training session for feedback towards improving the training program. The typical scope of the training sessions will encompass:

- Defining relevant environmental laws, regulations, and standards for each of the targeted institutions based on their responsibilities as well as current and prospective projects in the energy sector.
- Reviewing and discussing the World Bank's Safeguard Policies.
- Conducting bid tenders where appropriate while ensuring that the World Bank's Safeguard Policies and the applicable EPA legislation and GoL laws are respected.
- Reviewing Environmental Impact Assessment methodology (at both the sub project and strategic levels) and environmental sampling and monitoring procedures (air, noise, water, etc.).
- Introducing mitigation measures aimed at minimizing adverse environmental impacts associated with the construction and operation of energy-related projects with special emphasis on low technology, affordable and sustainable measures.

- Introducing the fundamentals of occupational health and safety procedures with emphasis on the risks associated with electricity production.
- Presenting case study EMPs of relevant projects (hydroelectric projects, thermoelectric projects, solar power energy production (such as thermal power generation, hydroelectric power generation, solar power generation, etc.))
- Conducting an open dialogue with the targeted audience, whereby individuals will be asked to share their experiences (success stories and shortcomings) in implementing EMPs and the main technical problems faced in the field.

The training program is to consist of technical assistance, likely by individual consultants, and will be targeted at individuals within primarily the LEC and EPA whose main responsibilities currently encompass or will in future encompass environmental and social safeguards. It is proposed that the training program be implemented at least twice a year over a period of two years—roughly the period of the two current Bank projects. Staff and operators of sub-projects may also be targeted as appropriate. A budget estimate is given below and includes capacity building of the target entities. The Total Training Budget is estimated at around US$100,000 (Table 7-2). This is only an indicative budget depending on the number of trainees, so the training budget may be less than or greater than the proposed.

Table 7-2: Estimated budget for the two-year training program

Category	*Description*	*Cost (USD)*
Technical assistance to LEC safeguards staff (general and project specific as required)		**50,000**
Technical assistance to EPA staff (general and project specific as required)		**50,000**
Total Budget (USD)		**~100,000**

7.2 BUDGETING FUTURE SAFEGUARDS MEASURES

The above budget refers only to the safeguards training program proposed for staff of the LEC and EPA at present. The cost of assessment for future sub-projects and mitigation activities would be assessed as part of the rehabilitation or construction works to be conducted by the contractor under the specific project. The bidding documents of the contractor would be reviewed to ensure that the recommendations set forth herein are reflected and their implementation adequately included in the overall price of the works. As

the future works become clear, the measures and their cost shall be reflected either in an updated ESMF or in specific Environmental Assessments and/or Environmental Management Plans, as well as the relevant bidding documents.

8 PUBLIC PARTICIPATION

Public involvement and consultations are important components in projects related to the energy and electricity sectors in order to ensure information is properly conveyed and that cooperation and acceptance from the public is secured. Public participation should also aim to increase general environmental awareness among the public and various stakeholders in regards to the proposed project and thereby addressing their concerns. Additional reasons for involving the public include:

- Public participation is regarded as proper and fair conduct in public decision-making activities.
- Public participation is widely accepted as a way to ensure that projects meet the stakeholders' needs and are suitable to the affected public.
- The project carries more legitimacy, and less hostility, if potentially affected parties can influence the decision-making process.
- The final decision is 'better' when local knowledge and values are included and when expert knowledge is publicly examined.

The effectiveness of public participation is measured by the degree of communication, the intensity of contact and the degree of influence for decision making.

Table 8-1 represents some example of effective public participation techniques that can be utilized by the contractor.

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Table 8-1: Examples of effective public participation techniques.

Technique	*Objective(s)*	*Scope*	*Participants*
Public Displays	To inform about the project	Informative	Affected people and other relevant interests
Public Meetings	To identify issues and to solicit feedback	Consultative	Affected people consisting of village officials, informal leaders and local people

Focus Group / Discussion	□ To identify issues and to solicit □ feedback To get ideas for environmental management	□ Informative □ Consultative □ Environmental Management	Affected people

8.1 REGULATIONS AND REQUIREMENTS

According to Sections 17 and 18 of the Environmental Protection and Management Law and World Bank safeguard policies for involuntary resettlement, indigenous peoples and environmental assessment, public consultations are an integral component of the EIA, RAP and IPP requirements and the guidelines identify the following principal elements:

- Developers are required to conduct public consultation during the preparation of ElAs.
- Formal EIA document is made available for public review and comments. Documents to which the public has access include Project Briefs, EIA terms of reference, draft and final EIA reports, and decisions of the appropriate authorities regarding project approval.

Consultations should identify key issues and determine how the concerns of all parties will be addressed in response to the terms of reference for the EIA. The public will be allowed to access information in Liberia (EPA) before project appraisal and in World Bank INFO-Shop before project appraisal in English. This is in fulfillment of WB Disclosure Policy (BP 17.50).

8.2 PROCESS FOR PUBLIC CONSULTATION IN THE ESMF

During the course of the Project, consultations should be carried out with all significant stakeholder groups (Table 8-2).

Table 8-2: Key Stakeholder Groups

Key Stakeholder Groups	
Government and regulatory agencies	EPA, Ministry of Lands Mines & Energy, Rural & Renewable Energy Agency, Ministry

	of Public Works.
Public and private sector operators	Liberia Electricity Corporation (LEC), Liberia Water & Sewer Corporation (LWSC), Liberia Petroleum Refining Company (LPRC)
Non-government organizations	International and local stakeholder groups, including environmental NGOs.
Local stakeholders	Community-based organizations (CBOs), district-level committees, unions, and other local groups.
Academic and research institutions	Environmental research groups, universities, and technical institutes.
Indigenous communities	If projects are planned to be performed in an indigenous people's territory.

For sub-projects that can be developed in indigenous territories, a translator must be used so that the entire audience can be informed about the project. Concerns and suggestions must be included in the consultation process for the environmental and social evaluation so that they can be considered in the final evaluation.

Initial consultations have been conducted as part of the preparation of this ESMF. The summary of the feedback received can be found in Appendix H.

8.3 PROPOSED DISCLOSURE PLAN

Both the EPA and the World Bank procedures require that an EIA be prepared and publicly disclosed prior to project appraisal. This allows the public and other stakeholders to comment on the possible environmental and social impacts of the project, and the appraisal team to strengthen the frameworks as necessary, particularly measures and plans to prevent or mitigate any adverse environmental and social impacts.

Toward this end, this document will be publicly released through the World Bank's Info Shop and in public locations in Liberia (EPA or LEC is mostly recommended). The documents should be made available in English in compliance with the World Bank's Public Consultation and Disclosure Policy.

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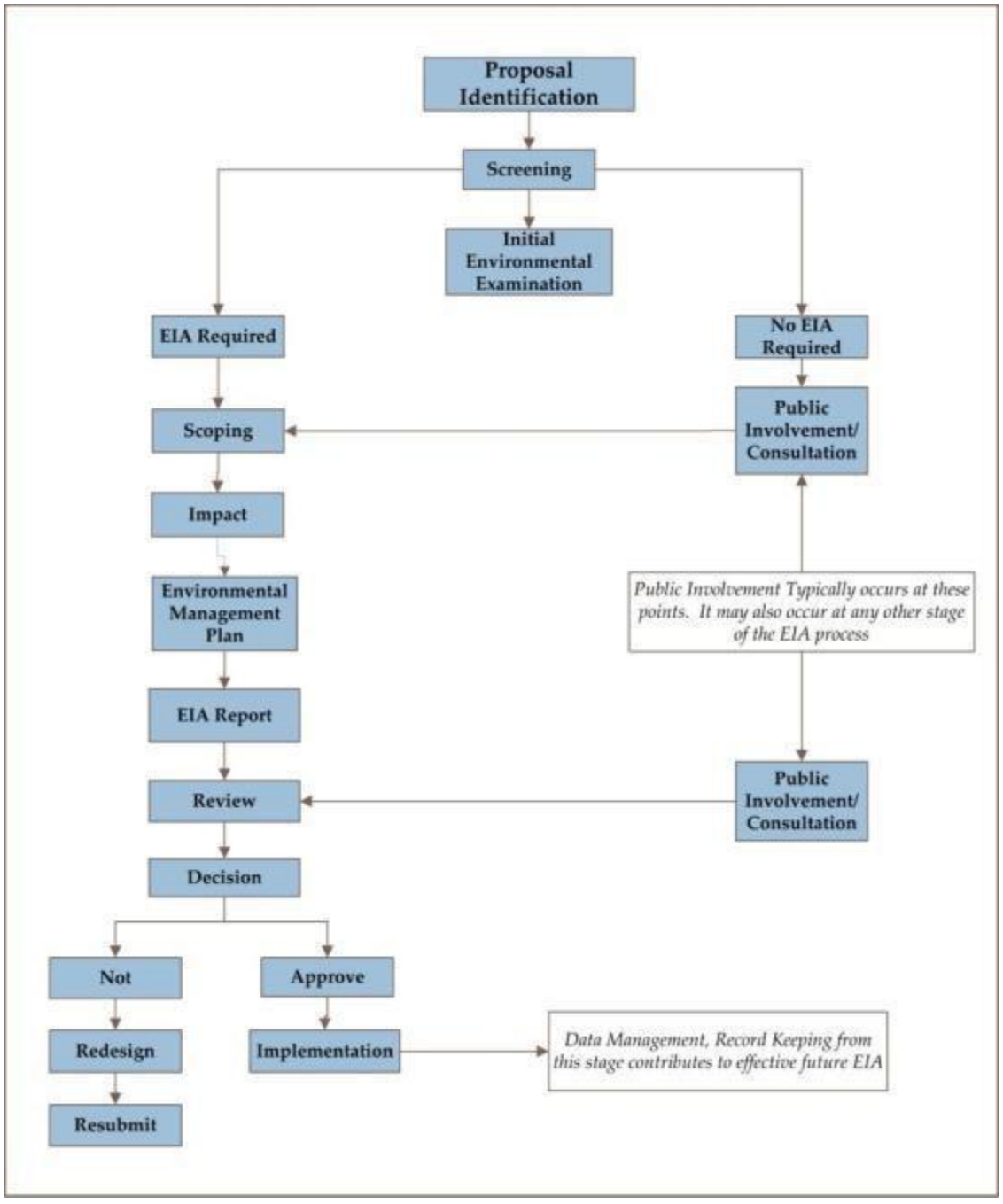
Appendix A EIA FLOW CHART



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APPENDIX B SUMMARY OF THE WORLD BANK'S SAFEGUARD POLICIES

OP 4.01: Environmental Assessment	The objective of this policy is to ensure that Bank-financed projects are environmentally sound and sustainable, and that decision-making is improved through appropriate analysis of actions and of their likely environmental impacts. This policy is triggered if a project is likely to have potential (adverse) environmental risks and impacts on its area of influence. OP 4.01 covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and trans boundary and global environment concerns.	Depending on the project, and nature of impacts a range of instruments can be used: EIA, environmental audit, hazard or risk assessment and environmental management plan (EMP). When a project is likely to have sectoral or regional impacts, sectoral or regional EA is required. The Borrower is responsible for carrying out the EA.
OP 4.04 Natural Habitats	This policy recognizes that the conservation of natural habitats is essential to safeguard their unique biodiversity and to maintain environmental services and products for human society and for long-term sustainable development. The Bank therefore supports the protection, management, and restoration of natural habitats in its project financing, as well as policy dialogue and economic and sector work. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. Natural habitats are land and water areas where most of the original native plant and animal species are still present. Natural habitats comprise many types of terrestrial, freshwater, coastal, and marine ecosystems. They include areas lightly modified by human activities,	This policy is triggered by any project (including any sub-project under a sector investment or financial intermediary) with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through human activities induced by the project). The proposed operation will not fund any activities that would negatively affect natural habitats.

	but retaining their ecological functions and most native species.	
OP 4.12: Involuntary Resettlement	The objective of this policy is to (i) avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs; (ii) assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them; (iii) encourage community participation in planning and implementing resettlement; and (iv) provide assistance to affected people regardless of the legality of land tenure.	This policy covers not only physical relocation, but any loss of land or other assets resulting in: (i) relocation or loss of shelter; (ii) loss of assets or access to assets; (iii) loss of income sources or means of livelihood, whether or not the affected people must move to another location. This policy also applies to the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons. The proposed operation has a RPF which will serve as a guide in preparing RAPs as necessary.
OP 4.37: Safety of Dams	The objectives of this policy are as follows: For new dams, to ensure that experienced and competent professionals design and supervise construction; the borrower adopts and	This policy is triggered when the Bank finances: (i) a project involving construction of a large dam (15 m or higher) or a high hazard dam; and (ii) a

	implements dam safety measures for the dam and associated works. For existing dams, to ensure that any dam that can influence the performance of the project is identified, a dam safety assessment is carried out, and necessary additional dam safety measures and remedial work are implemented.	project which is dependent on an existing dam. For small dams, generic dam safety measures designed by qualified engineers are usually adequate.
OP 7.50: Projects on International Waters	Notification of Riparian Countries The objective of this policy is to ensure that Bank-financed projects affecting international waterways would not affect: (i) relations between the Bank and its borrowers and between states (whether members of the Bank or not); and (ii) the efficient utilization and protection of international waterways. The policy applies to the following types of projects: (a) Hydroelectric, irrigation, flood control, navigation, drainage, water and sewerage, industrial and similar projects that involve the use or potential pollution of international waterways; and (b) Detailed design and engineering studies of projects under (a) above, include those carried out by the Bank as executing agency or in any other capacity.	This policy is triggered if (a) any river, canal, lake or similar body of water that forms a boundary between, or any river or body of surface water that flows through two or more states, whether Bank members or not; (b) any tributary or other body of surface water that is a component of any waterway described under (a); and (c) any bay, gulf strait, or channel bounded by two or more states, or if within one state recognized as a necessary channel of communication between the open sea and other states, and any river flowing into such waters..
OP 4.11: Physical Cultural Resources	The objective of this policy is to assist countries to avoid or mitigate adverse impacts of development projects on physical cultural resources. For purposes of this policy, "physical cultural resources" are defined as movable or immovable objects, sites, structures, groups of structures, natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above ground, underground, or underwater. The cultural interest may be at the local, provincial or national level, or within the international	This policy applies to all projects requiring a Category A or B Environmental Assessment under OP 4.01, projects located in, or in the vicinity of, recognized cultural heritage sites, and projects designed to support the management or conservation of physical cultural resources. The proposed operation will not fund any investments that have negative impacts on physical cultural resources.

	community.	

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Appendix C TERMS OF REFERENCE (GENERIC EA)

The TOR evolves from the scoping process of EIAs. The critical issues identified during the Scoping exercise, to be carried out in EIA study, should be included in the TOR. The project proponent should prepare a TOR that both delineates the scope of the EIA and provides complete guidance for undertaking the EIA study. After approval from the authorizing agencies the TOR becomes an official document. In the EIA report review process the TOR serves as a standard document against which the subject matter covered by the EIA report will be evaluated.

The consultant will perform the following tasks:

a. Carry out a description of the biophysical characteristics of the environment in which the planned activity will take place, and highlight the major constraints that need to be taken into account during construction as well as during operation of the facility;
b. Carry out a description of the socio-economic environment of the planned investment, and highlight the major constraints that need to be taken into account during construction as well as during operation of the facility;
c. Assess the potential environmental and social impacts due to construction, operation, or rehabilitation activities, and recommend mitigation measures as appropriate, including cost estimates;
d. Assess the potential environmental and social impacts due to the provision of water supply and sanitation facilities that might be needed for the planned facility and make appropriate recommendations;
e. Assess the need for liquid and solid waste collection, disposal and management in the facility, and make recommendations accordingly;
f. Discuss and assess alternative project designs and make recommendations;
g. Carry out a review of the respective national environmental policies, legislation, regulatory and administrative frameworks in conjunction with the World Bank's safeguard policies, indicate which of these policies is triggered by the planned activity, identify any gaps that might exist, and make recommendations as to how potential gaps should be bridged in the context of the planned activity;

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h. Review the Conventions and Protocols to which the country is a signatory;

i. Assess the country's environmental assessment and management capacity, as well as the capacity to implement the proposed mitigation measures, and make appropriate recommendations, including potential capacity building and training needs, and their costs;

j. Prepare an Environmental and Social Management Plan (ESMP) for the planned activity. The ESMP should outline:

- Potential environmental and social impacts resulting from the activity;
- Proposed mitigation measures;
- Institutional responsibilities for implementation of the mitigation measures;
- Monitoring indicators;
- Cost estimates for these activities; and
- Time horizons for implementing the ESMP

k. Public consultations. EIA results and proposed mitigating measures will then be shared with the potentially affected population, NGOs, local authorities and the private sector working in the area where the activity will take place. Minutes of this consultation will form an integral part of the report.

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APPENDIX D ESHS CLAUSES FOR CONSTRUCTION CONTRACTOR

Adequate selection of project site and right of way and appropriate project design can have a significant influence on the magnitude of the associated environmental impacts and the proper environmental management of energy and electricity distribution projects in Liberia. As such, the EA for projects involving any new construction, or any rehabilitation or reconstruction for existing projects, should provide information on screening criteria for site selection and design, including the following:

Site selection

Sites should be chosen based on community needs for additional projects, with specific lots chosen based on geographic and topographic characteristics. The site selection process involves site visits and studies to analyze:

(3) The site's urban, suburban, or rural characteristics;

(4) National, state, or municipal regulations affecting the proposed lot;

(5) Accessibility and distance from inhabited areas;

(6) Land ownership, including verification of absence of squatters and/or other potential legal problems with land acquisition;

(7) Determination of site vulnerability to natural hazards (i.e., intensity and frequency of floods, earthquakes, landslides, hurricanes, volcanic eruptions);

(8) Suitability of soils and subsoils for construction;

(9) Site contamination by lead or other pollutants;

(10) Flora and fauna characteristics;

(11) Presence or absence of natural habitats (as defined by OP 4.04) and/or ecologically important habitats on site or in vicinity (e.g., forests, wetlands, coral reefs, rare or endangered species); and

(12) Historic and community characteristics.

After choosing an appropriate site and design, the contractor needs to prepare his own EMP including health and safety at construction site, a traffic management plan, a waste management plan, chance-find procedures for physical cultural resources, etc. The EMP needs to be approved by the EPA and the World Bank. The contractor is responsible for the implementation of the EMP and is supervised by an independent consultant.

As construction activities could cause significant impacts on and nuisances to surrounding areas, careful planning of construction activities is critical. These are generally consistent for all power generation activities due to the similarity of the works involved. The following rules (including specific prohibitions and construction management measures) should be incorporated into all relevant bidding documents, contracts, and work orders.

Note that an extensive, but not exhaustive, list of mitigation measures is provided in Table 6.1 of the report, and should be used as a guideline for the selection of applicable rules and their inclusion in the contractor's contract. More energy-related project-specific rules can be extracted from Tables 6.1 to 6.4.

Prohibitions:

The following activities are prohibited on or near the project site:

(1) Cutting of trees for any reason outside the approved construction area;
(2) Hunting, fishing, wildlife capture, or plant collection;
(3) Use of unapproved toxic materials, including lead-based paints and asbestos;
(4) Disturbance to anything with architectural or historical value;
(5) Building of fires;
(6) Use of firearms (except authorized security guards); and
(7) Use of alcohol by workers.

Construction management measures:

Dust and other air pollution emissions:

(1) Watering of surfaces and/or chemical stabilization
(2) Reduction of surface wind speed with windbreaks or source enclosures
(3) Covering the road surface with a new material of lower silt content
(4) Grading of gravel roads

(5) Proper site enclosure through appropriate hoarding and screening;

(6) Maintaining minimal traffic speed on-site and on access roads to the site;

(7) Covering all vehicles hauling materials likely to give off excessive dust emissions;

(8) Ensuring adequate maintenance and repair of construction machinery and vehicles;

(9) Avoiding burning of material resulting from site clearance;

(10) Covering any excavated dusty materials or stockpile of dusty materials entirely by impervious sheeting;

(11) The provision of water troughs at entry and exit points to prevent the carryover of dust emissions, beyond the construction site

(12) Proper truck maintenance

(13) Turning off equipment when not in use

Noise:

(1) Enclosing the site with barriers/fencing

(2) Effectively utilizing material stockpiles and other structures to reduce noise from on-site construction activities

(3) Choosing inherently quiet equipment

(4) Operating only well-maintained mechanical equipment on-site

(5) Maintaining all construction-related traffic at or below 15 mph on streets within 200 m of the site.

(6) Maintaining all on-site vehicle speeds at or below 10 mph.

(7) To the extent possible, maintaining noise levels associated with all machinery and equipment at or below 90 db.

(8) Keeping equipment speed as low as possible

(9) Shutting down or throttling down to a minimum equipment that may be intermittent in use

(10) Utilizing and properly maintaining silencers or mufflers that reduce vibration on construction equipment

(11) Restricting access to the site for truck traffic outside of normal construction hours

(12) Proper site logistics and planning

(13) Limiting site working hours if possible

(14) Scheduling noisy activities during the morning hours

(15) Informing the locals when noisy activities are planned

Solid waste management:

(1) Use of generated construction debris materials for reclamation purposes whenever applicable, after ensuring the absence of contamination and the adequacy of the physical and chemical properties of such material

(2) Minimization of construction and demolition wastes through careful planning during the design stage, whereby reducing or eliminating over-ordering of construction materials

(3) Sorting of construction and demolition wastes into various categories and adopting re-use/recycle on site whenever deemed feasible.

(4) Segregating chemical wastes and properly storing and disposing of it as hazardous waste.

(5) Storing chemical wastes in a separate area that has an impermeable floor, adequate ventilation and a roof to prevent rainfall from seeping

(6) Clearly labeling all chemical waste in English and Liberian, storing it in corrosion resistant containers and arranging so that incompatible materials are adequately separated

(7) Securing a prior agreement with the EPA for the disposal of hazardous waste generated on-site

(8) Drafting an agreement with the solid waste collector in the county where the project is being implemented to identify collection sites and schedule the removal to minimize odor, pest infestation and litter buildup (9)

Prohibiting the burning of refuse on the construction site

(10) Promoting recycling and reuse of general refuse.

Wastewater management

(1) Provide channels, earth bunds or sand bag barriers to properly direct storm water to silt removal facilities

(2) Use adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins before discharge into the surrounding waters

(3) Maintain silt removal facilities by regularly removing deposited silt and grit

(4) Discharge rainwater pumped out from trenches or foundation excavations into storm drains via silt removal facilities and not directly to the aquatic environment

(5) Cover open stockpiles of construction materials on site with tarpaulin or similar fabric during rainstorm events to prevent the washing away of construction materials

(6) Compact earthworks as soon as the final surfaces are formed to prevent erosion especially during the wet season

(7) Collect and connect water used in vehicle and plant servicing areas to foul sewers via an oil/grease trap. Oil leakage or spillage should be contained and cleaned up immediately

(8) Collect spent oil and lubricants and store them for recycling or proper disposal

(9) Prepare guidelines and procedures for immediate clean-up actions following any spillages of oil, fuel or chemicals.

(10) Contain sewage from toilets, kitchens and similar facilities in sanitary cesspools before being transported by trucks to a nearby wastewater treatment plant

Health and safety

(1) Restriction of access to the construction site by proper fencing

(2) Establishment of buffering areas around the site

(3) Provision of guards on entrances and exits to the site

(4) Installation of warning signs at the entrance of the site to prohibit public access

(5) Provision of training about the fundamentals of occupational health and safety procedures

(6) Provision of appropriate personal protective equipment (PPE) (impermeable latex gloves, working overalls, safety boots, safety helmets, hearing protecting devices for workers exposed to noise levels exceeding 90 dBA[9], and lifesaving vests for construction sites near water bodies)

(7) Ensuring that workers can swim and that lifesaving rings are available at the worksite, near water

[9] The maximum allowable 8-hour occupational noise standard set by OSHA

(8) Ensuring that the protective material is being used wherever it is required

(9) Ensuring that especially sensitive or dangerous areas (like areas exposed to high noise levels, areas for especially hazardous work etc.) are clearly designated

(10) Ensuring that all maintenance work necessary for keeping machines and other equipment in a good state will be regularly carried out.

(11) Ensuring that the workers are qualified, well trained and instructed in handling their equipment, including health protection equipment.

(12) Provision of adequate loading and off-loading space

(13) Development of an emergency response plan

(14) Provision of on-site medical facility/first aid

(15) Provision of appropriate lighting during night-time works

(16) Implementation of speed limits for trucks entering and exiting the site

(17) Ensuring that hazardous substances are being kept in suitable, safe, adequately marked and locked storing places

(18) Ensuring that containers of hazardous substances are clearly marked, and that material safety data sheets are available

(19) Ensuring that all workers dealing with hazardous substances are adequately informed about the risks, trained in handling those materials, and trained in first aid measures to be taken in the case of an accident

(20) Designating an area where contaminated materials and hazardous waste can be stored for proper disposal according to environmental guidelines

(21) The adoption of good housekeeping practices for ensuring hygiene on site

(22) The elimination of pools of stagnant water, which could serve as breeding places for mosquitoes

(23) The provision of bednets for workers living on site.

(24) The appropriate elimination of waste of all types, including wastewater

(25) The provision of a safety specialist responsible for the preparation, implementation and maintenance of a comprehensive safety program

(26) For the rehabilitation and/or construction of fuel supply facilities, provision of fire-fighting equipment such as dry powder extinguishers

(27) Conducting fire fighting and leak checks training drills for the construction staff

(28) Prohibition of smoking as well as litter or weed build up in the area as these may pose fire risks

Environmental Supervision during Construction

The bidding documents should indicate how compliance with environmental rules and design specifications would be supervised, along with penalties for non-compliance by contractors or workers. Construction supervision requires oversight of compliance with the manual and environmental specifications by the contractor or his designated environmental supervisor. Contractors are also required to comply with national and municipal regulations governing the environment, public health, and safety.

APPENDIX E OIL SPILL RESPONSE PLAN

An environmental management plan for various activities will be developed in order to minimize and mitigate the effects of potential impacts that might arise during the construction, operation and post closure phases.

The area around the existing HFO tanks, which will be rehabilitated by the LESEP project that is being implemented simultaneously with LACEEP, at Bushrod Island is polluted with HFO. This HFO pollution happened during the civil war due to neglect of the facilities. All the HFO polluted soil will be taken out before the rehabilitation of the tanks can start and will be stored in a concrete confined area or treated to international standards. The exact method of disposal has still to be determined, but the method selected will be in compliance with World Bank Safeguard Policies and Environmental, Health and Safety Guidelines of April 2007. The risks of the existing polluted area and the disposal of HFO polluted soil are local and manageable. The risks of a HFO spill during operation will be small and the HFO spill with local and are related to filling the HFO storage tanks at the port from moored vessels, transport through the HFO pipeline of around 35 cm diameter and 1.5 km length and HFO storage in the rehabilitated tanks in Bushrod Island.

However, unexpected accidents and emergencies might occur that require additional measures during transportation, and handling of the oil and lubricants. In this case, a contingency plan should be developed.

The contingency plan includes the identification of likely accidents and emergencies, outlining response scenarios, delegating responsibilities, and co-ordination with the proper authorities. Furthermore, the plan would serve as a reference for risk assessment and employee training.

In the case of an oil spill, the required response should be implemented in a timely fashion in order to minimize the impacts of the accident and it must be undertaken by qualified individuals, experienced in emergency response actions. Table E-1 below provides a summarized oil spill response plan.

Table E-1: Summarized Oil Spill Response Plan.
Environmental & Social Management Framework
Appendices

Potential emergencies	*Response*
Accidental leakage and/or spillage of the solid waste, liquid waste (during transportation), discovery of hazardous or infectious wastes	**Isolation** • When safe to do so, isolate the contaminants to prevent further dispersion of any contaminates • **Spill Clean-up and Disposal** • Clean-up and disposal of spilled material must be undertaken in a timely fashion with due regard for potential adverse environmental impacts, health and safety and regulatory requirements • In consultation with local EPA authorities and the facility's

Potential emergencies	*Response*
	environmental management & monitoring consultant, the following steps shall be taken: o Locate and quantify the contamination o Assess the site conditions and environmental impacts o Assess potential for contamination, collection and repair o Deploy immediately the required personnel, materials and machinery to contain and clean-up the spilled material o Call in specialized spill response contractor or appropriate personnel and machinery as required **Spill Notification** • Contact local EPA authorities to notify them of accident and many potential risks related to the percolation into groundwater or flow into surface water **Monitoring as a Follow up** • A monitoring program shall be developed and implemented to confirm the effectiveness of any required clean-up **Root cause Assessment and Corrective Action** • An investigation will be undertaken to determine the root cause(s) of the incident and to identify, if feasible, corrective actions that can be undertaken to ensure that the incident does not re-occur **Documentation** • Incident report, including photographs, clean-up documentation, including the results of analytical testing and root cause assessment and corrective actions

Appendices

APPENDIX F CHANCE FIND PROCEDURE

Chance finds are defined as physical cultural resources encountered unexpectedly during project implementation. Chance find Procedures includes provisions for managing aforementioned encountered chance finds. These include the following:

- In the case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance all construction activity in the vicinity of the find/feature/site will cease immediately.
- The discovery will be clearly delineated and secured, and all found remains will be

left in situ.

- An LEC assigned archaeological consultant will assess, record and photograph the find/feature/ site.
- In consultation with the Ministry of Information, Culture and Tourism, the assigned Archaeologist will complete a report on the findings and determine the appropriate course of action to take.
- An on-site finds storage area will be provided, allowing storage of any artifacts or other archaeological material recovered during the process.
- A conservator will be made available to the project, if required, and will decide on the disposition of any found samples or relics.
- Once authorization has been given by the Ministry of Information, Culture and Tourism, the proponent will be informed when works can resume.

APPENDIX G SCREENING CHECKLIST GUIDE

Site Selection

Rate the sensitivity of the proposed project site in the following table according to the given criteria. High ratings indicate that more substantial environmental and/or social planning may be required to adequately avoid, mitigate, and manage potential effects.

Issues	***Site Sensitivity***			***Ratings***
	Low	***Medium***	***High***	
Natural habitats	No natural habitats present of any kind	No critical natural habitats; other natural habitats occur	Critical natural habitats present	
Water quality and water resource availability and use	Water flows exceed any existing demand; low intensity of water use; potential water use conflicts expected to be low; no potential water quality issues	Medium intensity of water use; multiple water users; water quality issues are important	Intensive water use; multiple water users; potential for conflicts is high; water quality issues are important	
Natural hazards vulnerability, floods, soil stability/ erosion	Flat terrain; no potential stability/erosion problems; no known volcanic/seismic/ flood risks	Medium slopes; some erosion potential; medium risks from volcanic/seismic/ flood/ hurricanes	Mountainous terrain; steep slopes; unstable soils; high erosion potential; volcanic, seismic, or flood risks	
Physical Cultural property	No known or suspected physical cultural heritage sites	Suspected cultural heritage sites; known heritage sites in broader area of influence	Known heritage sites in project area	

Involuntary resettlement	Low population density; dispersed population; legal tenure is welldefined; welldefined water rights	Medium population density; mixed ownership and land tenure; well-defined water rights	High population density; major towns and villages; low-income families and/or illegal ownership of land; communal properties; unclear water rights	
Indigenous peoples	No indigenous population	Dispersed and mixed indigenous populations; highly acculturated indigenous populations	Indigenous territories, reserves and/or lands; vulnerable indigenous populations	

Checklist Questions

Parameter	Yes/No answers and bullet lists
Physical data	
Site area in ha	
Rehabilitation of existing site	
Plans for new construction	
Preliminary environmental information	
Source of information available at this stage	
Has there been litigation or complaints of any environmental nature directed against the proponent or sub-project?	
Likely environmental impacts	
What are likely environmental impacts, opportunities, risks, and liabilities associated with the sub-project?	
Determine which category the sub-project falls under based on the environmental categories A, B, and C	
Mitigation of potential pollution	
Does the sub-project have the potential to pollute the environment or contravene any environmental laws and regulations	
Does the sub-project involve PCBs?	

Does the design adequately detail mitigation measures?	
Does the proposal require, under national or local laws, the public to be informed consulted, or involved?	
Has consultation been completed?	
Land and resettlement	
What is the likelihood of land purchasing for the sub-project?	
How will land be purchased?	
What level or type of compensation is planned?	
Who will monitor actual payments?	

Recommendations:

- Requires an EIA and/or RAP.
- Requires ESMP
- Requires an Environmental Audit
- Does not require further environmental studies

APPENDIX H MINUTES OF STAKEHOLDERS' CONSULTATIVE MEETING

Thursday March 26, 2015

Starting Time: 11:20 AM

Ending Time: 1:30PM

Venue: LEC Conference Room, Water Side, Monrovia, Liberia

Meeting was composed of two different sections:

Section 1: Presentation of Environmental & Social Management Framework

Section 2: Presentation of Resettlement Policy Framework

Section 3: Questions and answers, comments, suggestions, and concerns from the stakeholders.

Participants:

No.	Name	Organization	Position	Contact
1.	Samuel W.D Wesley	CEDA Consult	Manager	+231880767181 cedaliberia@gmail.com
2.	Michael V. Snah	Earth Environmental	General Manager	+231777518443
3.	Wassim Hamdan	Earthtime Inc.	Managing Director	+231886700060 whamdan@earthtimegroup.com
4.	Basma Shamas	Earthtime Inc.	Consultant	+231888300766 bshamas@earthtimegroup.com
5.	Williette T. Clarke	Earthtime Inc.	Administrative Assistant	wclarke@earthtimegroup.com
6.	Varney L. Conneh	Environmental Protection Agency (EPA)	ESIA Assistant MQR	+231886531024 Clvaney69@yahoo.com
7.	Jonh K. Jallah Jr	Environmental Protection Agency (EPA)	ESIA Assistant Technical Coordinator	+231777797160 Jlej2g4@gmail.com
8.	Tom Wesley Korkpor	Land Commission	Program Assistant	+231880773020 tomkorkpor@gmail.com

No.	Name	Organization	Position	Contact
9.	Mohammed L. Sow	Liberia Electricity Corporation (LEC)	Engineer /System Studies & Corporate Planning	+231886979041
10.	Arthur S. Johnson	Liberia Electricity Corporation (LEC)	Engineer/ System Engineer	+231886578472
11.	Joseph T Mayah	Liberia Electricity Corporation (LEC)	DCEO	+231886511941
12.	Mark C. Falkornia	Liberia Electricity Corporation (LEC)	Procurement Analyst	+231886308665 +231777520107
13.	Alvyce Brown	Liberia Electricity Corporation (LEC)	Finance Officer	alvyceb@yahoo.com
14.	Diabeson F Beyan Jr	Liberia Electricity Corporation (LEC)	Procurement analyst	Dbeyanzg9@yahoo.com
15.	Matthew F. Konai	Liberia Electricity Corporation (LEC)	Assistant Planning Manager	+231880326485 +231777091960 kentelco@gmail.com kentelco@yahoo.com
16.	Varmunyah Sherif	Liberia Electricity Corporation (LEC)	Executive Director/ Administrator	+231886614525 varmunyah@yahoo.com
17.	Mark Broplelt	Liberia Petroleum Refining Company (LPRC)	Assistant manager technical services	+231886518890 mbrop@yahoo.com
18.	Frankien N. Cassell	Liberia Water & Sewer Corporation (LWSC)	DMO / TS	+213886453554 Frantcass54@gmail.com
19.	Patrick N. Sandikie	Liberia Water & Sewer Corporation (LWSC)	Manager/Ts	pnsandikie@yahoo.com
20.	Lawrence T Massaquoi	Ministry of Agriculture (MOA)	Assistant Director	+231886543623 Lawrencemassaquoi1@gmail.com

No.	Name	Organization	Position	Contact
21.	Dianoh V. Konwloh	Ministry of Information	Secretary	+231880436115 +231776439884
22.	Ernest Gray Davis	Ministry of Internal Affairs (MIA)/ Bomi County	Assistant	egraydavis@yahoo.com
23.	Al Mohammed S. Manobah	Ministry of Internal Affairs (MIA)/ Grand Cape Mount County	County Project Planner	+231886560067 almsmanobah@gmail.com
24.	Sylvester S. Lama	Ministry of Internal Affairs (MIA)/ Montserrado County	Assistant Superintendent for Development	+231886901011
25.	Augustine F. Taylor	Ministry of Public Works/ Infrastructure Implementation Unit (MPW-IIU)	Engineer	+231886958626 Engineertaylor45@gmail.com
26.	James B. Walker	Ministry of Public Works/ Infrastructure Implementation Unit (MPW-IIU)	Environmental Assistant	+231886443263 Jas_walker2006@yahoo.com
27.	J. Liama Canmu	Ministry of Transport (MOT)	Director	+231886556668 jliamacanme@yahoo.com
28.	Vivian Bynum	Monrovia City Corporation (MCC)	General Manager	+231777518443
29.	Philip J. Beah	Paynesville City Corporation (PCC)	Director Environment, Health & Safety	+231886837151 +231555123126
30.	Prince G. Troh	Paynesville City Corporation (PCC)		+231886453496
31.	Stephen P. Potter	Rural Renewable Energy Agency (RREA)	Program Director	+231886525505/+231777525505 stephenvpotter@yahoo.com

No.	Name	Organization	Position	Contact
32.	Boiyan Kpakolo	Ministry of Lands Mines and Energy	Assistant Minister	+231886125659 Bkpakolo55@yahoo.com

I. SUMMARY

A meeting was held at LEC's conference room between Liberia Electricity Corporation, and the various stakeholders in the presence of representatives from the Environmental Protection Agency. The purpose of the meeting was to brief stakeholder on the components that fall under the LACEEP-AF Project as well as the various environmental and social impacts that are associated with the project, obtain comments and suggestions from the key stakeholders on the project. Mr. Matthew Konai presented the following LACEEP AF components:

- Extension of electricity transmission and distribution systems and connection of new users; this include:
    - North-West Greater Monrovia Corridor: Proposed 66-Kilovolt (kV) transmission line that will run for 22km from Paynsville to Virginia connecting Gardnersville, Stockton Creek and Bushrod substations.
    - Monrovia – Kle – Tubmanburg Corridor: Proposed 66-Kilovolt (kV) transmission line that will run for 180km from Virginia to Tubmanburg connecting Kle, Robertsport, and Bo Waterside.
    - Proposed construction of new substations in Kle and Bomi Hills
    - Proposed Rehabilitation of Gardnersville, Stockton Creek and Virginia substations.
- Support for the strengthening of LEC's commercial capacity which includes technical assistance and incorporation of modern management information systems.

A short presentation (attached) on the project was provided. Concerns were voiced and questions asked. Generally, attendees were attentive and interested and their comments, concerns and suggestions were valid and should be taken into consideration.

II. PRESENTATION

Joseph T. Mayah, Deputy-CEO of LEC welcomed the attendees to the meeting. Eng. Mathew Konai, Assistant Planning Manager LEC, presented the LACEEP-AF Components. The presentation included a short project description and location and a brief on the EIA process in Liberia as well as the World Bank Safeguard Policies and requirements for such projects. It also included some of the main environmental and social impacts of the project and main mitigation measures that should be taken into consideration when ESIA and RAP are being prepared for such project in order to minimize these impacts.

a. Project Location
b. Project components
c. EPA Guidelines and World bank safeguard policies
d. Potential environmental and social impacts of LACEEP
e. Mitigation measures and monitoring
f. Institutional Arrangements

Institutional Strengthening and capacity building

III. KEY CONCERNS, RESPONSES AND RECOMMENDATIONS

Concerns, questions, comments and suggestions regarding many aspects of the project were raised by the participants during the consultation meeting. The purpose of this section was to focus on the concerns of the major stakeholders on the project. Some concerns were discussed in the meeting and should be taken into consideration whenever conducting ESIA and RAP for sub projects.

Concerns were raised by several stakeholders about capacity building, the need to sensitize and provide awareness to affected communities about the project, and the need to put in more effort on reducing power theft. Social, health and safety, and environmental impacts of the Project were also issues raised by the stakeholders. The stakeholders also stressed the need to appropriately compensate affected people along the ROW, as well as taking into consideration avoiding activities that could have unfavorable impacts on cultural sites or structures.

Mr. Konai also mentioned that ESIA and RAP will be prepared for each project in which site specific mitigation measures will be prepared and implemented during the construction and operational phases of this project.

The questions, concerns and comments raised during the meeting are presented in the below Table 0-1.

Table 0-1: Questions, concerns and comments raised during the meeting.

Institution	Name & Position	Concerns/ Questions/ Comments/Responses
CEDA Consult	Samuel W.D Wesley (RAP Consultant/ Manager)	• Which regulation LEC uses for Resettlement Action Plans (RAP) when there are differences between Liberian regulations and World Bank regulations? o Mr Konai and Mr Mayah (LEC) answered that since the project is funded by the World Bank, LEC makes sure to follow their regulations as long as they do not contradict with the Liberian regulations and in case of conflict the issue is discussed between Liberian governmental and legal authorities and World Bank to reach an agreement.
Environmental Protection Agency (EPA)	John K. Jallah Jr (ESIA Assistant Technical Coordinator)	• EPA ensures sustainable development by requiring public participations. • Establishing an Environmental and Social Management Unit (ESMU) is a good way to ensure that LEC work is in line with EPA procedures. • LEC should be careful when constructing and operating HFO Facilities especially in terms of fuel storage, disposal and transportation as HFO is a contaminant to water and air: o Mr Mayah (LEC) mentioned that LEC complies with the EPA regulations and contracts EPA certified contractors for movement/ disposal of HFO contaminated materials. o Mr. Hamdan (Earthtime) mentioned that the World Bank has specific requirement in terms of HFO handling. LEC has prepared an oil spill response plan and is required to have oil spill kits on site. Also, LEC is currently conducting onsite monitoring to collect environmental baseline data and to be able to detect any contamination occurring from the use of HFO on site.

Institution	Name & Position	Concerns/ Questions/ Comments/Responses
Environmental Protection Agency (EPA)	Varney L. Conneh (ESIA Assistant MQR)	• Environmental processes include four major entities: EPA which is a regulator and reviewer of environmental projects/ the project owners that want to implement projects that might affect the environment/ Independent evaluators that conduct the environmental studies/ and project affected communities. • The Scoping process of the ESIA should include methodologies used in public awareness such as community meetings, publishing of letter of intents in newspapers, etc. • Communication between different institutions and stakeholders is very important especially in areas where different projects intersect. • While working on the resettlement action plan, make sure you identify the exact buffer zone that should exist between an electric tower and the nearest structure and communicated clearly to the public. Also make sure you use government rates for real estate and lands, etc. and reach a clear final agreement with the involved communities and entities so that nobody can at a later stage contradict what was put in place.
Land Commission	Tom Wesley Korkpor (Program Assistant)	• Is cash compensation the only issue tackled in Resettlement Action Plan (RAP)? What about proposing new lands to resettled people? Helping them fit into new communities? o Mr Mayah (LEC), Mr Hamdan (Earthtime) and Mr Potter (RREA) explained that the presentation included the resettlement framework that gives general guidelines to be followed during the ESIA and RAP processes. When the project get approved a resettlement team will do a thorough study including field visits and meetings with the affected communities to reach an agreement on the best way of compensation whether it is by providing land or cash, etc. o Mr Wesley (CEDA Consult) and Mr Suah also explained that the World Bank policies and regulations require a detailed study to reach a fair agreement and compensation that benefit the affected communities. • How would World Bank help in increasing capacity? o Mr Konai (LEC) explained that part of the funding within the project is allocated for

Institution	Name & Position	Concerns/ Questions/ Comments/Responses
		trainings in different fields related to project management, technical support and customer serveries. • Since a full ESIA is not yet conducted, how did LEC knew the impacts and mitigations that were presented? o Mr Mayah (LEC) and Mr Hamdan (Earthtime) explained that this presentation represents a general framework study that was conducted for all the components under the LACEEP AF project and that provide general guidelines and a range of impacts and mitigations that are common tot these kinds of projects. A specific ESIA will be conducted for each subproject under the LACEEP project and these will include specific impacts and mitigations for each sub-project.
Liberia Petroleum Refining Company (LPRC)	Mark Broplelt (Assistant manager technical services)	• During implementation, does LEC expect any resettlement along the HFO pipeline between LPRC and LEC Bushrod Facility? o The pipeline has been rerouted to pass within the china union facility so no resettlement will be needed. The pipeline is not part of LACEEP AF; it is a project under LACEEP.
Liberia Water & Sewer Corporation (LWSC)	Frankien N. Cassell (DMO/TS)	• Clarification regarding the component of the project related to the support on the expansion of supply: o Mr. Konai (LEC) explained that an amount within the budget of this project is allocated to training and support on both technical and commercial levels. The support also includes new ways of generating electricity such as hydropower plants. • In such meetings it is recommended to circulate the presentation before hand, so that stakeholders have more time to go through it. • How is this LACEEP-AF project connected to the national power grid project? o Mr Mayah (LEC) clarified that the national power grid project is a common project between Liberia, Sierra Leone, Guinea and Ivory Coast (CLSG). The CLSG project will reach financial closure soon in the next weeks, but this project does not relate to the internal electrical

Institution	Name & Position	Concerns/ Questions/ Comments/Responses
		network system. The two projects are not related in terms of work but they complete each other as the power generated by the CLSG project will be distributed to the people using the systems and transmission lines that will be built under the LACEEP-AF. • EPA deserves credit for refining the EIA process and making it clearer. • How does EPA conduct monitoring of compliance with mitigation measures? What is the role of the environmental and social monitoring unit (ESMU) in LEC? o EPA representatives and Mr. Konai confirmed that the ESMU makes sure LEC is complying with the mitigation measures and reports to the EPA which reviews the ESMU work and conduct field visits to ensure compliance. • What is the methodology used in RAP in terms of property evaluation mechanism and the role of the government and how are disagreements addressed? o Mr. Konai (LEC) explained that the RAP is done by a professional expert. Field visits and assessments are conducted to identify entities that need resettlement, compensations amounts and methods of resettlement. This is then communicated to the affected members of the communities to reach an agreement. If agreement cannot be reached, the issue will be raised to government authorities and court to get settled.
Ministry of Internal Affairs (MIA)/ Bomi County	Ernest Gray Davis (Assistant superintendent for Development)	• Community police can help the Liberian National Police with power theft concerns along the route of the transmission. • The number of projected user should be reviewed and projected to include future users as well as current capacity especially with the increase of mining activities along the route.
Ministry of Internal Affairs (MIA)/ Grand Cape Mount County	Al Mohammed S. Manobah (County Project Planner)	• County Authorities should be involved during the RAP process as they can help communicating with their communities. • The number of estimated users should be reviewed as it does not accurately reflect the actual current capacity.
Ministry of Internal Affairs	Sylvester S. Lama (Assistant	• LEC should inform and involve the county's local government authorities when it comes to

Institution	Name & Position	Concerns/ Questions/ Comments/Responses
(MIA)/ Montserrado County	Superintendent for Development)	Resettlement Action Plans (RAP) especially in terms of affected areas/communities and names of people to be compensated, etc. Local authorities can take responsibility and help in stopping people from claiming ownership of lands after being compensated. • Communities can help in limiting power theft if good communication is established
Ministry of Lands, Mines and Energy		• Does LEC have any safeguards in place related to power theft? o Mr. Mayah advised that a unit is being prepared and equipped to perform patrols to monitor and minimize power theft. He also added that reducing power theft is one of Manitoba Hydro International goals and that agreement with Liberia National Police is being drafted on this issue.
Ministry of Public Work (MPW)	James B. Walker (Environmental Assistant)	• The ministry of public work already performed a RAP on the route going from red light to Kakata. Will LEC perform another RAP on this route and would this impact the ministries work along this route? o Mr. Konai explained that another RAP will be performed as the conditions between the two projects is different, but coordination between LEC and the ministry can take place to check common points.
Ministry of Public Work (MPW)	Augustine F. Taylor (Engineer)	• Collaboration between all stakeholders is necessary to ensure sustainable development.
Ministry of Transport (MOT)	J. Liama Canmu (Director)	• Meetings and good communication with community leaders can help in minimizing power theft and increasing security for the components of the project. • The ease of connection to the electricity network should be taken into consideration as some people live very close to transmission lines but cannot get connected to the network which increases power theft. • Is there communication between LEC and the ministry of transport regarding HFO Transport: o Mr Mayah (LEC) advised that communication regarding petroleum products transport is with LPRC, but LEC will consult the minister of transport and check if there is a requirement for

Institution	Name & Position	Concerns/ Questions/ Comments/Responses
		communication between the two entities regarding this issue.
Monrovia City Corporation (MCC)	Vivian Bynum (Chief of Staff)	• Raising public awareness and conducting community meetings to explain the project to the different communities and reach a common consensus between the communities is recommended and can help in many aspects during project implementation especially in resettlement aspects.
Rural Renewable Energy Agency (RREA)	Stephen P. Potter (Program Director)	• Does EPA review the ESIA before project implementation? o When an environmental report is generated, EPA reviews it and conducts field inspections before issuing an environmental permit. Based on this review EPA decides if a permit will be issued or not and the conditions that should apply under this permit.

APPENDIX I LIST OF STAKEHOLDERS

earthtime

Stakeholder Consultation Meeting
ESMF for Liberia Accelerated Electricity Expansion Project - Additional Financing (LACEEP-AF)
LEC Conference Room
March 26, 2015

Attendance Sheet

№	Name	Organization	Position	Phone No./Email	Signature
1.	SYLVESTER S. LAMA	MONTSERRADO COUNTY/MIA	ASSISTANT SUPERINTENDENT FOR DEVELOPMENT	0886901011 [illegible]@gmail.com	[signature]
2.	Philip J. Beah	Paynesville City Corporation	Director Env. Health + Safety	0886837151 0555123126	[signature]
3.	Mohammed L Sow	LEC	Eng / System Studies & Corporate Planning	0886979041	[signature]
4.	Arthur S. Johnson	LEC	Eng. System Eng.	0886618472	[signature]
5.	Frankie N. Cassell	LWSC	DMD/TS	0886453554 [illegible]	[signature]
6.	MARK BROPLEH	LPRC	Asst. Mgr./ Tech. Serv.	0886518890 mbrop@yahoo.com	[signature]
7.	WASSIM HAMDAN	EARTHTIME	Managing Director	0886 700060 whamdan@earthtimegroup.com	[signature]
8.	Joseph T. Nkayah	LEC	DCEO	0886511941	[signature]

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№	Name	Organization	Position	Phone No./Email	Signature
9.	VARNEY L CONNEH	EPA	ESIA Asst. Mgr.	0886531024 clvarney68@yahoo.com	
10.	John K. Jallah Jr	EPA	ESIA Asst Tech Coord.	0777797160 jkj2946@gmail.com	
11.	Lawrence T. Massaquoi	MOA	Assistant Dirct.	0886543623 lawrencemassaquoi2@gmail.com	
12.	Prince G. Tiah	PCC	Driver	0886453496	
13.	Vivian Bynum	MCC	Chief of Staff	0886113275	
14.	Michael V. Sack	Earth Environmental	General Manager	0777518443	
15.	MARK T FALLORNA	LEC	PROCUREMENT ANALYST	0886-308-666 0777-520-107	
16.	Dianah V. Konulah	Ministry of Information	Secretary	0880436115 0776439884	
17.	Al Mohammed S Manobah	MIA/Cape Mount	County Project Planner	0886560067 almsmanobah@gmail.com	
18.	AUGUSTINE F. TAYLOR	MPW/IIU	Engineer	engineertaylor45@gmail.com 0886056626	
19.	James B. Walker	IIU/MPW	Environmental Assistant	jas.walker2006@yahoo.com 0886443263	

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№	Name	Organization	Position	Phone No./Email	Signature
20.	J. Liama Cammue	Ministry of Transport	Director	0886556668 jliama cammue@yahoo.com	
21.	Stephen V. Potter, Sr	RREA	Program Director	0886/0777/525-505 stephenvpotter@yahoo.com	
22.	Basma Chamas	Earthtime	Consultant	0888 300 766 bchamas@earthtimegroup.com	
23.	Patrick N. Sandikie	LWSC	Manager/TS	pnsandikie@yahoo.com	
24.	Ernest Gray Davis	MIA/Bomi Co	Asst Supt for Dev. Bomi Co	egraydavis@yahoo.com	
25.	Alvyce Brown	LEC	Finance Officer	alvyceb@yahoo.com	
26.	Dickerson F. Beyan Jr	LEC	Procurement Analyst	dbeyanjr@yahoo.com	
27.					
28.					
29.					
30.					

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STAKEHOLDERS' CONSULTATION MEETING ON THE REVISION AND UPDATING OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF) AND RESETTLEMENT POLICY FRAMEWORK (RPF) TO REFLECT THE ACTIVITIES ASSOCIATED WITH THE IMPLEMENTATION OF THE LIBERIA ACCELERATED ELECTRICITY EXPANSION PROJECT – ADDITIONAL FINANCING (LACEEP AF), LIBERIA ELECTRICITY CORPORATION (LEC) CONFERENCE ROOM, WATERSIDE, MONROVIA
THURSDAY, MARCH 26, 2015

NO.	NAME	JOB TITLE	INSTITUTION	PHONE NO.	EMAIL ADDRESS
1	MATTHEW F. KONAI	ASSISTANT PLANNING MANAGER	LEC	0777 09 1960 0880 32 6485	kentelco@gmail.com kentelco@yahoo.com
2	J. Liama Ganma	Director	Ministry of Transport	0886556668	jliamaganma@yahoo.com
3	AUGUSTINE F. TAYLOR	ENGINEER	LIU/MPW	0777228166 0886958626	engineertaylorajs@gmail.com aftaylor36@yahoo.com
4	JAMES B. WALKER	Environmental Officer	LIU/MPW	0886HM3265	JamesWalker2006@yahoo.com
5	Boiyan Kpakolo	Assistant Minister	LME	0886-125-659	bkpakolo55@Yahoo.com
6	Tom-Wesley KORKPOR	Program Assistant	Land Commission	0850 773 020	tomkorkpor@gmail.com
7	Philip J. Beah	Director ENV. Health	Paynesville City Corp	0886837151 0555123126	philipjbeah47@gmail.com
8	SYLVESTER S. LAMA	ASSISTANT SUPERINTENDENT FOR DEVELOPMENT	MONTSERRADO COUNTY MIA	0886901011	Saysylama@gmail.com
9	Stephen V. Potter, Sr.	Program Director	RREA	0886525505	Stephenvpotter@yahoo.com

STAKEHOLDERS' CONSULTATION MEETING ON THE REVISION AND UPDATING OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF) AND RESETTLEMENT POLICY FRAMEWORK (RPF) TO REFLECT THE ACTIVITIES ASSOCIATED WITH THE IMPLEMENTATION OF THE LIBERIA ACCELERATED ELECTRICITY EXPANSION PROJECT – ADDITIONAL FINANCING (LACEEP AF), LIBERIA ELECTRICITY CORPORATION (LEC) CONFERENCE ROOM, WATERSIDE, MONROVIA
THURSDAY, MARCH 26, 2015

NO.	NAME	JOB TITLE	INSTITUTION	PHONE NO.	EMAIL ADDRESS
10	VARNEY L CONNEH	SSIA Asst. Mgr.	EPA	088653029	clvarney68@yahoo.com
11	John K. Jalkl Jr	Assit Coordinator ESIA	EPA	0777797160	jkjzg45@gmail.com
12	Michael V. Suah	General Manager Earth Environmental	Earth Environmental Consultancy	0777518443	michael.suah@yahoo.com
13	Joseph T. Mayah	DCEO ~~LEC~~	LEC	0886511941	tambumayh@yahoo.com
14	WASSIM HAMDAN	~~CHIEF EXECUTIVE~~ Managing Director	EARTHTIME	0886 700060	whamdan@earthtimegroup.com
15	SAMUEL W.D. WESLEY	manager CEDA	CEDA	0880767181	ceddiberia@gmail.com
16	Varmuyah Sheriff	EX. Director Adm	LEC	0886614525	Varmuyah@yahoo.com
17	MARK T. FALKONIA	PROCUREMENT ANALYST	LEC	0886-308-665	falkoniamark@yahoo.com
18	Patrick N. Sandikie	Technical Services Mgr.	LHSC	0886516079	pnsandikie@yahoo.com

STAKEHOLDERS' CONSULTATION MEETING ON THE REVISION AND UPDATING OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF) AND RESETTLEMENT POLICY FRAMEWORK (RPF) TO REFLECT THE ACTIVITIES ASSOCIATED WITH THE IMPLEMENTATION OF THE LIBERIA ACCELERATED ELECTRICITY EXPANSION PROJECT – ADDITIONAL FINANCING (LACEEP AF), LIBERIA ELECTRICITY CORPORATION (LEC) CONFERENCE ROOM, WATERSIDE, MONROVIA
THURSDAY, MARCH 26, 2015

NO.	NAME	JOB TITLE	INSTITUTION	PHONE NO.	EMAIL ADDRESS
19	Al Mohammed S. Manobah	County Project Planner	Cape Mount	0886560067	almsmanobah@gmail.com
20	Ernest Gray Davis	Asst Supt for Development	Comi Co. Ministry of Internal Affairs	0886578734	egraydavis@yahoo.com
21	Lawrence T. Massaquoi	Assistant Director MOA	Ministry of Agriculture	0886543623	lawrence massaquoi1@gmail.com
22	Vivian Doe-Bynum	Chief of Staff	Monrovia City Corporation	0886113275	vannehdoe@gmail.com
23	Mohamed L Sow	Env/System Safeguards Corporate Plan	LEC	0886979041	molasow@yahoo.com
24					
25					
26					
27					