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Design of Priority Sections of the Coastal Highway in Liberia

Contract No. EDF/2016/374 548

DETAILED DESIGN Part 6 ESIA

SANNIQUELLIE - LOGUATUO

March 2018

Republic of Liberia

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT

Part 6 of the Coastal Highway Project- Liberia: Construction of Road from Sanniquellie to Loguatuo in Nimba County

March 2018

List of Acronyms	
AfDB	African Development Bank
ASTM	American Society for Testing and Material
CASD	Community Affairs and Sustainable Development
CFSNS	Comprehensive Food Security and Nutrition Survey
DCP	Dynamic Cone Penetrometer
EC	European Commission
EDF	European Development Fund
ESAP	Environmental and Social Assessment Procedures
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Mitigation Plan
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EU	European Union
FAD	Food and Agricultural Organization
FAPS	Food and Agricultural Policy and Strategy
FDA	Forestry Development Agency
GoL	Government of Liberia
HPMMR	Hybrid Performance Based Maintenance and Management of Roads
IFC	International Finance Corporation
LEPA	Liberia Environmental Protection Agency
MDG's	Millennium Development Goal
MPW	Ministry of Public Works of Liberia
PEA	Preliminary Environmental Assessment
PRS	Poverty Reduction Strategy
PUPs	Private Use Permits
PEMP	Provisional Environmental Management Plans
RAP	Resettlement Action Plan
RoW	Right of Way
TMP	Traffic management Plan
UNCED	United Nations Conference on Environment and Development

EXECUTIVE SUMMARY

Introduction:

After the war that ended in 2003, the Government of Liberia, with the assistance of the donor community, developed in 2008 the first Poverty Reduction Strategy (PRS). The PRS defined the development programme of the government of Liberia. It was implemented between April 1, 2008 and June 30, 2011 (the end of the 2010/2011 fiscal year). The main thrust of the first PRS was to build on the country's potential. It considers transport as a key factor in reducing poverty and raising living standards in the medium and longer term. The National/Regional Indicative Programme of the 10th EDF signed by the Government of Liberia and the European Commission reflects the EC's willingness to support the transport sector in Liberia. Within the framework of this Indicative Programme, it has been foreseen to allocate funds for feasibility studies, detailed designs, optional procurement services and optional supervision of works, of which the Environmental and Social Impact Assessment for Phase 6 of the Coastal Highway project; stretching from Sanniquellie to Loguatuo.

Guidelines and ESIA Procedure:

The Environmental Impact Assessment Procedural Guidelines (2006) produced by the EPA provides detailed guidance on the procedures to be adhered to when undertaking an EIA. This in addition to Guidelines of the EU and AfDB was adopted in preparing this report.

Policy, Legal and Administrative Requirements:

This ESIA for the proposed Road Construction project was conducted within the policy, legal and institutional framework of the Liberia EPA, EC, AfDB and relevant international environmental conventions to which the Government of Liberia is a signatory.

Project Description:

The proposed project is the road construction from Sanniquellie, in Nimba County to Loguatuo also in the same County at the Ivorien Border. The proposed project will be implemented along the already existing mud roads. The Sanniquellie to Loguatuo road covers an estimated distance of 47.98km. The Right of Way (RoW) for the project will mostly follow the already existing unpaved roads. The overall impact is expected to affect mostly vegetation and the several rivers along the Sanniquellie to Loguatuo stretch.

Project Alternatives:

The ESIA evaluated alternative approaches to achieving the desired outcomes of the development effort under review. Both the "No Action" scenario and the project option were reviewed and captured in the following sections. The "No Action" scenario was not considered a viable alternative. The re-construction alternative represents a more realistic option. The project will bring significant benefits to communities along the road and the general population, while the negative impacts will be managed.

Cumulative Impacts

Cumulative impacts are those impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the proposed Phase 6 Coastal Highway Project. Cumulative impacts are therefore generally impacts that act with others in such a way that the sum is greater than the parts. This is, however, not always the case – sometimes they will simply be the sum of the parts, but that sum becomes significant. Although specific management measures are laid out in later sections of this ESIA, the following measures will help to holistically mitigate and manage all cumulative impacts: First, undertaking a Strategic County Environmental and Social Impact Assessment: A

strategic regional impact assessment would allow a comprehensive assessment of potential impacts that may result from the development of the road and the power lines and other immediately planned projects in the area along this corridor of the Nimba county. This type of assessment would consider the cumulative impacts associated with the presence of these projects and would prevent isolated and iterative decision-making. The assessment would require greater integration and planning by the various project sponsors and implementers and should be led by the Government of Liberia. Such an assessment would ideally feed into combined and issue-specific mitigation and enhancement measures. Secondly, is the option of Shared Infrastructure: Proposed project implementers along this corridor should agree between them where possible, to share infrastructure (viz. access roads and transportation routes inside their project areas) to reduce the potential disturbance caused by installing several similar infrastructure in close proximity to each other.

Description of the Project Environment:

The most distinctive landforms of northern Nimba County are the Nimba Range of mountains. These are dominated by a ridge which runs 40km in a north-east to south-west direction along the GuineanIvorian border, across the Guinean-Liberia border and on for the remaining half of its length. The mountains' highest point is 1752m above sea level, on the Guinean section of the main Nimba ridge, and is known as Mount Richard-Molard; in Liberia, the highest point is 1300m on the same ridge, and referred to in this document as 'Mount Nimba'. In northern Nimba County the significant but isolated peaks of Tokadeh, Beeton and the twin peaks of Gangra and Yuelliton lie to the west of the main Nimba Ridge. Climate in this saharian country alternates between drought and very heavy rainy seasons. Liberia has a tropical climate with average temperatures of 27°C. There are relatively small variations between day and night and between seasons, with temperatures almost always below 37° C and over 20° C. There are two seasons: the wet from May to October and the dry from November to April. It seldom rains during the dry season, though there are dry periods during the rainy season, including a dry spell in July or August lasting about two weeks. The annual rainfall averages 4.000 mm inland and very high intensities are frequent. The average humidity on the coastal belt is 78% during the wet season, but it is liable to drop to 30% from

December to March when the Harmattan winds blow from the Sahara. Liberian Geology is mainly dominated by the presence of igneous rocks of the Leo and Man Shield of the West African Craton, metamorphic rocks, and its weathering products. Most areas of the project corridor develop in the Pan African Belt. The rocks of the region have Paleoproterozoic age. Over them, some alluvial flood plains are developed, particularly in bands close to the main rivers.. Also some Aeolian deposits are conspicuous, related to the Harmathan winds from the Saharian Region. The project corridor is within the tropical rainforest area. However, much of the forest has been replaced with secondary vegetation resulting from forest clearance for agricultural purposes and other form of forest exploitation. The present vegetation is composed of rubber trees, open grass vegetation, farm plots, plantain, maize, cassava, pineapple, shrubby vegetation, and numerous palm trees. Very few occasional patches of high virgin forest can be seen within the corridor. The Liberian forest serves as habitat for large amounts of endemic fauna and is a unique ecological niche for some of the rarest species in the world. The Jentink's duiker (the rarest in the world), white-breasted guinea fowl, pygmy hippopotamus, Diana monkey, Liberian mongoose, the giant forest hog, chimpanzees, red colombus (a long-tailed monkey), bongo antelope, leopard and the golden cat are amongst the animal population inhabiting Liberia's forests. It is also home to hundreds of birds, nine of which are endangered; several dozens of reptiles, including three types of crocodiles and at least eight poisonous snakes; amphibians and at least a thousand different insects. The population of Liberia has grown significantly in the last thirty years and has become increasingly unevenly distributed among the counties; the five most populous counties (Montserrado, Nimba, Bong, Lofa, and Grand Bassa) make up approximately 69.9% of the population. Bong, Lofa and Nimba counties make up what is often referred to as North Central Liberia. Rural Liberians depend primarily on agriculture for their livelihoods; nearly 70% of rural Liberians rely on crops only; a little over 20%, however, do not depend on agriculture at all. All two counties are significantly more involved in crop production than livestock rearing. Even though the problems surrounding limited agricultural productivity and weak markets affect everybody in rural areas, men and women experience these problems differently because each have different roles and opportunities in agriculture. It is estimated that women in Liberia comprise 53% of the agricultural labor force and produce 60% of agricultural output. They tend to be more involved with food crops as opposed to cash crops: women contribute approximately 42.5% of the labor for food crops as compared to 35.3% of men; 31.5% of labor for cash crops compared with 48.5% by men (CSFNS). Fifty percent of women engage in agricultural processing activities as

compared to 25% of men. Rural women are also heavily involved in trading in markets, carrying out 80% of trading activities in rural areas and thus playing a vital role in linking rural and urban markets. (WB Gender Assessment, 2007). While prior to the regime of President Samuel Doe during the 1980s there was little strife between ethnic groups, ethnic tensions were greatly exacerbated during the Civil War as a result of political manipulation (Ellis, 1999). While such violent conflict has since almost completely subsided, there still exists periodic tension, usually involving land, that tends to fall along ethnic/religious lines (Heaner, 2008; US Dept. of State, 2012). Therefore, ethnicity should be considered in any project that will connect communities and bring in 'outsiders' of various ethnicities. Liberia is made up of at least sixteen ethnic groups (other African ethnic groups are represented in very small numbers) that tend to be concentrated around certain parts of the country, though all ethnic groups can be found throughout, especially in the nation's capital, Monrovia. Villages and clans tend to be made up of members from the same ethnic group, especially in very rural and cut-off areas.

Identification and Assessment of Environmental Impacts:

The identification and assessment of impacts of the project was conducted by conducting desk top reviews and field studies a well as consultations with all relevant stakeholders. Impacts were identified to occur during the construction phase and the operation phase. The construction phase impacts include; disruption of road usage, impact on; biodiversity, water ways, drainage, traffic, infrastructure, properties and land use patterns, resettlement etc. The anticipated post construction impacts include; Poor reinstatement of the construction site; improper disposal of construction and life camps waste; demobilization of the contractor from the area may also have a negative impact on those who have succeeded in making good business with the contractor and the workers, resulting in a downturn in economic activity. The anticipated positive impacts include; Improved access to communities and facilities within all settlements; increased frequency of private sector investment and other businesses due to access; stimulation of the development of other social amenities, such as building of health centers, schools, bore holes and major development agenda among others. The most significant impact that often arises from road construction projects is that of resettlement. However, the existing RoW largely follow the old existing dirt road and since some structures are too close to the RoW for safety, there will be the need for relocation. It is envisaged (based on the overall strategy of the

project) that quality of life for residents along the corridor would be improved even with the proposed resettlement plans.

Provisional Environmental Management Plan:

To mitigate environmental impacts, the project implementers seek to; enter into a contract agreement with experienced and competent contractors who will accept moral and contractual obligations to avoid unnecessary nuisance to the local communities or delays to the completion of the works; secondly employ the professional services of an experienced and reputable engineer on site, to supervise the contractors in all aspects of planning, programming, quality control with broad social and environment protection formulated under the environmental management plans and in addition, all contractors and their employees would be educated on the Environment and Social Action Plan (ESAP) including the Environmental Management Plan (EMP) for the construction phase to ensure that contractor's work plans reflect the environment and social action plans to meet the desired sustainability objectives in the project implementation. The proposed ESMP of the project is planned to cover these three broad areas: Liberian, EU and AfDB corporate policies and legislative framework on environment, safety, health, and wellbeing, and human rights and community relation; Environmental and Social Impacts as well as provide an Environmental and Social Management Plan.

Environmental and Social Monitoring Program:

Environmental monitoring of the project is planned to ensure that impacts have been accurately predicted and that mitigation measures are being implemented as planned and has the assumed effects. The monitoring exercise will: Ensure that the remedial actions recommended in the environmental assessment are incorporated in the project; ensure that remedial measures are maintained throughout the operation life where appropriate; identify additional remedial measures; and identify corrective measures or redesign remedial measures if they are not sufficiently effective. All major stakeholders in the project have a monitoring responsibility of some kind.

Public Consultations:

Extensive consultation with stakeholders, especially at the project inception stage, was undertaken as part of the assessment of the impacts of the project. The outcomes of the consultations were incorporated in determining the main issues of environmental

and social significance. Based on the mapping of stakeholders, the following were identified as the key stakeholders to be consulted with regard to the project: Local community: Community leaders and project affected persons; planning and administrative authority: County Superintendent; regulatory institutions: EPA, FDA, Community Health Services and policy makers and MPW. The concerns of the local communities were not many as they welcomed the proposed improvements the project would bring. Attitudes could however change at the commencement of the project. In order to reduce friction and facilitate the project, it is imperative that: The local community be involved from the onset and made to feel a sense of ownership; the Executing Government Agency should incorporate the EU and AfDB's Policy Goal, Objectives and Guiding Principles in Resettlement; and finally, a comprehensive Environmental and Social Management Plan (ESMP) is recommended.

Conclusion:

This Environmental and Social Impact Assessment was conducted in accordance with the Terms of Reference provided by MPW and the EU/AfDB's ESIA Procedures. The following are conclusions drawn from the study: The project affected communities have given unanimous approval to the project as proposed; A number of negative construction related impacts were identified, but these may be considered as temporary. Mitigation measures for all of these have been identified and will be included in the Environmental Social Management Plan; The expected range of social and economic benefits to the affected communities was clearly identified and will compensate for the temporary negative impacts during construction.; The goal of the Road Project is to enhance rural accessibility and connection to neighbouring Cote D'Ivoire to improve the quality of life of the people of the Nimba County; For the project to become very useful during the operational phase, it is recommended that, complimentary projects such as road safety campaigns and traffic regulations be enforced along the route; The proposed project is a good developmental choice and it is recommended that all stakeholder Authorities and Agencies lend their maximum corporation.

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1.0 INTRODUCTION

1.1 LIBERIAN COASTAL HIGHWAY PROJECT - OVERVIEW

After the war that ended in 2003, the Government of Liberia, with the assistance of the donor community, developed in 2008 the first Poverty Reduction Strategy (PRS). The PRS defined the development programme of the government of Liberia. It was implemented between April 1, 2008 and June 30, 2011 (the end of the 2010/2011 fiscal year). The main thrust of the first PRS was to build on the country's potential. It considers transport as a key factor in reducing poverty and raising living standards in the medium and longer term. Since then, a new Poverty Reduction Strategy called The Agenda for Transformation, Steps toward Liberia RISING 2030, covering the period 2012-2017 has been developed and is now underway. The activities related to Infrastructure are now part of Pillar II – Economic Transformation, more specifically Sector Goal C: Infrastructure.

Together with the wider economy the transport system was devastated by the long period of war. Value added by the transport and communication sector in Liberia fell by 69% between 1987 and 2005. However, following policy reforms introduced by the new government, Liberia has made substantial progress.

Liberia's growth strategy is based on rebuilding roads and other critical infrastructure; reviving the traditional engines of growth in mining, minerals, forestry, and agriculture; and establishing a competitive business environment to help diversify the economy in the medium-term. However, the majority of roads are unpaved and unable to provide all-year access to either county or district headquarters. Vehicle operating costs, fares and tariffs are, consequently, very high. The Liberian long and intense rainy season makes it one of the harshest for maintaining roads. Some 3 000 to 5 000 mm of rain falls

per annum, concentrated over a 5-6 month rainy season from May to October, though some rain falls during every month of the year. Cursory observation indicates that laterite (gravel) roads never fully dry during the rainy season.

The European Union has been a long-term development partner with Liberia and has been in the past years (and still is) the largest grant donor. Based on its own research and recommendations, the EU, with the approval of the Government of Liberia, intends to focus their assistance to the transport (road) sector in Liberia, which involves what is described as the Coastal Highway Project including;

- Hybrid Performance-based Maintenance and Management of Roads (HPMMR);
- Feasibility Studies, Designs and optional Supervision services for:
  - Improvement/expansion of sections of the Coastal Corridor, connecting Sierra Leonean Border (Bo River) - Monrovia – Buchanan – Greenville – Harper;
  - Upgrading of the section Toe Town to the border crossing with Ivory Coast;
  - Upgrading the road Sanniquellie in the Nimba County to Danané in Ivory Coast

The National/Regional Indicative Programme of the 10th EDF signed by the Government of Liberia and the European Commission reflects the EC's willingness to support the transport sector in Liberia. Within the framework of this Indicative Programme, it has been foreseen to allocate funds for feasibility studies, detailed designs, optional procurement services and optional supervision of works, of which the Environmental and Social Impact Assessment for Phase 6 of the Coastal Highway project; stretching from Sanniquellie to Loguatuo

1.1 PURPOSE OF THE ESIA

The Environmental Impact Assessment Procedural Guidelines (2006) of the Liberian EPA provides detailed guidance on the procedures to be adhered to when undertaking an ESIA. This in addition to Guidelines of the European Commission and AfDB was adopted in preparing this report.

1.1.1 METHODOLOGY OF ASSESSMENT

In undertaking the ESIA, full and regular liaison has been maintained with the EPA throughout the assessment process. The assessment consists of two main components:

- Environmental Baseline Study, which involved gathering of environmental data from the project area; and
- Impact Assessment (the prediction and study of the impact that the proposed project would have on the existing environment) and the suggested measures to mitigate the negative impacts.

The ESIA commenced with desk study, involving the following:

- Review of literature related to the project and also of both the historical and present environment of the area.
- Review of various maps, including those from road construction projects along the RoW.

This was followed by field visits to study the area and to collect baseline data. This field study was carried out by experts in the various fields to be covered in the impact assessment. In the field, settlements and the communities within the project area were visited and activities carried out included:

- Consultations;

- Field observations and Tests;
- Conduct of interviews and panel discussions; and
- Taking of relevant photographs.

The following groups and institutions were consulted:

- EPA ;
- MPW;
- Heads and members of the various communities; and
- Nimba County Authorities.

1.2 LAYOUT OF EIS

In accordance with the Liberia EPA's Environmental Impact Assessment and Procedural Guidelines (2006), this ESIA incorporates a series of chapters describing various aspects. This has been presented in the following chapters as required by the Liberian Environmental Protection Agency (EPA) as follows:

Executive Summary

The executive summary presents the most important findings of the report in a very concise and non- technical manner that is particularly suited for decision-makers in order to facilitate the comprehension of the study and corresponding decision-making.

- *The Project Description*: covering description of the proposed project and how environmental impacts will be resolved.
- *Findings:* including assessed environmental impacts, recommended mitigation measures, and recommended monitoring program. Significant environmental impacts will also be highlighted.

Introduction-overview of the project

This section will cover data regarding the ESIA scope including:

- ESIA objective and Scope;
- Project Rationale: describing the principle of the project along with a review of similar projects and methods used therein to identify, predict and evaluate impacts.

Policy, legal and administrative framework

This section of the EIA report sets the policy, administrative and legal basis within which the project may be implemented. Regulations and standards applicable to the project should be referred to.

Detailed project description

This is a detailed statement of all the critical activities which will be involved in the proposed project including construction phase, through to operational phase of the road. Most development projects like this one involve two stages; construction and operation.

Construction Phase

The construction activities associated with the proposed project should be described in this section of the Environmental Impact Assessment.

Operational Phase

This section of the Environmental Impact Statement should discuss the environmental issues related to the operation of the project. The report should discuss the expected lifespan of the project and any planned updates to the facility over that time frame.

Description of the Environment

The project environment is described in this section. This includes description of the biological environment, physical environment, and human environment.

- *Biological Environment:* This section describes vegetation at and around the project site, presence of flora, fauna rare and endangered species; as well as endemic flora and fauna.

- *Physical Environment:* This section covers Geology, topography, soil types, climate; ambient air; noise; seasonal changes; etc.
- *Human Environment:* This Environmental Impact Statement addresses land use including, residential and community features, agriculture and industrial at and around the project area including information concerning existing infrastructure (roads, utilities).

Impact Prediction and Evaluation

The Environmental Impact Assessment describes the positive and negative effects which the project may have on the environmental features.

Socio-economic analysis of project impacts

The socio-economic characteristic of the existing location are identified. The impacts of the proposed project on the socio-economic environment are then analysed. The analysis includes the use of land, the main economic activities, and employment. Impacts are categorized in terms of positive and negative.

Identification of Alternative

The ESIA will assist decision-makers in selecting optimum alternatives whether related to the materials, process/technology or selected sites. All the alternatives taken into account in developing the project are documented. An analysis of the "no action" alternative is also included.

Environmental Management Plan (EMP) and Mitigation Measures

The following issues are addressed in a provisional EMP found in this Report:

- Summary of Impacts
- Description of mitigation measures
- Description of monitoring programmes
- Assignment of responsibilities for plan implementation

- An impact management strategy to correct larger than predicted changes
- Implementation and Reporting procedures

A full ESMP report will be developed that covers all requirements.

Monitoring Program

A detailed environmental monitoring programme/plan is defined to identify the necessary monitoring activities to ensure proper process and performance efficiency of the project.

Public Participation

The proponent's plans for public consultation are detailed in this section of the Environmental Impact Statement.

Conclusion and Recommendations

This section makes a conclusion on the project as described in the report. It also concisely incorporates the mitigation measures that are planned for the project.

Annexes

The annexes in this report include:

- Reference documents
- Attendance Lists of Public Consultation sessions

2.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This ESIA for the proposed for the Phase 6 of the Coastal Highway Road project was conducted within the policy, legal and institutional framework of the Liberia EPA, European Commission, AfDB and relevant international environmental conventions to which the Government of Liberia is a signatory.

2.1 LIBERIAN NATIONAL ENVIRONMENTAL POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1.1 THE NATIONAL ENVIRONMENTAL POLICY OF LIBERIA

The National Environmental Policy Provides:

- The systematic and logical framework by which to address environmental issues. Section 4.7 of the policy calls for an EIA on all major developmental, socio-economic and land use activities in any form which may have adverse effect/impact on the environment to one degree or another Benchmark for addressing environmental problems in the medium and long term
- Context for financial donor support to particular sector and non-sector projects
- Demonstration of Liberia's commitment to sustainable management of the environment and natural resources.

2.1.2 THE ENVIRONMENT PROTECTION AND MANAGEMENT LAW

The approved law provides:

a. Regulations for conducting EIAs
b. Tools for environmental management
c. Framework for the effective enforcement of environmental standards
d. Sector-specific regulations

e. Integration of concepts of international environmental laws into national environmental protection and development frameworks

2.1.3 THE ACT CREATING THE ENVIRONMENTAL PROTECTION AGENCY

This act provides for:

a. An autonomous entity empowered to ensure that environmental policies and laws are implemented
b. A Policy Council to propose and update environmental policies as required/needed
c. An institutional arrangement that supports the agency in carrying out its mandate/functions

2.1.4 THE NATIONAL TRANSPORT MASTER PLAN OF LIBERIA

The focus of this plan is on a number of strategic objectives, namely to:

- Rehabilitate, reconstruct and construct primary/secondary, feeder and neighbourhood roads;
- improve the transport sector through effective systems and infrastructure for quality service provision;
- improve urban and rural transport; and build human resource capacity.

2.1.5 COMMUNITY RIGHTS LAW

This provides:

- Community rights guidance regarding ownership and use of forest land resources. It aims to empower communities to fully engage in the sustainable management of the forests of Liberia by creating a legal framework that defines and supports community rights in the management of forest resources;
- For all forest resources on community forest lands to be owned by local communities;

- For all forest resources in Liberia, regardless of any proprietorship, to be regulated by the Forestry Development Authority for the benefit of the people, except forest resources located in community forests and forest resources that have been developed on private or deeded land through artificial regeneration (see Recent Development in Forestry Regulation above);
- For any decision, agreement or activity affecting the status or use of community forest resources to not proceed without the prior, free, informed consent of said community;For the recognition of community land tenure rights such that they shall apply to tenure systems recognized by the Constitution and laws of Liberia;
- For all matters related to land tenure and proprietorship to be dealt with by the Land Commission in accordance with national land policies issued and legislations enacted;
- For the Authority to perform its duties in a fair and impartial manner to ensure that all communities equitably benefit from the Authority's technical assistance and support in the management of community forest resources;
- For all forest resources to be regulated, protected, managed and developed so as to;

- Sustain and optimize the potential yield of their economic, social and environmental benefits;
- Ensure the fair and equitable distribution of their economic, social and environmental benefits to members of society;
- Promote community-based forest management with the vision of granting communities the right to manage forest resources;
- Develop the capacities and capabilities of communities to enable them equitably participate and benefit from sustainable management of forests;
- Conserve natural resources, biological diversity, ecosystems and habitats;
- Encourage the active participation of all members of society; and
- Promote aesthetic and cultural value of the Liberian society,

2.1.6 CUSTOMARY LAW

This Provides:

- That the administration of justice in the hinterland are government-created customary courts, presided over by the chiefs while commissioners and superintendents are involved with administrative duties and as agents of executive oversight. (Article 65 of the Constitution);
- That Statutory circuit courts are legally allowed to review customary law decisions, but this is very rarely done; and
- That [the administration of] tribal affairs through tribal chiefs who shall govern freely according to tribal customs and traditions so long as these are not contrary to [statutory] law.' (Article 29, the General Rule of Administration within customary law includes a number of guidelines that deal with land ownership, resource allocation and appropriate measures for decision-making that will come into play in all phases of the road construction project

2.1.7 LAND RIGHTS AND LAND TENURE POLICY

The 2013 Land Rights Policy approved by the Liberian Land Commission makes puts is clear on the approach to be adopted by government and government agencies in land acquisition for projects either from customary or private owners. The next paragraph summarizes the various ways that land can be acquired by government for development.

There are four ways in which the Government may acquire land. The Government may acquire Private Land and Customary Land through mutual agreement, eminent domain, or donation. In addition, the Government may acquire Private Land, but not Customary Land, through reversion. The new land policy recommendations (found in section 5.3 of the new land rights policy document) are designed to ensure the Government exercises eminent domain consistent with international best practices and in a manner that balances the Government's constitutional powers with the fundamental constitutional right of Private Land and Customary Land ownership.

2.2 EU'S ENVIRONMENTAL POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

EU's requirements for preparing Scoping Statements as well as for coordinating with host country ESIA requirements, are presented in section 1.3.1 of this scoping statement.

2.3 AfDB'S ENVIRONMENTAL POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

AfDB's requirements for preparing Environmental Impact Statements as well as for coordinating with host country ESIA requirements, are presented in section 1.1.1 of this EIS.

The AfDB has an Integrated Safeguards System(ISS) which consists of an Integrated Safeguards Policy Statement, Operational Safeguards (OSs), a revised set of Environmental and Social Assessment Procedures (ESAPs) and) Integrated Environmental and Social Impacts Assessment (IESIA) Guidance Notes. The preceding components of the ISS are discussed briefly below;

The ISS consists of:

- The Integrated Safeguards Policy Statement is the Bank's declaration of its commitment to environmental and social sustainability and to reducing potential risks of non-compliance with Bank policies and procedures;
- Operational Safeguards are clear statements of the Bank's requirements from its borrowers or clients in terms of conducting best practice environmental and social assessments of operations that may be financed or managed by the Bank, and identifying specific standards or risk management measures that should be adopted as a condition for Bank support;

- Environmental and Social Assessment Procedures (ESAP) provide information on the specific procedures that the Bank and its borrowers or clients should follow to ensure that Bank operations meet the requirements of the OSs at each stage of the Bank's project cycle
- Integrated Environmental and Social Impact Assessment (IESIA) Guidance Notes that provide technical guidance on specific methodological approaches or standards and management measures relevant to meeting the OSs.

The key Operational Safeguards of the Bank are also indicated as follows:

- OS 1: Environmental and Social Assessment: This includes issues such as scope, categorization, use of Strategic Environmental and Social Assessment (SESA), and Environmental and Social Management Frameworks, climate-change vulnerability, public consultation, grievance procedures. This overarching OS consolidates the policy commitments and requirements set out in the Bank's Policy on the Environment. It also updates the requirements to take advantage of best practice among the MDBs on a number of operational issues.
- OS 2: Involuntary Resettlement: Land Acquisition, Population Displacement and Compensation. This OS consolidates the policy commitments and requirements set out in the Bank's policy on involuntary resettlement; it also incorporates refinements designed to improve their operational effectiveness.
- OS 3: Biodiversity and Ecosystem Services: This OS translates the policy commitments in the Bank's policy on integrated water resources management into operational requirements. It reflects the importance of biodiversity in Africa as well as the priority to clarify relevant standards and requirements.

- OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency: This OS covers the range of key environmental impacts for which there are agreed international standards followed by all MDBs and the Equator banks.

- OS 5: Labor Conditions, Health and Safety: This OS reflects ILO standards that have been adopted by most, if not all, MDBs and Equator banks.

The Five Operational Safeguards will be triggered in this project and will be addressed accordingly as captured in Chapters 6 to 8 of this ESIA and as Provided in the Environmental and Social Management Plan (ESMP) and the Construction Environmental and Social Management Plan (CESMP)

2.3 INTERNATIONAL POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

In 1992, at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Agenda 21 was adopted as a program of action for the 21st Century. Twenty- seven (27) environmental principles were outlined at the UNCED conference as an attempt to enshrine a charter for the protection of the Earth. Three principles outlined in the Agenda 21 action program were applied to the ESIA process for this development.

These include:

- Principle 1, which states that human beings are at the center of concern for sustainable development and that, they are entitled to a healthy and productive life in harmony with nature;
- Principle 3, which mentions that the right to development must be fulfilled so as to equitably meet development and environmental needs of present and future generations; and
- Principle 17, which states that EIAs should be a national instrument that shall be undertaken for proposed activities that are likely to have a significant adverse

impact on the environment and are subject to the decision of a competent national authority.

The above principles outlined in Agenda 21 can be seen as mechanisms by which the global community will cooperate to promote sustainable development. Within this context, the GoL has put into place its National Environmental Policy so as to include the principles of Agenda 21 and have included aspects related to the above environmental principles.

In addition, Liberia is signatory to a number of international environmental conventions and treaties that may be relevant to the proposed EU-funded Coastal Highway project. They are presented in the following sections.

2.3.1 INTERNATIONAL STANDARDS AND BEST PRACTICES

This Environmental and social Impact Assessment was guided by the international standards and best practice, including the following documents:

- World Bank Environmental Health and Safety Guidelines, Environmental Assessment Sourcebook
- IFC Environmental, Health, and Safety General Guidelines

3.0 PROJECT DESCRIPTION

3.1 BACKGROUND

The proposed project is the road construction from Sanniquellie, in Nimba County to Loguatuo also in the same County at the Ivorien Border. The proposed project will be implemented along the already existing mud roads. The Sanniquellie to Loguatuo road covers an estimated distance of 47.98km. The Right of Way (RoW) for the project will mostly follow the already existing unpaved roads. The overall impact is expected to affect mostly vegetation and the several rivers along the Sanniquellie to Loguatuo stretch.

The project will be influenced by the modern design guaranteed by the phases associated with its planners. It will comprise the following components;

a. Right of Way (RoW)
b. Alignment Test Pit Field Investigations
c. Boring at River Crossings
d. Dynamic Cone Penetrometer (DCP) Testing
e. Material Field Investigations
f. Construction Based Activities

3.2 ALTERNATIVES TO THE COASTAL HIGHWAY PROJECT - PHASE 6

The scoping phase also initiates the process of evaluating alternative approaches to achieving the desired outcomes of the development effort under review. With the Coastal Highway Project, this means that any alternative must effectively achieve:

- Access by means of transportation in areas of the project activity,

- Capacity building of local Liberian Ministry of Public Works staff and consultant firms in the road construction sector and environmental compliance,
- Stimulation of local private sector growth and investment in construction, transport and associated industries

This scoping activity identified alternative approaches to Phase 6 of the Coastal Highway project at two levels:

- Reconstructing the equally bad stretch of road from Ganta to Sanniquellie, instead of Phase 5; since this will achieve the aim of continuous development of the good stretch of road constructed from Bong county and ends at Ganta in Nimba county.
- Go by option above, however keep the Phase 5 road regularly graded and motorable.

Keeping to the current option of Phase 6 of the Coastal Highway however provides direct link between the major city of Sanniquellie and neigbouring Ivory Coast, hence enhancing the socioeconomic advantage of transboundary trade. In doing so, there consideration of minimal social and environmental impact was also considered; hence the old path of road was followed for the design of road; reducing the amount of vegetation to be cleared by way of RoW; and also the quantum of resettlements. Most of the existing water bodies have bridges that are in good shape; which may need little reinforcement; hence aquatic life will not be affected during construction. This will be ensured by prescriptions in the ESMP that ensures the contractor avoids silting of water bodies during the construction process. A Resttlement Action Plan (RAP), is being prepared to address those Project Affeted Persons whose settlememts could still not be avoided despite following the old existing RoW. Following the existing road ensured that no new forest or fresh vegetation areas are opened up, hence wildlife and other rare species will not be affected.

3.3 PROJECT AREA

The project areas is located both in and out of residential areas and it encompasses settlement characterization of village, town, city or rural, peri-urban and urban. It also is a home to a few industrial zones. Roads, electricity and railways are currently the only infrastructure available in Nimba County

3.4 PROJECT LOCATION

The Project is located in both Nimba County. The leadership structure of the County has a Superintendent serving as the head of the County Administration, while the District Commissioners head the districts. At the community level, the Paramount Chief heads the chiefdom, Clan Chief the clan, and Town Chief the town. The Town, Clan, and Paramount Chiefs are elected by the community members.

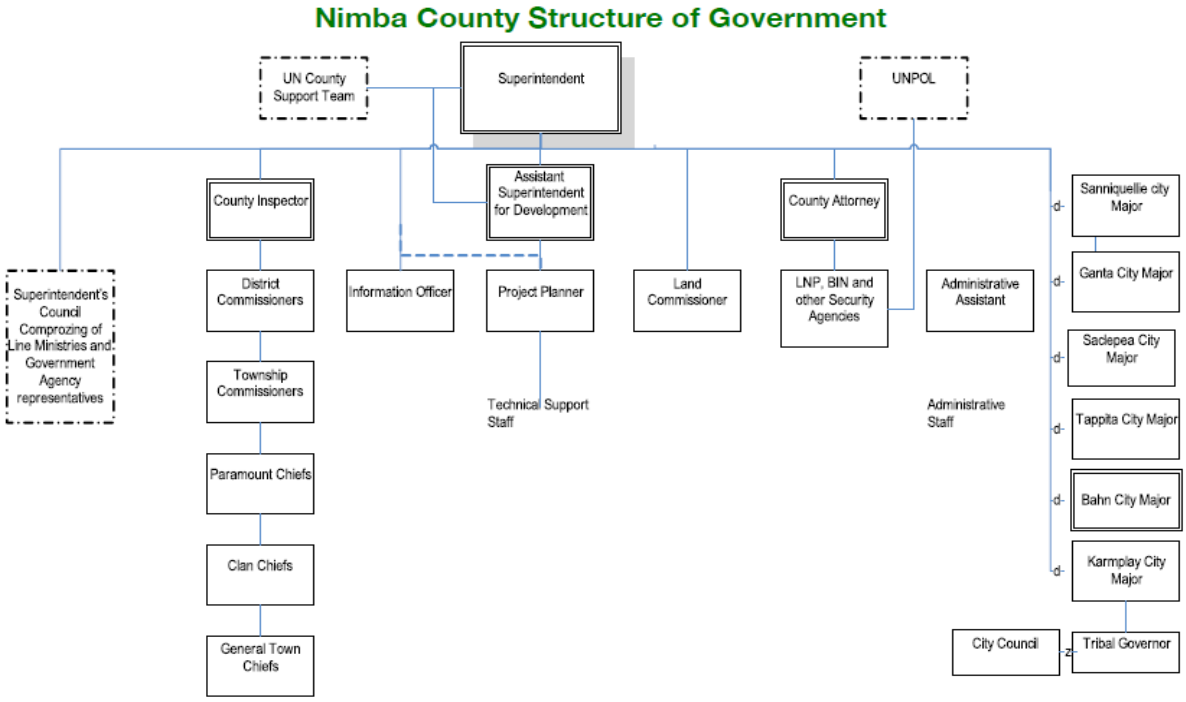
Figure 1: A house marked in the RoW in Nimba County

Swamps, creeks, and several rivers located within the Project area but there are no know mangrove areas. Of the four inland Wetlands in Liberia, one is located within Nimba County (Nimba County: Gbedin, Wetland which is classified as an inland swamp). It is presumed, based on visual assessment that the inhabitants of the area are engaged in different types of activities ranging from petty trading, farming, skilled and unskilled jobs, entrepreneurs, production and etc. A full understanding of their activities, historical areas, protected areas, tourist and recreational areas will be catalogued upon completion of the full ESIA.

3.4.2 NIMBA COUNTY

Nimba gained county status in 1964 by an act of the National legislature during William V. S. Tubman presidential tenure and has the third largest population in Liberia. It has 17 administrative districts and 9 electoral districts. It is named after the tallest and largest mountain in the country with the dominant tribes being the Mano and Gio. The

structure of Nimba County's government is consistent with that of the rest of the other counties.



Source 1 Nimba County Development Agenda

The table below shows the findings from the National Census of 2008, reports that the total number of electricity deficiency on lighting and cooking by gender in Nimba County.

Figure 2: Section of Rubber Plantation and Railway along the main dirt highway in Nimba County

Figure 3: Some Graveyards and River in the RoW in Nimba County

Figure 4: Homes and other Government Offices in the RoW at Loguatuo - Nimba County

Figure 5: Project Route from Sanniquellie to Loguatuo

3.5 RATIONALE OF PROJECT LOCATION

The location was selected based on the following reasons:

- The road connects Sanniquallie in mainland Liberia to Loguatuo at the Cote D'Ivoire border with relatively high traffic; hence is of immense commercial importance to Liberia.
- Consideration of mitigating adverse impacts and enhancing beneficial impacts to both environmental and socio-economic receptors. Eg. The road construction project seeks to follow to a large extent the already existing mud roads and put in place mitigation measures for adverse impacts to displacement of structures, intangible values, fauna and flora.

3.6 TECHNICAL DESCRIPTION OF PROJECT

The proposed project is the construction of roads from Sanniquellie to Loguatuo, in Nimba. The proposed project will be implemented along the already existing mud roads. The Sanniquellie to Loguatuo road covers an estimated distance of 47.98km. The Right of Way (RoW) for the project will mostly follow the already existing unpaved roads. The overall impact is expected to affect mostly vegetation and the several rivers along the Sanniquellie to Loguatuo stretch.

The project will be influenced by the modern design guaranteed by the phases associated with its planners. It will comprise the following components;

a. Right of Way (RoW)
b. Alignment Test Pit Field Investigations
c. Boring at River Crossings
d. Dynamic Cone Penetrometer (DCP) Testing

e. Material Field Investigations

f. Construction Based Activities

3.6.1.1 RIGHT OF WAY (ROW)

The margin for the RoW will be identified using the standard set by the Ministry of Public Works (MPW); since construction work was done on the road in recent times through this Ministry. However, if any new structures should fall in the RoW, owners of these affected structures should be resettled in accordance with guidelines set by the Bank. The margin would take into consideration safety of individuals dwelling very close to the roads. The purpose of the safety margin helps to avert the risk of fire disasters and mitigates accidents.

3.6.2 ALIGNMENT TEST PIT FIELD INVESTIGATIONS

Test pits will be excavated along the chosen by-pass alignment at approximately 500m intervals to a depth of 1.0-1.Sm below the surface or as may be determined by the construction experts. A total number of test pits will be determined and excavated. During the test pit excavation process, thicknesses of any topsoil layer will be recorded and visual description of all soil strata encountered will be documented. Samples will be collected of the subsoil layer(s) for subsequent laboratory testing in all the test pits.

3.6.3 BORING AT RIVER CROSSINGS

It is anticipated that boring will be carried out at the likely location of the bridge abutments on the rivers within the RoW. The boring will reveal the existence details of quartz gravel layer at 1.5 m below the surface. Further drilling with sophisticated details will be done depending on the need details of the areas.

3.6.4 DYNAMIC CONE PENETROMETER (DCP) TESTING

Dynamic Cone Penetration (DCP) tests will be carried out immediately adjacent to each of the test pits along the alignment for the road and at 500 m intervals along the planned alignment. The depths of the DCP testing will generally estimated to be 0.8 m below the surface. The equipment to be used will be determined after full feasibility studies. At each location, the layer of thickness and corresponding CBR strength will be assessed from the DCP measurements.

3.6.5 MATERIAL FIELD INVESTIGATIONS

Identification of possible quarry areas through visits to the project road area and by interview local contractors, ongoing projects, etc. will be carried out to obtain local knowledge of possible sources. The quantities of gravel materials required for the works will depend on the solution finally adopted for road design.

3.6.6 CONSTRUCTION BASED ACTIVITIES

Generally, construction activities for the roads will entail the following activities which have been summarized as follows:

a. Clearing of vegetation along the horizontal alignmen;
b. Cut and fill to change vertical road alignment, remove top layer and to facilitate the construction of road related infrastructure including drainage facilities such as bridges and culverts at specific sections of the alignment;
c. Excavation of gravel sub layers and other fill materials;
d. Construction of campsites involving construction of temporary shelters, installation of water and electricity, paving or levelling to accommodate equipment and stores etc.
e. Blasting and mining of quarry. The blasting is likely to be carried outside the project area (potential quarry sites will be investigated as part of the full project feasibility studies);
f. Construction/setting up of water abstraction points along some of the rivers;

g. Transportation of soil and construction materials from their sources;
h. Construction of road related infrastructure including bridges, culverts, parking spaces/bus bays, road furniture/signs;
i. Application and Compaction of base layer and sub base natural laterite gravel and sub grade layer of classified material to facilitate road paving and sealing process ;
j. Road paving and sealing;
k. Road signage;
l. Construction of road shoulders and road drainage systems e.g. drainage off-shoots, stone pitching of side channels;
m. Landscaping and rehabilitation of degraded sites including borrow pits and detours;
n. Re-vegetation;
o. and Decommissioning of project.

3.6.7 FACILITIES, MATERIALS, EQUIPMENT AND INSTALLATIONS

Main equipment will include; excavators, compactors and transport vehicles. The equipment is expected to be stored in the campsites and roadsides. There will be no major installations except for water and electricity in campsites and signposts along the new road.

The project will require various materials for the construction of the road. Some of the materials include gravel, sand, water, cement, quarry stone aggregates, paints, bitumen , solvents, bricks , stones, wood, electronic gadgets, explosives, wire and ropes, steel-enforcements, plastics, diesel, petrol, oils, food items, various mechanical equipment, labour, management , vehicles, biological materials, propellants, various laboratory chemicals, gases, electrical energy, soldering equipment and other minor inputs.

Most of these materials are locally available such as gravel, water, sand and others.

Some of these materials will have to be procured from different sources locally or imported. Gravel will be mined locally from nearby sites by simple excavation and hauling. Care will be taken to rehabilitate all the sites after the project. Water will be abstracted from local reservoirs with consideration of riparian rights for local users. Quarry stone and rocks will be acquired from existing quarry sites being used for the reconstruction of road projects in the area. Labour will be recruited locally.

4.0 PROJECT ALTERNATIVES

The ESIA evaluated alternative approaches to achieving the desired outcomes of the development effort under review. Both the "No Action" scenario and the project option were reviewed and captured in the following sections.

4.1 "NO ACTION

The road currently provides the only direct and shortest link between Sanniquellie and Loguatuo, a fst growing commercial town and a border town within the Nimba County respectively. If the "no action" option was chosen, from the economic standpoint and motor traffic and social considerations, the following benefits will be foregone:

a. Improvement of the access road;
b. Enhanced economy and gender development in communities along the road;
c. Reduction in travel time and cost;
d. Improvement in drainage and aesthetics;
e. Employment opportunities for local residents along the road;
f. Boost in tourism and trading activities; and
g. Improvement in agriculture.

The "no action" option was not considered as a viable alternative.

4.2 RE-CONSTRUCTION OF EXISTING ROAD

The re-construction alternative involves improving the existing surface and geometric alignments as well as constructing new culverts of the road to acceptable safety, speed and environmental standards. The proposed road will follow the existing alignment from Sanniquelli to Loguatuo. The work will generally consist of vegetation clearance and topsoil removal, earthworks and excavation of longitudinal ditches, construction of culverts, construction of bridges, pavement construction, provision of erosion control measures, drainage improvement, safety improvements including reflectorized paved markers, sidewalks, curb, gutter through urban areas and other ancillary works. The

project interventions will lead to involuntary displacement of some properties within the Right of Way, necessitating the development of a Resettlement, which shall be carried out before commencement of the project.

The vegetation along the road, especially the portions within sacred forests and farmers rubber plantations and other crops would be impacted. The project would however minimize the potential destruction of vegetation. Farmers who are affected would be compensated. This alternative represents a more realistic option. The project will bring significant benefits to communities along the road and the general population, while the negative impacts will be managed.

This alternative has provided the following upsides in social and environmental impacts that will be managed as stated below, among other measures stated in the project ESMP.

a. Minimum resettlement required due to following the existing RoW of the old road will be carried out according to the RAP currently being prepared for the project
b. There is minimal disturbance of side low growth vegetation and there will not be opening up of new forest areas, thus disturbance of wild life and other rare species will be avoided
c. Adopting this alternative enables the maintenance of existing bridges thus reducing impact on water bodies and aquatic species like fishes etc.
d. The alternative also creates rapid access between Liberia and neigbouring Cote D'Ivore, hence enhancing rapid transboundary trade among the border communities and mainland Liberia.

4.3 JUSTIFICATION, BENEFITS AND MOTIVATION FOR THE PROJECT

Notwithstanding, the fact that the current road is bing used by motorists, the intense wet climatic conditions in Liberia present major challenges in the maintenance of unpaved roads which often come with high life cycle costs. In the absence of a suitable

maintenance funding framework, such as a Road Fund, Liberia would increasingly find it difficult to maintain unpaved roads that require consistent technical and cost attention. Reconstruction and paving of the Sanniquellie- Loguatuo road would ensure that the road is more motorable, fully responsive to the terrain and climatic conditions and have low life-cycle costs.

The project would improve access to transport services for the rural population in Nimba County with the rest of the country; improve farm to market linkages as well as farm-gate prices, and uplift the quality of life of the people of the project area. The road corridor is situated in an area heavily endowed with mineral and agriculture resources such as rubber that could take the populace to greater socio-economic development and promote regional integration with neighbouring Ivory Coast.

The advantages to be derived from the re-construction alternative far outweigh the disadvantages of the "No Project Development Option". Although there are environmental implications associated with the improvement alternative, appropriate mitigation measures would be implemented to control them, thus justifying the case for implementing the project. Even though the project will require relatively substantial financing, the accrued benefits to be derived from this option socially, environmentally, and economically; now and in the long term far supersede all other options.

4.4 RATIONALE FOR DEVELOPMENT PARTNERS' INVOLVEMENT

The EU and AfDB's involvement in the project is motivated by a number of environmental and social effects that have been assessed as potential positive outcomes of the project. These include:

- Improved Household welfare
- Job creation and private sector development
- Gender impacts

- Contribution to the achievement of Millennium/Sustainable Development Goals

4.4.1IMPROVED HOUSEHOLD WELFARE:

The project will improve the Liberian population's access to urban and rural areas right from Sanniquellie through to the Ivory Coast border. Currently, the road connecting the Nimba County capital, Sanniquellie to the Ivory Coast and other rural communities is in very bad shape and becomes almost unmotorable in the wet season. This gravely affects transport and subsequently other economic activities and access of healthcare facilities and education, especially institutions of higher learning, most of which are located outside the rural areas. The project will thus contribute to raising the general standards of living of these urban and rural households by among others, improving access topublic services such as healthcare services, education, transport of produce to market centres, attendance of social ceremonies, etc.

4.4.2 JOB CREATION AND PRIVATE SECTOR DEVELOPMENT:

The project will directly contribute to the creation of temporary jobs during construction activities, most of which will be contracted locally. Job estimates will be determined during the appraisal mission. In addition, the project will stimulate the development of additional income- generation activities via the hiring of sub-contractors and a variety of general services (repair and maintenance, security cleaning, catering). But most importantly, it is expected that an improved road hence improved transport system will stimulate the development of small and medium enterprises and industries in the project area, since there is electricity already in the road corridor. Transport and easy access can reduce operational costs significantly and thus boost business expansion and /or multiplication. This will positively affect businesses that currently transport their goods and services to and fro along the project corridor.

4.4.3 GENDER IMPACTS

Increased access to quality roads has positive implications on gender. While it is not expected that the project will reduce women's chores of sending produce and wares to the market to sell as well as sending children to school and health centres, nevertheless improved road, hence transport will improve women's productivity in executing their trade and household chores as well as free some time for other activities given the extended work day. The development of businesses along the corridor due to improved acces is likely to benefit women, as the proportion of women engaged in trade and manufacturing activities is already larger than men.

4.4.4 CONTRIBUTION TO THE ACHIEVEMENT OF MILLENNIUM DEVELOPMENT GOALS:

With a good road network, it becomes more possible to achieve the Millennium Development Goal (MDG's) – Including; reducing poverty, improving women and children's health, broadening the reach of education etc. A good road system avails social and economic development, offering opportunity for improved lives and economic progress.

4.5 CUMMULATIVE IMACTS

Cumulative impacts are those impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the proposed Phase 6 Coastal Highway Project. Cumulative impacts are therefore generally impacts that act with others in such a way that the sum is greater than the parts. This is, however, not always the case – sometimes they will simply be the sum of the parts, but that sum becomes significant.

This Chapter considers the cumulative impacts that would result from the combination of the Phase 6 of the Coastal Highway Project and other actual or proposed future developments in the broader Project Area.

4.5.1 DEVELOPMENT CONTEXT

In addition to the proposed Coastal Highway Project the broader project area may experience cumulative impacts as a result of the West African Power Pool (WAPP), which involved the laying of High Voltage (HV) lines from the Cote D'Ivoire to Liberia through the road corridor under consideration.

4.5.2 HOLISTIC MANAGEMENT OF CUMULATIVE IMPACTS

Although specific management measures are laid out in later sections of this Chapter, the following measures will help to holistically mitigate and manage all cumulative impacts:

- Undertaking a Strategic County Environmental and Social Impact Assessment: A strategic regional impact assessment would allow a comprehensive assessment of potential impacts that may result from the development of the road and the power lines and other immediately planned projects in the area along this corridor of the Nimba county. This type of assessment would consider the cumulative impacts associated with the presence of these projects and would prevent isolated and iterative decision-making. The assessment would require greater integration and planning by the various project sponsors and implementers and should be led by the Government of Liberia. Such an assessment would ideally feed into combined and issue-specific mitigation and enhancement measures

- Shared Infrastructure: Proposed project implementers along this corridor should agree between them where possible, to share infrastructure (viz. access roads and transportation routes inside their project areas) to reduce the potential disturbance caused by installing several similar infrastructure in close proximity to each other.

4.5.3 IDENTIFIED CUMULATIVE IMPACTS

The cumulative impacts that would result from a combination of the proposed Coastal Highway project and the earlier WAPP project and other actual or proposed future developments in the broader Project Area include:

- Impacts to Surface Water (Hydrology)
- Air Quality Impacts;
- Impacts to the Noise Environment;
- Impacts to the Ecological Environment; and
- Impacts to the Social Environment (including Cultural Heritage and Visual and Landscape Impacts).

Each of these potential cumulative impacts is described below:

4.5.3. 1 SURFACE WATER

Cumulative Impacts:

A number of surface water bodies are present in the project area, mostly rivers and creeks. Some are perennial while others flow only during frequent flash flood events caused by high rainfalls in the area. The road construction project and other projects will establish infrastructure for their construction activities including camp sites, access roads, etc.. The establishment of infrastructure has the potential to interrupt run-off channels and result in cumulative negative impacts to the sensitive ecology that depend on small drainage lines that transport surface water during flash flood events.

Further, the construction of the road and availability of [power from WAPP will lead to increased possible influx of further people attracted to the broader Project Area by job opportunities, these river systems may possibly come (i.e. – if not mitigated) under increasing pressure, not only in terms of water abstraction, but also in terms of the potential contamination of these river systems by diffusing sources of pollution, such as:

- The ad hoc maintenance of vehicles and machinery;
- The washing of equipment and vehicles;

- Improper management of sewage; and
- Potential spillages of fuels and chemicals.

Mitigation Measures for Consideration:

Current and upcoming projects in the Sanniquellie – Loguatuo corridor should collaborate and participate in a forum together with the necessary key authorities to discuss solutions to adverse cumulative hydrology impacts (such as surface water flow and quality impacts) through applying good engineering and industry practice related to infrastructure siting and establishment across run-off channels, vehicle washing and maintenance, and procedures around the storage and handling of fuels and chemicals.

4.5.3.2 AIR QUALITY

4.5.3.2.1 CONSTRUCTION ACTIVITIES

Cumulative Impacts:

Construction activities associated with the proposed road project and the earlier laying of WAPP power lines together with construction activities from other developments have the potential to create significant negative cumulative impacts associated with the generation of total dust, PM_{10} and $PM_{2.5}$. The magnitude of these potential impacts may be minor, moderate or major, depending upon how the impacts from other projects will combine with impacts arising from the road construction project and the respective timing of each project. These impacts may be worsened by elevated wind speeds, increasing the potential for cumulative impacts during periods of adverse weather.

Mitigation Measures for Consideration:

As the construction activities are temporary and because suitable mitigation will be in place, the potential for significant impacts is reduced as dust raising activities would need to be coincidental on other development locations.

The implementation of the mitigation measures included in the Air Quality Management in this ESIA is considered likely to render the impacts associated with construction activities as having a negligible significance during most circumstances. However, during periods of particularly adverse weather conditions (i.e. on days when the wind speed is particularly elevated), or when activities elsewhere are resulting in major emissions of dust, there may be call to reduce dust causing activities associated with the road project or defer particularly dusty activities until such time as other activities are ceased, or weather conditions improve; again, this will all be contigent on if the road construction activities coincide with other major projects in the larger project area.

4.5.3.2.2 TRAFFIC GENERATED DURING BOTH THE CONSTRUCTION AND OPERATIONAL PHASES

Cumulative Impacts:

Significant cumulative impacts can arise due to emissions from vehicle exhausts and from dust dispersion lifted from unpaved road surfaces. Impacts at roadside sensitive receptors caused by the vehicles associated with the phase 6 of the coastal highway project are however predicted to be of negligible negative significance (post-mitigation). On this basis, where air quality standards are to be approached or exceeded, these impacts would likely arise from vehicles other than the Phase 6 Coastal Highway project vehicles.

Where unpaved access roads are used however, major adverse impacts associated with dispersion of dust and PM_{10}/$PM_{2.5}$ can potentially occur. These effects can be especially

significant if the same unpaved road is used during the phase 6 of the coastal highway construction project and other projects' traffic.

Mitigation Measures for Consideration:

Major project implementers in the Sanniquallie – Loguato corridor of the Nimba coounty should collaborate and participate in a forum together with local authority, county government and other key authorities so as to establish agreements regarding the use and maintenance of unpaved roads, the use of dust-binding agents and in keeping the speed of all traffic using unpaved roads to below 32kph.

4.5.3.3 NOISE ENVIRONMENT

4.5.3.3.1 CONSTRUCTION ACTIVITIES

Cumulative Impacts:

In the event that construction activities of other developments happen to be in parallel with the construction phase of the road project, it is possible that the cumulative noise impact of activities carried out in these phases may increase from the direct impact predicted in this ESIA; however, this is dependent on how the impacts from other developments combine with the impacts from the proposed road project, and the respective timing of these impacts. However, this said, construction sites between developments will vary in their locality and hence it is unlikely that there will be a cumulative increase in predicted noise levels for noise sensitive receptors (NSR's), and in particular the settlements along the project corridor.

4.5.3.3.2 OPERATIONAL PHASE

The phase 6 of the coastal highway project when completed will be open to traffic for 24 hours, 7 days per week, 365 days per year. However, night time noise impacts to NSRs in close proximity to the road would not be significant, since traffic on the road will not be

high to the extent that will lead to rapid tooting of vehicle horns. However, it is possible that the incremental increase in the predicted noise environment (as a result of potential noise contour overlap) may be increased as a result of other project activities at certain times.

Mitigation Measures for Consideration:

There may be the potential for cumulative noise impacts to arise as a result of potential noise contour overlap during the construction and operational phases of the road project, that is, if they overlap with other major projects that produce significant levels of noise. Although unlikely, this would be particularly significant if other projects are sited in relatively close proximity (< 5km) to one another. In this respect, project implementers in the current proposed road construction corridor should collaborate with one another and participate in a forum so as to ensure that impacts (viz. overlapping noise impacts) are discussed and agreed and that (if necessary) appropriate mitigation implemented. In this respect, project implementers should attempt (if possible given other critical design factors) that a distance between their own and other projects is such that the impacts associated overlapping noise emissions is avoided or kept to a minimum.

4.5.3.4 ECOLOGICAL ENVIRONMENT

Cumulative Impacts

Habitat Loss and Disturbance of Wildlife:

The current road construction project does not open up significant new vegetation areas, apart from clearing out the existing RoW of the existing road with some extensions to the edges. As such, it would not lead to any major habitat loss or disturbance of wildlife, apart from the fact that noise during the construction phase may cause some wildlife to migrate further into denser vegetation areas. However, other projects that may come up

along the corridor may result in increased habitat loss or disturbance of wildlife depending on the nature of these projects

.

Widespread Human Influx:

Each operation, that is, the WAPP and the phase 6 of the coastal highway project, and other major infrastructure projects are expected to result in significant in-migration of people brought in to work there, or attracted by potential opportunities there. An influx of people will lead to pressures on the environment in the form of fuel wood harvesting, increased demands for water, increased pressure on ecosystem services, and greater disturbance effects on wildlife. There may also be an increase in numbers of livestock.

Mitigation Measures for Consideration:

Project companies should collaborate with one another and participate in a forum together with local government, county government and MPW as well as EPA and other relevant authorities to discuss solutions to adverse impacts that occur or are expected as a result of increased pressures on the environment.

4.5.3.5 SOCIAL ENVIRONMENT

This Section describes the potential cumulative impacts to the social environment that may result from the combined effects of the proposed phase 6 of the coastal highway project, the WAPP project and other potential developments including other proposed projects along the Sanniquellie – Loguatuo corridor.

4.5.3.5.1 PROJECT INDUCED IN-MIGRATION

Cumulative Impact:

The proposed Project is expected to cause some in-migration into the Project Area and surrounds related to the arrival of opportunistic economic migrants and migrant labour.

Other potential projects in the vicinity of the proposed road project may increase the scale and likelihood of this in-migration due to a perception that more benefits are available in the area. The presence of several development projects in the area is likely to increase the perceived desirability of the area for visitors, increasing the scale of in-migration.

Mitigation Measures for Consideration:

The following management consideration should be implemented to help mitigate negative impacts and enhance positive cumulative impacts related to in-migration respectively.

- Capacity Building of County and District Administrations: Project implementers should agree on a holistic approach to provide the area local government with support and build the capacity of its staff to plan effectively for future development. Administrative capacity building could include training, provision of equipment and the provision of technical support (e.g. information technology support). The potential benefits may include improved local governance and greater efficiency in capacity development initiatives.

- Increasing Human Capital among the Local Population: The residents of Sanniquellie- Loguatuo corridor will benefit from increased economic activity related to the provision of power as well as the easy transportation due to the road construction development. However, they may not be in the position to benefit directly from other skill intensive project initiatives that may arise in the area due to accessibility and availability of power. Increasing the capacity of the local population will allow for increased local benefits and increase the local resilience to potential in-migration related impacts. Early efforts to increase human resource capital through training and capacity building would assist in putting

local inhabitants in a position to be employed or start business enterprises to service future developments.

- Recruitment Alignment: project companies should agree to a holistic approach to aligning recruitment strategies. This will help to ensure that there is a viable labour pool of local employees for companies and help to build the skills and experience of local people. Combined efforts to align the approach to recruitment will help to reduce or avoid potential in-migration

4.5.3.5.2 INCREASED RISK OF ROAD TRAFFIC ACCIDENTS

Cumulative Impact:

Existing vehicle traffic is not very high in the Sanniquellie- Loguatuo corridor, as far as people tend to walk to their destinations. Settlements tend to be located close to existing roads and children and livestock roam freely and are unsupervised. The proposed Project will increase light and heavy vehicles using the local roads throughout the duration of the construction period and during the life of the road. It is assumed that the two other potential project operations in the area will be transporting their materials or products in and out to Monrovia or to neighbouring Cote D'Ivoire using the same transport corridor. The anticipated number of light and heavy vehicles movements related to these other proposed projects is unknown; however, it can be assumed to be a significant number. The combined volumes of road traffic will place both human and livestock in danger of being injured or killed throughout the life of the road.

Mitigation Measures for Consideration:

The following management considerations should be implemented to help mitigate potential cumulative impacts from other project developers related to traffic accidents:

A specialist and integrated Road Traffic Risk Assessment should be considered by the Ministry of Transport of Liberia, to understand the cumulative risks related to key project operations in the area using the Monronvia- Sanniquellie- Loguatuo corridor. This assessment should be informed by all Projects and will assist in planning and coordination of road traffic reducing risks related to traffic accidents. Where possible all operators should consider the use of shared access roads that join a shared transport corridor.

4.5.3.5.3 AVAILABILITY OF WATER AND LIVELIHOOD IMPACTS

Cumulative Impact:

Fresh water is freely available along the Sanniquellie – Loguatuo corridor; however, simultaneous large-scale water abstraction from the rivers by different major operations has the potential to decrease available water resources. This could have adverse impacts on both local communities and ecological receptors. Without systematic management, the unplanned and uncoordinated abstraction of water resources could contribute to water shortages and livelihood impacts.

Mitigation Measures for Consideration:

Specifically establishing a county water committee, that will liaise with the hydrological Services Department of Liberia will help to manage the abstraction of water. Also, collaborating with other project companies (together with any other necessary/appropriate stakeholders) in the area to conduct groundwater, ecological and livelihood analysis so as to understand the spatial extent and magnitude of the impact to communities and other ecological resources such as palms and rubber trees from ground water abstraction

4.5.3.6 CULTURAL HERITAGE

Cumulative Impacts:

In terms of cumulative impacts, the main concern for cultural heritage is the potential for a substantial increase in population within the larger region as people from neighbouring regions move into the Nimba County in search of work. Increased population is usually accompanied by the expansion of existing settlements or the establishment of new settlements. As settlements expand or are established, new areas are impacted by building activity and it is likely that sacred or archaeological resources will be impacted by this increased activity. Population growth may also prompt the development of more access roads to link up with the current proposed Sanniquellie – Loguatuo road and other civil infrastructure; with ground disturbing components, which will also likely impact sacred grounds or archaeological sites. Increased traffic resulting from higher population density or other development projects in the area could also generate additional impacts.

Mitigation Measures for Consideration:

Public outreach is the main tool that can be used to educate newly arriving populations about the county's important local heritage and why sacred and or archaeological sites should be avoided when choosing new places to build or expand communities. Engagement with the MPW would also be important since they would likely be in charge of civil infrastructure development and would need to better understand the cultural sensitivities of the region.

4.5.3.7 VISUAL AND LANDSCAPE CHARACTER

Cumulative Impact:

The Construction of the Sanniquellie – Loguatuo road, in combination with other projects along the corridor will increase impacts on the surrounding landscape and visual receptors/amenity during the construction and operational phases, including:

- Landscape Impacts – the presence of additional development will increase the impact on the greenery and vegetation character of the surrounding landscape.

- Visual Impacts – the presence of additional infrastructure along with other developments in the area will affect the visual character of the area, such as the asphalt roads from this road construction project and the HV pylons from WAPP.

Mitigation Measures for Consideration:

Project implementing entities should collaborate with one another and participate in a forum where the potential to share infrastructure is discussed (viz. access roads and transportation routes). Moreover, operational entities should align their operations in a way that the mitigation/management recommendations outlined in Visual and Landscape Impacts of this ESIA are implemented during the life of similar projects along the corridor. Furthermore, project implementers along the Sanniquellie-Loguatuo stretch could collaborate and confine their shared infrastructure to set corridors.

4.5.3.8 IMPLICATIONS OF UNCERTAINTY

The cumulative environmental and social impacts described in this section were assessed on the basis of the information available at the time, using information collected through site visits, and consultations with stakeholders. The cumulative impact

assessment has a certain level of uncertainty, which is inevitable with a study of this type. Uncertainties are associated with the following:

- Other projects are at different phases of development, and as such, are experiencing on-going changes in design as implementation of these projects are optimised;
- How the coastal highway project and other projects in the area will proceed to the construction/operations phase;
- Inconsistencies or inexplicable results arising from the fact that there is no detailed information available for potential projects; and
- The nature and extent of impacts based on human responses to events and changes that are not definite or predictable.

5.0 DESCRIPTION OF PROJECT ENVIRONMENT

5.1 PHYSICAL ENVIRONMENT

TOPOGRAPHY

The most distinctive landforms of northern Nimba County are the Nimba Range of mountains. These are dominated by a ridge which runs 40km in a north-east to south-west direction along the GuineanIvorian border, across the Guinean-Liberia border and on for the remaining half of its length. The mountains' highest point is 1752m above sea level, on the Guinean section of the main Nimba ridge, and is known as Mount Richard-Molard; in Liberia, the highest point is 1300m on the same ridge, and referred to in this document as 'Mount Nimba'. In northern Nimba County the significant but isolated peaks of Tokadeh, Beeton and the twin peaks of Gangra and Yuelliton lie to the west of the main Nimba Ridge. The highway along which the RoW of the project is found traverses a rolling to mountainous terrain with altitudes between 7 m to 309 m varying along the roads.

CLIMATE AND HYDROLOGY

The climate of Liberia and of northern Nimba County is tropical, with fairly consistently high rainfall and temperatures, although there are distinct wet and dry seasons, driven by the movement of the Inter-Tropical Convergence Zone.. Liberia has average temperatures of 27°C. There are relatively small variations between day and night and between seasons, with temperatures almost always below 37° C and over 20° C.

There two seasons: the wet from May to October and the dry from November to April. It seldom rains during the dry season, though there are dry periods during the rainy season, including a dry spell in July or August lasting about two weeks. The annual rainfall averages 4.000 mm inland and very high intensities are frequent. The average humidity on the coastal belt is 78% during the wet season, but it is liable to drop to 30% from December to March when the Harmattan winds blow from the Sahara.

Rainfall in Liberia is of three types: very wet with torrential rains, thunderstorms and lightning, wet with heavy downpours; and rainy days interspersed by days of dry

weather, with the moisture being supplied by the south-westerly winds in most cases. At the beginning of the rainy season, from April to June and from September to November, short thunderstorms with storm winds lasting from three to ten minutes, accompanied by thunder, intensive lightning and by a marked drop in temperature, bring heavy downpours of rain.

The rainfall range varies from 1,600 to 4,000mm per year and is often of high intensity leading to high sediment loads and floods in the lower reaches. The rivers and creeks have long periods of sustained high flows during the wet season, followed by a gradual decrease in flow during the dry season. The rivers are perennial.

RIVERS ALONG THE ROW

Table 1: Water bodies and their coordinates along the RoW

River/Waterbody	Location	Coordinates
Gwena creek	Sekyimpa	N 07 22.495' W 008 40.732'
Twormie creek	Sarkazue	N 07 22.250' W 008 37.915'
Yah River	Gbobayee	N 07 20.290' W 008 34.870'
	Zorgowee	N 07 19.923' W 008 34.480'
River Nyein	Kialey	N 07 18.77' W 008 32.468

WATER QUALITY

Water quality measurements in the water bodies along the RoW were taking at three points along each waterbody, Upstream of where the road crosses the water, midstream at the point where the road crosses and downstream from the point where the road crosses the water body. Measurements were taken to establish baseline conditions (Table 2.0). In-situ water quality parameters were measured at each flowing stream using SensionTM 156 – a portable water testing kit. The findings indicate that, the pH of the

water bodies are near neutral, they all have low dissolved oxygen and fairly high conductivity in all the streams, which is indicative of pollution levels in the rivers and creeks, hence the presence of contaminants.

It is important to note that, the levels of the Total Dissolved Solids (TSS) as well as that of the Total Suspended Solids (TSS) will be affected once the road works are undertaken along the RoW, especially during bridge works. These will have implications on communities that use the water bodies for washing and other domestic activities. However, the arrangements to provide alternatives in this event will be laid out in an Operational Environmental Management plan for the project.

Table 2: Water Quality parameters at points where the RoW Crosses Water bodies

Paraemeters	Rivers/Creeks Sample Points																	
	Gwerna			Twormie			Yah			zor			Nyein			Bee		
	Us	Ms	Ds	Us	Ms	Ds	Us	Ms	Ds	Us	Ms	Ds	Us	Ms	Ds	Us	Ms	Ds
pH	5.5	5.7	6.1	5.6	5.8	7.0	5.7	5.6	5.8	7.0	5.8	6.0	5.7	5.8	7.0	6.5	6.9	5.6
Electrical Conductivity (mS/cm)	92	150	94	79	98	89	169	77	164	130	70	147	88	67	64	160	165	70
Total Dissolved Solids (mg/L)	200	300	300	219	267	300	314	395	231	250	312	213	215	314	390	210	270	200
Total Suspended Solids (mg/L)	5	20	16	6	8	7	25	38	21	15	39	37	4	31	3	11	14	3
Dissolved Oxygen (mg/L)	3.92	4.23	4.00	5.70	3.90	6.00	6.00	4.13	5.12	2.56	3.00	4.00	3.90	5.20	3.02	2.19	3.12	2.90
Bio-Chemical Oxygen (mg/L)	1.0	1.0	1.0	1.0	1.0	1.0	2.0		2.0	2.0	2.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0
Total Coliforms (cfu/100ml)	5000	31000	7500	2000	17000	15000	27000	18000	31000	420000	3000	2100	2300	2000	4700	4000	2300	33000

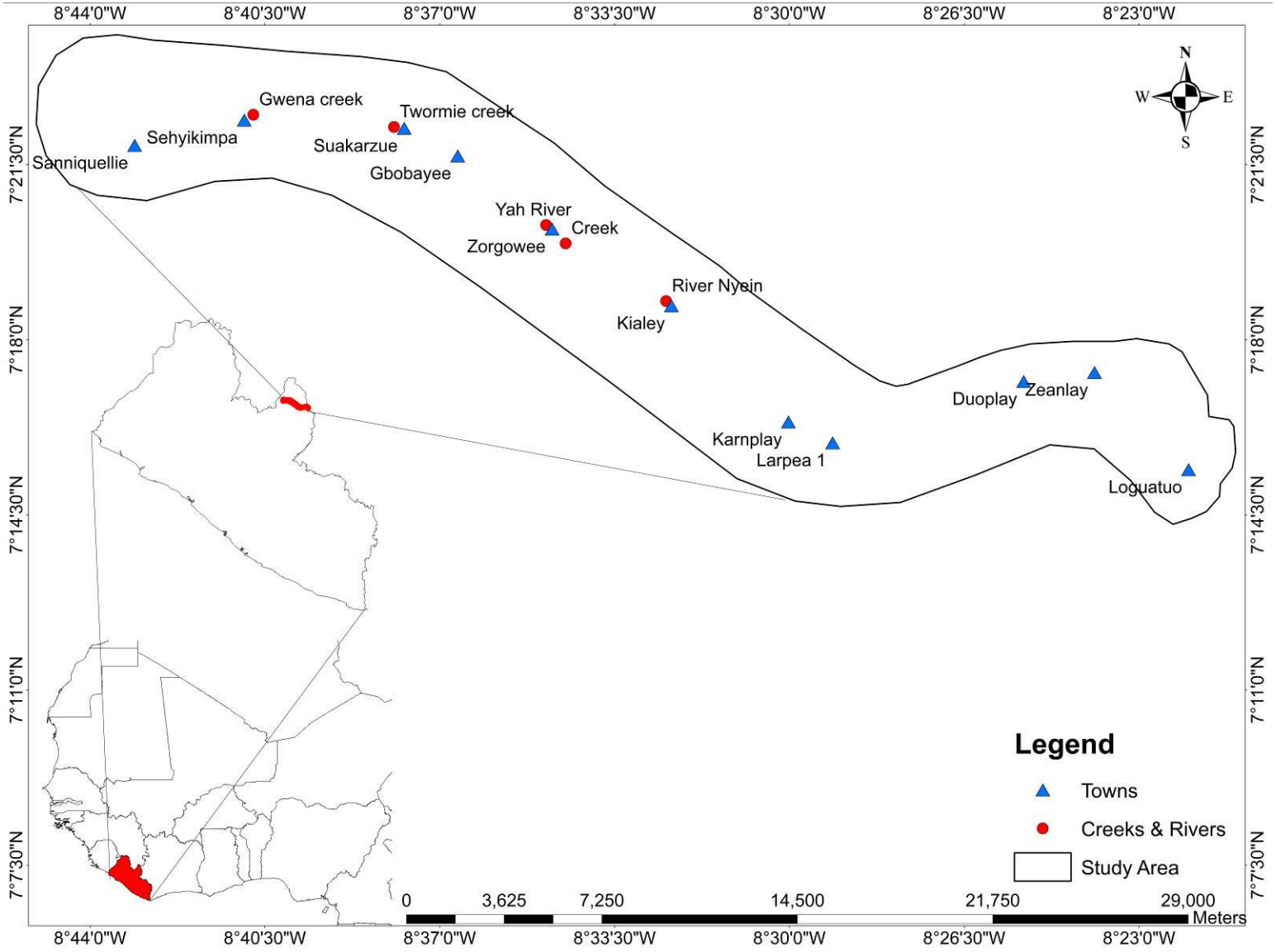


Figure 6: Map of Rivers and Creeks Along Project RoW

GEOLOGY

Liberian Geology is mainly dominated by the presence of igneous rocks of the Leo and Man Shield of the West African Craton, metamorphic rocks, and its weathering products. Most areas of the project corridor develop in the Pan African Belt. The rocks of the region have Paleoproterozoic age. Over them, some alluvial flood plains are developed, particularly in bands close to the main rivers.. Also some Aeolian deposits are conspicuous, related to the Harmathan winds from the Saharian Region. As a result of intense tropical weathering, varying thickness residual soils, rich in sesquioxides are present in the landscape. Lateritic and oxisoles, reddish and yellow colored soils are exposed in the slopes of the RoW. Under them, saprolytes and rock outcrops in many road slopes were observed.

5.2 BIOLOGICAL ENVIRONMENT

FLORA

The project corridor is within the tropical rainforest area. However, much of the forest has been replaced with secondary vegetation resulting from forest clearance for agricultural purposes and other form of forest exploitation. The present vegetation is composed of rubber trees, open grass vegetation, farm plots, plantain, maize, cassava, pineapple, shrubby vegetation, and numerous palm trees. Very few occasional patches of high virgin forest can be seen within the corridor.

FAUNA

The Liberian forest serves as habitat for large amounts of endemic fauna and is a unique ecological niche for some of the rarest species in the world. The Jentink's duiker (the rarest in the world), white-breasted guinea fowl, pygmy hippopotamus, Diana monkey, Liberian mongoose, the giant forest hog, chimpanzees, red colombus (a long-tailed

monkey), bongo antelope, leopard and the golden cat are amongst the animal population inhabiting Liberia's forests. It is also home to hundreds of birds, nine of which are endangered; several dozens of reptiles, including three types of crocodiles and at least eight poisonous snakes; amphibians and at least a thousand different insects

5.3 SOCIAL ENVIRONMENT

This section provides a summary of the existing socio-economic conditions in the vicinity of the RoW before the start of the Project; this is based on a desk study and stakeholder engagement with the local communities in the area, governmental institutions. It includes a summary of methods employed to undertake the study, an overview of the area and socioeconomic description of communities found in the project RoW.

The consultants reviewed existing information and available socio-economic studies of the county and where the Project is being developed. This included looking at background Liberian information at a national level and at the Nimba County level, where the project is located. The aim of the baseline study was to understand the general socio-economic environment and potential wider impacts that could be felt by the local communities along the RoW.

Using a participatory approach, study team used its existing knowledge of the county and knowledge of the social dynamics within the area to approach and engage government institutions, and the communities along the RoW. The various consultation methodologies for the baseline study in the field included:

- Open forum discussions
- Field observations
- Key Informant Interviews
- Questionnaires
- Informative Power Point presentation

In order to obtain some primary data on the communities along the project RoW, Random Purposive interviews were administered to a number of respondents within the various communities along the RoW. A total number of two hundred and thirty (230) respondents were interviewed across ten (10) towns and villages in the Nimba County of Liberia. These towns and villages include: Karnplay; Duoplay; Zorgowee, Larpea, Sehyikimpa, Gbobayee, Kialey, Zeanlay and Suakarzue, and some across in Loguatuo. Majority of the respondents were from Karnplay. Out of the total number of 230 respondents, 187 were male and 43 female.

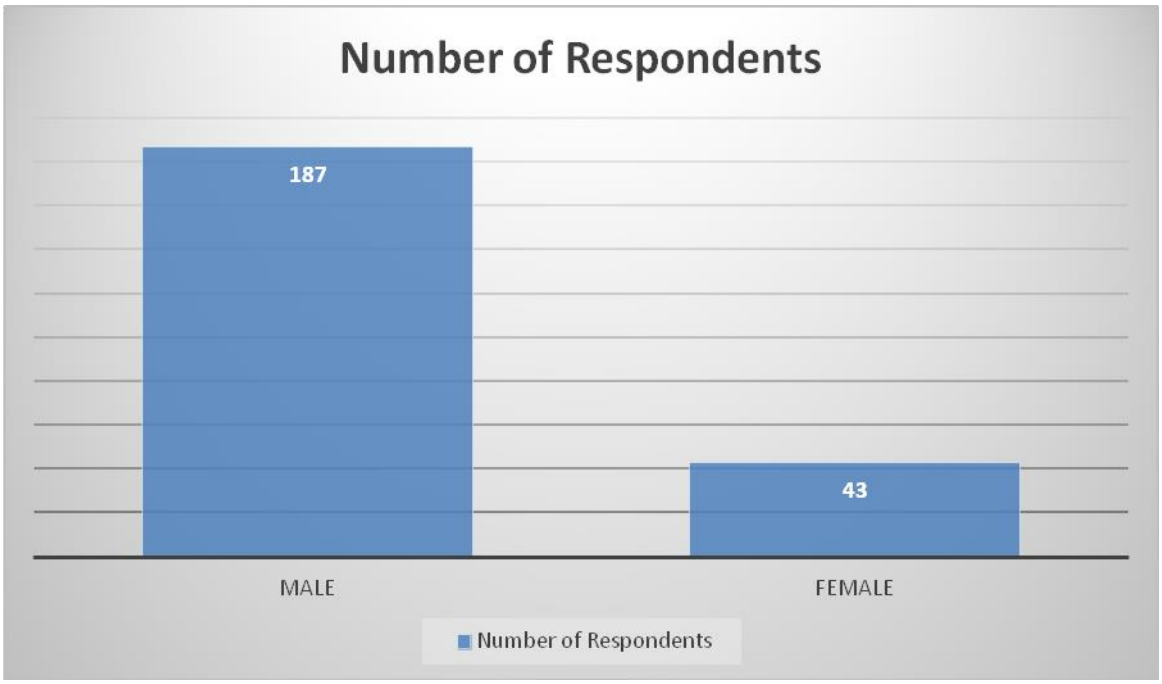


Figure 7: Respondents to Questionnaire Interviews

The information obtained was then analysed and summarised to identify the baseline socio-economic conditions, to determine the potential Project impacts, to develop the mitigation measures and to enable monitoring and evaluation of the Project. Through this process the consultants obtained an understanding of the social spectrum of the local area, the dynamics, and wants of the local communities along the RoW concerning

the project. This involvement also gave the consultants an opportunity to introduce themselves and present the Project to the communities.

The impact predictions described are based on an assessment of the primary and secondary data collected during the socio-economic baseline assessment. Based on an analysis of collected stakeholder views, the socio-economic assessment provided relevant information for the next chapter, which involves the identification and assessment of environmental impacts.

5.3.1 POPULATION

The population of Liberia has grown significantly in the last thirty years and has become increasingly unevenly distributed among the counties; the five most populous counties (Montserrado, Nimba, Bong, Lofa, and Grand Bassa) make up approximately 69.9% of the population. Bong, Lofa and Nimba counties make up what is often referred to as North Central Liberia. Table 4 shows the population distribution by district and sex for the affected county.

Table 3: Population Distribution of Males and Females in the Various Districts of Nimba County

Nimba County (Districts)	Male	Female	Total
Boe & Quilla	9,163	9,099	18,262
Buu-Yao	20,028	19,979	40,007
Doe	18,122	17,796	35,918
Garr Bain	29,813	31,412	61,225
Gbehlay- Geh	15,859	16,317	32,176
Gbi & Doru	4,152	3,979	8,131
Gbor	5,339	5,536	10,875
Kparblee	5,602	5,822	11,424
Leewehpea-Mahn	12,518	12,229	24,747
Meinpea-Mahn	12,237	11,920	24,157
Sanniqquellie Mahn	12,336	13,034	25,370
Twan River	18,658	18,821	37,479
Wee-Gbehy-Mahn	16,015	16,919	32,934
Yarmein	11,396	11,322	22,718
Yarpea Mahn	11,438	10,209	21,647

Yarwein	13,101	12,483	25,584
Zoe-Gbao	14,336	15,036	29,372
Grand Total			462,026

Table 4 lists the key towns along the project RoW and the population of males and females as well as the coordinates of these towns.

Table 4: Population and Coordinates of Key Affected Towns Along the RoW

Town	Coordinates	Population of Males	Population of Females	Total Population
Sanniquellie	N 07 21.883' W 008 43.108'	5,613	6,241	11,854
Sechyimpa	N 07 22.388' W 008 40.914'	2,348	2,518	4,866
Suakarzue	N 07 22.224' W 008 37.712'	164	164	328
Gbobayee	N 07 21.672' W 008 36.641'	155	185	340
Zorgowee	N 07 20.212' W 008 34.751'	2,935	3807	6,742
Kialey	N 07 18.677' W 008 32.363'	539	661	1,200
Duoplay	N 07 17.165' W 008 25.312'	431	417	848
Zeanlay	N 07 17.345' W 008 23.894'	300	313	613
Loguatuo	N 07 15.403' W 008 22.010'	1012	1229	2,241

5.3.2 ECONOMIC ENVIRONMENT

Rural Liberians depend primarily on agriculture for their livelihoods; nearly 70% of rural Liberians rely on crops only; a little over 20%, however, do not depend on agriculture at all. Nimba county residents are significantly more involved in crop production than livestock rearing.

Rice and cassava account for approximately 60% of crop production throughout Liberia. In Nimba county studied in this report, while rice and cassava continue to account mostly for the total production, each project affected town along the RoW is also involved in different types of supplemental agriculture. The project affected towns are also involved in the production of rubber and oil palm. Table 5 shows the livelihood means and the crops produced by the various projected affected towns along the RoW.

Table 5: Livelihood Means and Crops Grown in Project Affected Towns along RoW

Town	Key Livelihood Means/Crops Cultivated
Sanniquellie	Trading, Shop Keeping, Public Sector and Private Business Employment, Cassava, Plantain, Rice, And Cocoa Farming
Sechyimpa	Petty Trading, Charcoal Making, Rice, Cassava, Plantain Farm, Rubber Plantations Etc.
Suakarzue	Rice, Rubber Farm
Gbobayee	Vegetables, Charcoal Making, Black Smithing, Artisanal Diamond Mining, Cassava, Plantain
Zorgowee	Petty Trading, Cassava, Oil Palm, Rubber Farms, Charcoal Making, Cola Nut, Pepper, Rice, Cocoa
Zeanley	Sugar Cane, Rice, Rubber, Cocoa, Coffee, And Plantain Farm
Kialey	Rice, Cassava, Rubber, Oil Palm, Petty Trading.
Duoplay	Sugar Cane, Cocoa Farm
Karnplay	Petty Trading, Rice, Vegetables, Cocoa, Rubber Farm
Larpea 1&2	Petty Trading, Rice Cassava
Loguatuo	Cassava, Rice, Cocoa, Coffee, Bananas Farm Etc.

5.3.3 BASELINE ECONOMIC ACTIVITY INDICATORS

Economic indicators used to determine the baseline economic and social welfare among groups within the project affected communities include the following:

- Employment and wages
- Income
- Alternative livelihoods available.

These factors do not necessarily capture the complete picture of a people's economic and social welfare, but they were selected because they were available, quantifiable, and because they provided some indication of people's presumed quality of life. With the project county being generally rural in nature, farming is the predominant economic activity undertaken by the inhabitants.

5.3.3.1 INCOME AND EXPENDITURE OF THE PROJECT AFFECTED COMMUNITIES

Farming is the core economic activity in the settlements along the project corridor. The communities cultivate rice, cocoa, cassava, vegetables etc, as shown in Table 5. From the table, the communities also engage in other livelihood means such as petty trading, blacksmithing, among others. The communities and their inhabitants plant essentially the same kind of crops in different proportions and according to the land available to the household. Table 6 illustrates the monthly incomes from the farming and other livelihood activities among a total of 101 persons surveyed along the project RoW. Table 7 however indicates the expenditure pattern of the various income groups along the RoW.

Table 6: Average Monthly Income of Communities Along Project RoW

Average Income (Liberian Dollars)	Baseline Frequency	Percentage (%)
3,000 – 10, 000	22	21.78
10,000 – 16,000	51	50.48
17,000 – 24,000	13	12.87
25,000 – 33,000	10	9.9
33,000 – 50,000	5	4.95
Total	101	

Table 7: Average Monthly Expenditure of Communities Along Project RoW

Average Expenditure (Liberian Dollars)	Baseline Frequency	Percentage (%)
3,000 – 10, 000	14	13.86
10,000 – 16,000	56	56.55
17,000 – 24,000	17	16.83
25,000 – 33,000	12	11.88
33,000 – 50,000	3	2.97
Total	101	

5.3.4 FOOD PRICES

High food prices constitute one of the most commonly reported difficulties among Liberian households. Even rural farming households that tend to grow their own food report high dependency on markets during certain growing season. Although many markets are well- stocked, food price volatility can greatly affect communities, especially those that are relatively isolated and thus poorly integrated into the countrywide market networks. Along those lines, areas with the poorest road networks are the most food insecure; distance has a significant and negative correlation according to the Comprehensive Food Security and Nutrition Survey (CFSNS) 2010 food consumption score (FCS): the longer it takes households to reach the capital center, the lower the FCS and thus the more food insecure the household. Rice is the most important crop for Liberians; while over 94% of urban households source rice from markets, only 45.5% of rural households do so (CFSNS, 2010). This is an increase in numbers of people who rely on markets alone.

5.3.4 GENDER

Even though the problems surrounding limited agricultural productivity and weak markets affect everybody in rural areas, men and women experience these

problems differently because each have different roles and opportunities in agriculture. It is estimated that women in Liberia comprise 53% of the agricultural labor force and produce 60% of agricultural output. They tend to be more involved with food crops as opposed to cash crops: women contribute approximately 42.5% of the labor for food crops as compared to 35.3% of men; 31.5% of labor for cash crops compared with 48.5% by men (CSFNS). Fifty percent of women engage in agricultural processing activities as compared to 25% of men. Rural women are also heavily involved in trading in markets, carrying out 80% of trading activities in rural areas and thus playing a vital role in linking rural and urban markets. (WB Gender Assessment, 2007) Because rural women are so heavily involved in agriculture and would in turn benefit greatly by any improvements, it is important to consider the distinct problems that they face. A World Bank assessment of gender and agriculture (2010) stressed that the most serious obstacles to improving their agricultural productivity are:

- Lack of access to agricultural production inputs and technology – especially processing, packing, storage and transport;
- Less access to land, control over it, and land tenure security than men;
- Lack of readily available household or farm labor which limits potential to expand;
- Limited provision of extension services to all, but women in particular have difficulty reaching them because they tend to be illiterate and/or have less access to non-written information than men (i.e. radio);
- Limited information about various market prices around the country; inaccessibility to information (see above) limits their potential to compete;
- Access to finance is very limited, especially for women;
- Lack of access to markets as a result of poor road infrastructure;

- Inability to store surplus goods to take advantage of the hunger season that occurs as stored food depletes, the rainy season begins, and harvest are as many as two to three months away (typically July-September); and
- Lack of marketing support services and business training for women.

In addition to pursuing livelihoods in agriculture and small business, women have demanding responsibilities in the household and the community; the difficulty in undertaking daily tasks is greatly exacerbated when electricity is lacking. One of women's major domestic responsibilities is to fetch water; if she is unable, then it is likely that she will send one of her children especially at night where there is no source of electricity. When distances to access water are few and far in between, as they are in some particularly isolated areas of Liberia, much of the woman's day is spent walking when it could be spent engaging in more productive activities. A Liberia-wide survey found that 48.2 percent of rural women, versus 7.8% of rural men, are responsible to get drinking water. Though statistics are not available at the county level, it is likely that similar figures exist in each county.

EDUCATIONAL ATTAINMENT

Eight percent of the population, 10 years and above, along the route can read and write a simple sentence in English compared to 92% who cannot. With respect to school attendance in the communities along the route, 60% of the population had never been to school, 10% are drop outs, 12% have completed high school, i.e., grade 12 and 18% are currently in school.

HEALTH

There are 74 fuctional health facilities in Nimba Countyof which there are 6 hospitals. There is one regional referral: Jackson F. Doe Hospital, One County Referral- George Way Harley Hospital , Tuberculosis and Leprosy hsopital (Ganta Rehab), Accelaor Mittal Hospital, Ganta United Methodist Hospital,and E&J Hospital. The leading health partner is Africare -Liberia. Malaria has been recorded as the leading cause of morbidity and mortality in Liberia. HIV Prevalence rate in Nimber county is at 35%.

In terms of number of health centres available to respondents aong the project RoW, there are eleven clinics, health centres and hospitals available to them. They include: Duoplay community clinic; Karnplay Health Centre; GW Harley Hospital; Gedion Hold Clinic; St Mary Hospital; Give them Hope Clinic; Loguatuo medical centre; Othello Clinic; Sanniquillie; Zao Community Health Centre and Zorgowee clinic. These medical centres have some degree of proximity to the respondents and their choice of which to attend is largely fueled by proximity and cost. All the respondents, with the exception of one, have used the Sanniquellie-Loguatuo Road to obtain medical care. The chart below illustrates the proportions by respondents.

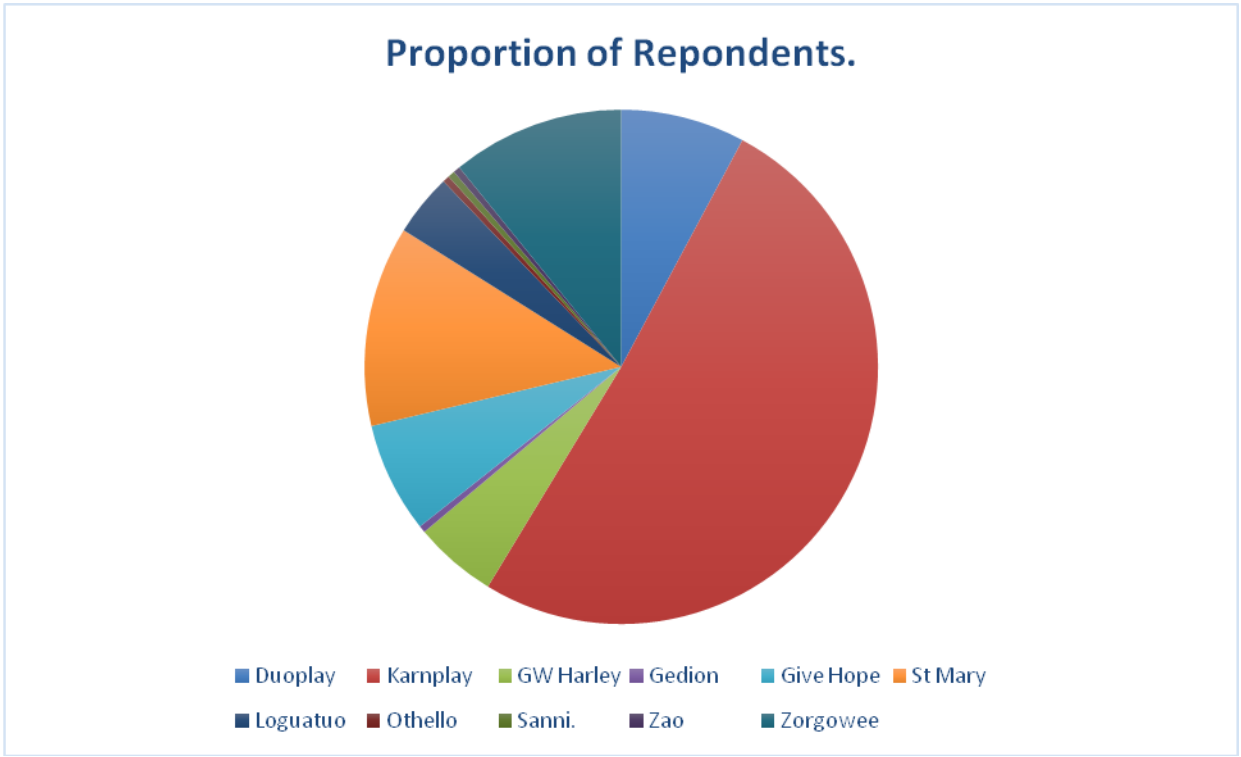


Figure 8: Medical Facilities Along the Project RoW

The principal reasons for which the respondents visited the medical centre were to treat sicknesses. Some of the major sicknesses that sent respondents to the medical centres are: malaria (198 respondents); typhoid (20); flu/cough (8); and ulcer and stomach aches (4).

WATER AND SANITATION

With regards water, sanitation and hygiene, a mix of sources exist, according to the respondents. In terms of water sources, the respondents listed public wells/pumps, private wells, public taps, private taps, purchase, river and rainwater as their sources of water. Fourteen (14) respondents depend on private wells, three (3) on private taps, twenty-one (21) on public taps, two (2) each depend on river sources and purchased water while one (1) cited rain as the source of water. Majority of them, however, depend on public wells and pumps for their water. Majority of the respondents to travel less than five (5) minutes to their source of water while a significant minority also travel between five (5) to twenty (20) minutes to their water source. Very few travel beyond 20 minutes.

In terms of sanitation, respondents discharged faeces in three forms, pit latrines (shared and private), flushed toilets and through open defecation. The disposal of solid waste in done in one of the following forms:

- Designated community waste sites
- Burning
- Indiscriminate disposal
- Garbage collection vendor
- Dug hole in backyard

The charts below illustrate the disposal methods used by the respondents for both liquid waste.

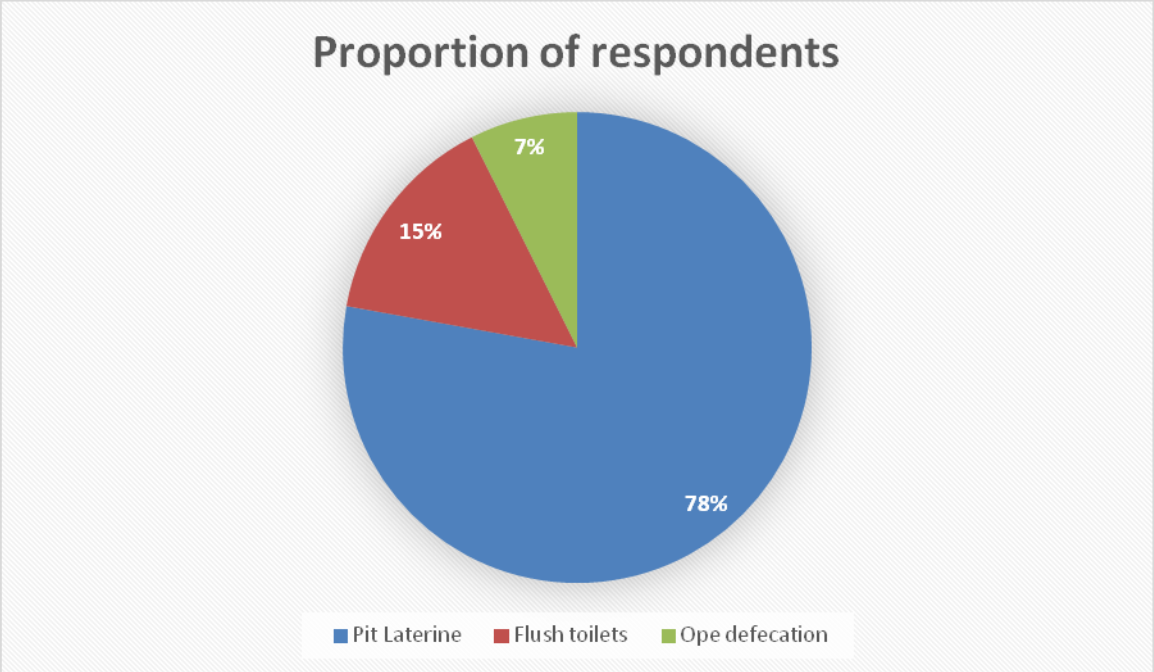


Figure 9: Means of Liquid Waste Disposal by Respondents Along RoW

Access to electricity by the respondent is generally poor, as a majority of them are without any form of electricity. Out of the total of 230 respondents, only 73 have access to one form of electricity or another. Out of that 73, fifty-seven (57) are connected to the grid, two (2) are connected to some community current while a whopping 157 are without any access at all.

5.3.5 ETHNICITY AND RELIGION

While prior to the regime of President Samuel Doe during the 1980s there was little strife between ethnic groups, ethnic tensions were greatly exacerbated during the Civil War as a result of political manipulation (Ellis, 1999). While such violent conflict has since almost completely subsided, there still exists periodic tension, usually involving land, that tends to fall along ethnic/religious lines (Heaner, 2008; US Dept. of State, 2012). Therefore, ethnicity should be considered in any project that will connect communities and bring in 'outsiders' of various ethnicities. Liberia is made up of at least sixteen ethnic groups (other African ethnic groups are represented in very small

numbers) that tend to be concentrated around certain parts of the country, though all ethnic groups can be found throughout, especially in the nation's capital, Monrovia. Villages and clans tend to be made up of members from the same ethnic group, especially in very rural and cut-off areas. The majority populations are either Kpelle (27%) or Bassa (18%); the others make up less than 10% each. Americo- Liberians (descendants of freed American slaves) and Congos (descendants of Caribbean immigrants) make up less than 5% of the population. There is an increasing number of Fulah (from Guinea) moving into the country, and are especially prominent in border regions. However, the projected affected towns along the RoW have mainly the Guo and Mano ethnic groups dominating. Table 6 below shows the various ethnic groupings that live in the towns and villages along the project RoW. Majority of residents of Nimba county are Christians (98%). The rest are Muslims(1%) and Animists(1%)

Table 8: Resident Ethnic Groups along Project RoW

City/Town/Village	Resident Ethnic Goups	Religious Groups
Sanniquellie	Guo, Mano, Gbe, Mandingo, Kran, Kpelleh, Bassa	Christianity, Traditional, and Islam
Sechyimpa	Mano, Guo, Kissi, Kpelleh	Christianity, Traditonal
Suakarzue	Mano, Guo	Christianity
Gbobayee	Mano, Guo, Kpelleh	Christianity
Zorgowee	Mano, Guo, Mandingo	Christianity, Traditonal
Kialey	Guo, Mano	Christianity
Larpea 1&2	Guo, Mano, Kpelleh	Christianity, Islam
Duoplay	Guo, Mano, Mandingo	Christianity
Loguatuo	Guo, Mano, Mandingo	Christianity, Islam, and

		Traditional

SITES OF CULTURAL AND RELIGIOUS IMPORTANCE

Along the project RoW are a number of sites of religious and cultural significance to the communities. Table 7 and Figure 8 depict these various sites and their respective locations along the RoW. Identification of these sites is crucial in informing the project implementers during relocation exercises and the various rites or detours necessary to ensure that the project does not destroy sites of cultural and religious significance to these communities. There are also a number of grave sites along the RoW within the various communities.

Table 9: Sites of Cultural and Religious Significance Along RoW

Town	Site of Cultural & Religious Significance	Coordinates of Site
Sechyimpa	Sacred Cotton Tree	N 07 22.481' W 008 40.885'
Gbobayee	Society Bush	N 07 21.467' W 008 36.376'
Zorgowee	Gogan Cemetry	N 07 20.194' W 008 34.750'
Kialey	Society Bush	N 07 18.677' W 008 32.427'
Larpea 1	Snake Society Bush	N 07 16.031' W 008 29.253'
Duoplay	Denm Tree	N 07 17.033' W 008 25.315'
Zeanlay	Community Cemetery	N 07 17.106' W 008 24.098'

TRANSPORT

The survey interviewed a total of Hundred (100) passenger respondents out of which were five business owners, a student, a labourer and three others whose occupations were not readily available. In terms of gender composition, the respondents were made up of six (60) males and four (40) females. Fifty(50) of the respondents were interviewed in Karnplay, forty (40) in Loguatuo and Ten (10) in Saniquellie. All these towns and villages are spread across the Sanniquellie Mahn and Gar Bain districts of the Nimba County.

The town frequented by most respondents was Ganta. Fifty (50) of the Hundred (100) respondents frequented Ganta with twenty (20) frequenting Monrovia and ten (10) each for Luogautuo, Saniquellie and Karnplay. The highest number of times a respondent frequented a destination in a month was thirty (30) times by labourers. This was directly followed by sixteen (16) times by a business men/women and petty traders, with the rest frequenting their destinations between once and four times monthly.

The most used means of transport was a car. Eighty (80) of the respondents used a car while twenty (20) used means of transport other than a car. The total average amount of time used to reach the various destinations ranges from three (3) hours to a number of days by bus, forty (40) minutes to ten (10) hours by minivan and fourteen minutes to seven hours by car. By motorcycle, the respondents indicate that a minimum of twenty-five (25) minutes to six (6) hours could be used. From the data, it is clear that the ready availability of the means of transport and the distance of travel play very key roles in the time used to travel.

In terms of cost of travel, it costs between 50 and 2,500 Liberian dollars to travel to the various destinations. This cost range also takes into account the type of transport used. It is cheaper with a motorcycle and more expensive with a car.

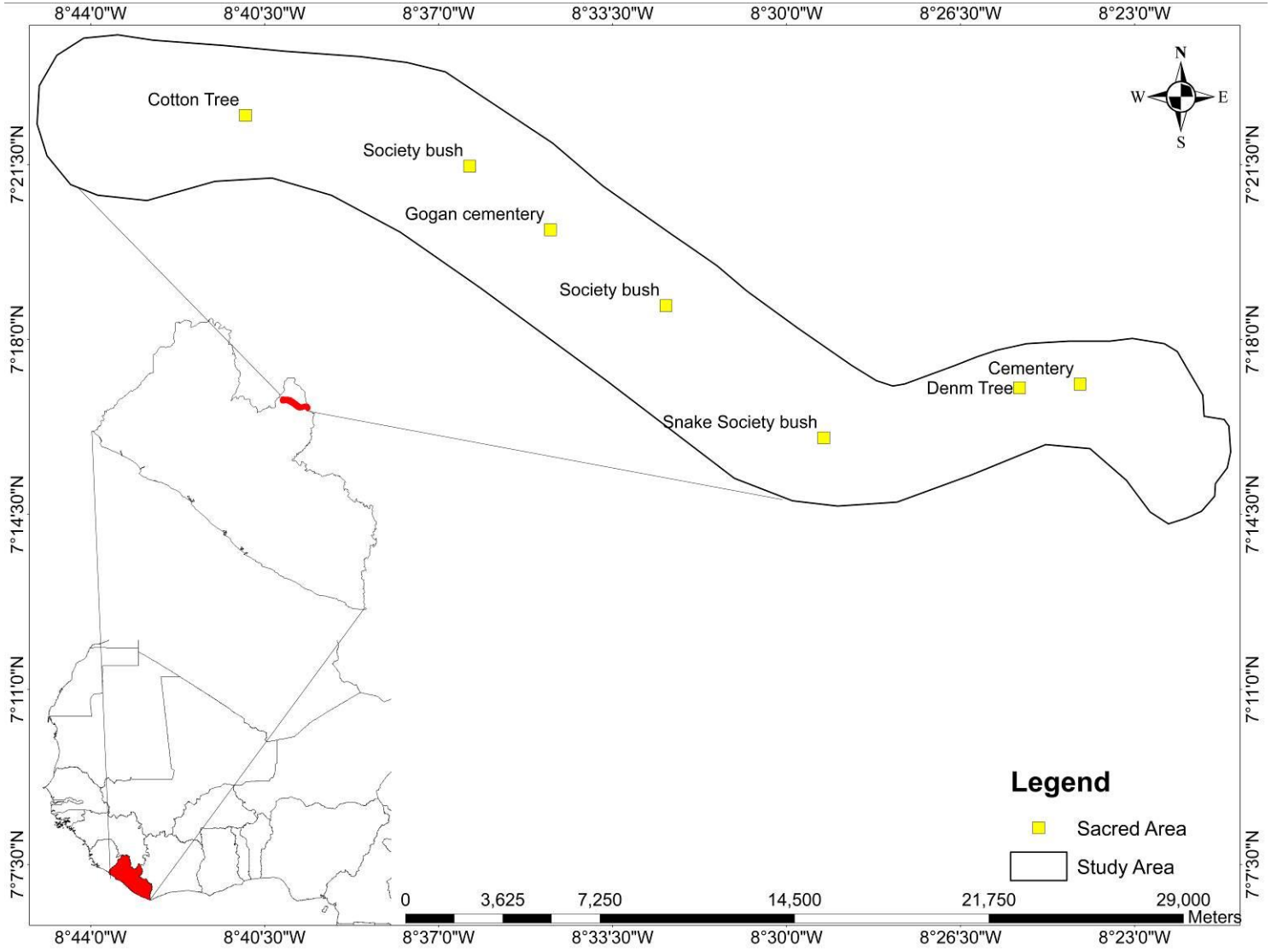


Figure 10: Sites of Cultural and Religious Significance Along Project RoW

6.0 IDENTIFICATION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

6.1 METHODOLOGY FOR IMPACT IDENTIFICATION

6.1.1 REVIEW AND COLLECTION OF INFORMATION

The collection of information involved:

- Desktop Review of available relevant documentation such as Feasibility Studies on other similar projects materials on the power sector as a whole. Important and relevant information was gathered from such documents for the identification and assessment of the potential impacts.
- The collection of information on the physical and socio-economic features of the project area through field surveys, site visits and consultations with the members of the local community who are knowledgeable about the local setting and the existing environmental conditions.

6.1.2 OFFICIAL CONSULTATIONS

Consultations were held with officials at various decentralized departments in Monrovia, and Nimba County. These included:

- Ministry of Public Works
- Office of the Superintendent – Nimba County
- Environmental Protection Agency

6.1.3 PUBLIC CONSULTATIONS

In order to gather public intake concerning the project there were series of meetings held in communities along the project corridor with traditional rulers and opinion leaders and groups of men, women and youth.

6.2 PROJECT ACCEPTANCE

A factor of fundamental importance is the level of acceptance by the communities and their leaders of any proposal that is likely to make an impact on their social, cultural or economic livelihoods. Hence an important part of the social impact evaluation process was to ascertain the level of approval and acceptance of the proposed project. The information gathered from respondents (both community leaders and members) showed almost unanimous approval within the affected communities. Clearly this view is the result of the expected/anticipated benefits that the communities will experience as a result of the completion of the project.

6.3 EVALUATION OF PROJECT WITH RESPECT TO ENVIRONMENTAL IMPACT POTENTIAL

The identification of potential impacts and the search for appropriate mitigation has been considered from two separate aspects:

- From the project construction aspects where impacts from this project will be similar to those experienced under many similar projects throughout Liberia.
- From the particular concerns of the local communities that have been consulted. A number of their concerns repeat those already identified by the consultants as construction related problems.

From baseline information collected during the fieldwork and issues that transpired during the consultation stage, the impacts of the project particularly during the construction phase are outlined in the following sections.

6.3 PRE-CONSTRUCTION PHASE

Displacement of People:

The proposed development will displace people within the way leave, hence there will be the need for relocations. MPW and the Consultants for the project feasibility study, AIC,

have concluded that a Resettlement Action Plan (RAP) needs to be done for Project Affected Persons (PAPs) that may fall within the RoW during the road construction project.

Expectations of Improvement in Livelihood:

These are associated with expectations of the residents of villages along the road alignment. In the Project area, the information about the Project raised hopes of the villagers of an asphalted road to their villages and anticipation of improvement in their lives. They also anticipated a rise in trading activities as a result of construction and temporary or permanent employment.

6.4 POTENTIAL CONSTRUCTION PHASE IMPACTS

6.4.1 DISRUPTION TO ROAD USAGE

Travelers may experience possible inconveniencies on road diversions during the period of construction. This is of limited duration; however it is crucial as it has a direct bearing on economic activity in the predominantly farming area.

6.4.2 IMPACT ON BIODIVERSITY

Thick vegetation exists along the entire corridor. Although the construction activities will not deviate significantly from existing road alignment, the works will lead to the removal of trees and vegetation on both sides as the right of way is expanded. Vegetation removal, noise and vibration from the construction works could frighten the wildlife in the vicinity and probably drive them from their habitat. Significant alterations to the flora, fauna and aquatic habitats will not be experienced.

6.4.3 CLIMATE CHANGE IMPACT

No significant negative incidence on the regional or local climate or microclimate is expected. There is the possibility of a rise in temperature with clearing that will be done to clean the right of way. This negative impact is negligible.

6.4.4 IMPACT ON WATER WAYS AND SITE DRAINAGE

Site preparatory works would involve the clearing of some amount of vegetation resulting in the exposure of fine soil materials that will be susceptible to erosion by surface run-off. Construction foundation works would also involve excavations and earth movements, which will expose loosened, fine soil materials to the surface. However, these will be re - compacted and thus erosion and siltation of nearby water courses and valley floors are therefore not likely to be highly affected during the construction phase of the project. This situation will however be accentuated if site preparatory works, excavations and earth movements are carried out in the rainy season. Some amount of siltation of water courses and valley floors may occur, affecting the direction and rate of flow of nearby water bodies especially during the construction of bridges. The result could be minor flooding of adjoining agricultural lands.

6.4.5 TRAFFIC-RELATED IMPACTS.

The consultations reveal some concerns directly relating to the anticipated increase in traffic both during construction and upon completion of the works due to conveying of construction logistics and personnel, perceived availability of casual jobs and the resultant easy transport access upon project completion. The expected traffic-related impacts include:

- Noise and vibration impacts: Construction activities involving heavy duty machinery, vehicular movement, and vehicle's horns etc. will increase ambient noise levels and vibration. Noise level is expected to reach up to 90 dB(A) within the project vicinity. The effects of this impact include welfare and physiological disruptions. Vibrations can damage roadside structures, particularly makeshift or lightly constructed buildings. Noise also has the potential to destroy wildlife habitats and movement in sensitive areas.

- Air pollution: The major sources of air pollutants are the emissions from construction machinery and dust from moving vehicles. Major air pollutants (dust, gaseous emissions and particulate matter) produce air pollution and impacts adversely on human health, flora and fauna and on the built environment. The amount of dust that will be released will depend on the intensity of works and the period within which these works are undertaken. Intensive works during dry periods would generate the most dust.
- Safety related impacts: Generally unguarded construction machines, ill-planned construction activities, and the carelessness of the machine-operators may lead to fatal accidents. Road accidents may also be caused by unsafe conditions owing to poor or inadequate provisions for pedestrians, cyclists and other non-motorized users of roads. 6.4.6 Impact on Infrastructure, Property and Land-use

The communities along the project route are engaged in agricultural production, producing subsistent crops such as, cassava, plantain and vegetables. There are a number of rubber plantations along the route. The project may involve the destruction of farmland and plantations and also petty trading bordering the RoW. However, there will be a Resettlement Action Plan put in place for both residential and commercial activities as well as any utility easements impacted by the construction to take care of these developments.

6.4.7 RESETTLEMENT

The project will require a resettlement plan. The Executing Agency (MPW) has indicated the arrangements being made regarding the preparation of a Action Plan. However this will not have a major impact on the communities since the road will follow the existing route.

6.4.8 IMPACT ON THE SOCIAL STRUCTURE

Culture is an element that transcends local parameters. A significant change in traditional norms, apart from a few sacred sites, and alteration in the basic lifestyle of inhabitants is not expected. The role of women as wives, care givers and income earners under the leadership of men will not be altered. Although the prospects are there, the road project will not single-handedly transform the livelihoods and lifestyles of the people along its route without further government intervention and other private sector investments.

6.4.9 IMPACT ON PUBLIC HEALTH

Dust borne communicable diseases, respiratory infections and minor throat and eye irritations are expected, especially during the dry season as a result of the emission of vehicular pollutants and dust (carbon monoxide and particulates). The presence of construction workers and related increase in disposable cash makes the transmission of STDs a possibility. Inadequate management of construction waste and domestic waste generated at the work sites and sewage from the construction camp(s) would create conditions for the growth of vectors of diseases such as cholera and dysentery. The outbreak of these diseases would have far-reaching negative implications for the health of residents. The increase in health cases could bring pressure to bear on personnel and resources at the limited health posts in the counties.

6.4.10 OCCUPATIONAL HEALTH AND SAFETY

Construction activities would expose the workers on site to conditions that could be hazardous/risky to their health and safety. The workers will be exposed to:

- Dust pollution and its attendant respiratory difficulties.
- Some level of noise and vibration that could result in temporary hearing loss. However, the level of noise is not likely to exceed generic occupational hazard exposure limits of 85 db(a) during the construction period. In addition, the use of jack hammers in such rocky areas during foundation constructions can

potentially generate high peak sound pressure level (instantaneous) that may average a maximum sound level reach 110db (a). The overall impact of noise and vibration on the environment construction workers is expected to be significant during the construction phase.

- Injuries resulting from falling from heights and falling objects, as well as from the (mis)use of equipment and tools.
- Cuts from stepping on sharp objects such as nails and other metal off-cuts.
- Injuries resulting from clashes between vehicles and the workers as they both operate within the same space. This impact is considered significant since it affects human lives and would therefore require adequate mitigation measures.

6.5 POTENTIAL POST CONSTRUCTION IMPACTS.

Potential post construction impacts anticipated may include:

- Poor reinstatement of the construction site
- Improper disposal of construction and life camps waste.
- Demobilization of the contractor from the area may also have a negative impact on those who have succeeded in making good business with the contractor and the workers. A downturn in economic activity will thus result around the work camps.

6.6 ANTICIPATED POSITIVE IMPACTS

In contrast to the likely negative impacts during the construction period, the operational period will result in many social and economic benefits resulting from completion of the construction. The road will enable easy access to the communities, which will result in the development of new commercial and production ventures in the areas. The easy access may lead to the provision of improved social services and act as an inducement to government employees (teachers, nurses) who previously shunned the districts due to

bad roads and transportation. Increased activity in along the corridor will lead to the revitalization of the county as related businesses are directly and indirectly affected.

Improved energy accessibility between the two large cities (Sanniquellie and Loguatuo) may lead to an increase in their rate of growth and development and result in gentrification. The possibility of the latter in the other communities along the road is also quite possible. Improved business opportunities may reduce the level of outmigration among youth in search of better prospects.

Summary of anticipated positive impacts:

- Improved access to and from facilities within all settlements
- Increased frequency of private sector investment and other businesses due to accessibility via transport.
- Stimulation of the development of other social amenities, such as building of health centers, schools, bore holes and major development agenda
- Facilitation of the undertaking of other economic activities in the settlement areas.
- Improved delivery of health care and education
- Opening up of important historic/tourist sites

Table 10: Summary of Environmental Impacts

Project Activities	**Potential Impacts**										
	Soil Erosion	Air Quality	Noise	Water Resources	Habitat Destruction (Fauna)	Loss of Trees and Crops	Ecologically Sensitive Sites	Cultural/ Historical Sites	Health Hazards	Safety	Waste Management
Pre-Construction Phase											
Construction Survey/ RoW Assessment	0	0	0	0	0	0	0	0	0	0	0
Pre- Material/Soil Testing	0	0	0	0	0	0	0	0	0	0	0
Alignment Pit Investigations	0/1	0	0	0	0	0/1	0	0	0	0	0
Boring at River Crossings	0/1	0	0/1	0/1	0/1	0	0	0	0	0	0
DCP Testing	0/1	0	0	0	0/1	0/1	0	0	0	0	0
Construction											
Acquisition/Clearing of RoW	2	1	0	0/1	1	2	0	2	0	0/1	1
Earthworks/Foundations	1	2	2	1	1	0	0	0	1	1	1
Laying road foundations	1	2	1	0	0	0	0	0	1	1	0
Laying Asphalt	0	1	1	0	0	0	0	0	1	1	0
Materials Haulage	0	2	1	0	0	0	0	0	1	1	0
Construction Camps	0	0	1	1	0	1	0	0	1	0/1	2
Post Construction											
Camp Site Decommissioning	0	0	2+	0	2+	2+	0	0	0	0	2+
Maintenance Works	0/1	0	1	0	0	0	0	0	0	0	0
Road Safety Measures	0	0	0	0	0	0	0	0	0	2+	0

6.7 SCALE AND DURATION OF PHYSICAL IMPACTS

The most significant impact that often arises from road construction projects is that of resettlement. The existing RoW is also clearly demarcated and since there some structures are too close to the RoW for safety, there will be the need for relocation. All affected persons will be compensated prior to the commencement of the road work. It is envisaged (based on the overall strategy of the project) that quality of life for residents along the corridor would be improved even with the proposed resettlement plans. The scale of the loss would require a RAP. However monetary compensation has been suggested as a way of mitigating the impact on the property owners.

All other potential negative physical impacts arising from actual construction works, (together with the possible social impacts caused by imported labor), may be considered as being temporary in nature. Proper completion of the works will result in total demobilization and removal of all contractor's staff, offices, housing, vehicles and equipment. Also the scale of the negative impacts will be of variable intensity, depending on the proximity of operations at any particular time.

6.8 MITIGATION OF ENVIRONMENTAL IMPACTS

This section presents remedial measures proposed to avoid or reduce the negative environmental and social impacts likely to arise from the implementation of the road project. In assessing the short and long-term impact mitigating measures the Consultant assumed that MPW will;

- Enter into a contract agreement with experienced and competent contractors who will accept moral and contractual obligations to avoid unnecessary nuisance to the local communities or delays to the completion of the works.
- Employ the professional services of an experienced and reputable engineer on site, to supervise the contractors in all aspects of planning, programming, quality

control with broad social and environment protection formulated under the environmental management plans

- In addition, all contractors and their employees would be educated on the Environment and Social Action Plan (ESAP) including the Environmental Management Plan (EMP) for the construction phase to ensure that contractor's work plans reflect the environment and social action plans to meet the desired sustainability objectives in the project implementation.
- The Construction Environmental and Social Management Plan (CESMP) must take into account measures to mitigate environmental impacts of in-migration of workers impacts as proposed in section 4.5.3.5.1 under Cumulative Impacts, of this ESIA document

6.8.1 MITIGATION OF IMPACTS OF ROAD INFRASTRUCTURE

As stated earlier, most of the potential negative impacts will relate to the construction phase of the project. The list below is a summary of the potential impacts and the measures proposed by the project team (in consultation with the Executing Agency and other relevant stakeholders) to mitigate these impacts.

a. **Impact:** Disruptions to road usage

Potential Source: unplanned detours and road closures

Mitigation Measure: The contractor will be obliged to work to a Traffic management Plan (TMP)

Guidance on TMP content:

- Any diversions and temporary running surfaces must be sufficiently smooth for the use of bicycles.
- The TMP may be expected to include Stop/Go signals at each end of the working sections. Long working sections may be interspersed with several such signals.

Traffic using the project roads at present is relatively low hence the delays at the end of such traffic controls will normally be few.

- The concept of major disruptions over the whole length of the road should not be encouraged. The contractor would have to complete work in a continuous and consecutive sequence without leaving isolated sections. In cases where foundation works and laying asphalt does not interfere with vehicle movement, road users can be cautioned with slow down signs while using the roads. However, markets must remain reachable on any day.

b. **Impact:** Traffic Impacts - Noise and Vibration /Air pollution

Potential Source: Construction of road foundations, Laying of Asphalt

Mitigation Measure:

- Mixing plants for foundation construction would be located at least 500m from any community along the project road.
- Critical areas (schools, health posts) will be protected with temporary barriers.
- Contractor will be prevented from working in settlement areas after the hours of darkness.
- The Project Consultant will be responsible for enforcing that all vehicles are maintained in accordance with the manufacturer's specifications, with particular regard to control of noise and diesel particulate emissions.
- Dust-producing materials must be covered by tarpaulins when being transported by truck.
- Transport of other materials for tower construction to sites must be done in compliance with safety standards.

c. **Impact:** Community Health/Safety Measures

Potential Source: Presence of migrant workers/unguarded construction machines; ill- planned construction activities; carelessness of the machine-operators; etc.

Mitigation Measure:

- The commitment to providing HIV/AIDS education for contractor's workers and the residents will reflect in the budgetary allocations for the project. HIV/AIDS Awareness public orientations and poster displays.
- Community outreach programs must be factored into project cost. Road safety education for especially schools along the routes would be pursued.
- The communities will be well indoctrinated into the dangers of settling too close to roads. This education will start immediately the project commences. This will help protect the communities from injury or ill-health caused directly or indirectly by project activities.
- A speed limit of 15 kph will be instituted for all of the contractor's heavy vehicles through all of the settlements during the construction period. The contractor will be held responsible for controlling the speed of his vehicles
- Proper conditions of workers on the project will be ensured by putting in place a human resource policy and management plan for the contractor
- Citing of workers camps and storage facilities will be properly planned so as not to affect the surrounding communities or interfere with their daily activities negatively
- Adequate and proper standard sanitary facilities will be provided at each project camp site. This will avert pressure on existing community sanitary facilities during the construction phase
- Mobile toilet facilities will be provided for construction workers. This is to ensure that decent and comfortable places of convenience are provided for the workers and also to prevent environmental pollution with human waste.
- Lifting of excessive weights at the workplace will be prohibited. Lifting appliances (e.g. forklifts) will be provided for lifting heavy objects. First aid facilities and good drinking water will be made available for the use of workers. Raincoats,

Wellington boots, etc., will be provided for construction workers who will be working in rainy or wet conditions

- The HR Policy for the project will include a code of conduct for workers, preceded by training on how to abide by these occupational codes; both on and off site in project affected communities for the project duration.

d. **Impact:** Campsite waste management / Occupational health & Safety

The following wastes are likely to be generated at the construction site:

- Clearance and excavation wastes: clearance of site vegetation and removal of soils, inert construction materials and residues, spoil, etc.
- General construction wastes: reject and excess material, drainage from wastewater and site run-off, containers etc.
- Hazardous wastes: Other hazardous wastes may result from spillages from construction equipment.
- Other wastes: from offices, food preparation wastes, sanitation etc.

The objectives of managing waste are based on the hierarchy of avoidance/reduce, re-use, recycle, treat and dispose. To re-use and/or recycle a minimum of 80% of all Hard Waste Material, and Soft Waste Material generated on the construction site, thus achieving up to 80% reduction/avoidance in waste to landfill. Best Practice should be adopted wherever possible, to achieve waste minimisation and reduction. Key areas that will be targeted in the Waste Management Plan are:

- ✓ To avoid, whenever possible, the generation of wastes
- ✓ Demolition Materials (including hazardous building materials i.e. asbestos)
- ✓ Construction Materials
- ✓ Excavated Fill Materials
- ✓ Domestic & Human Waste
- ✓ Wastewater
- ✓ Litter generation due to construction activities

In addition the project will:

- ✓ liaise with Subcontractors to identify areas where they can reduce waste and reuse materials in
- ✓ their respective trades;
- ✓ meet local, county and national waste minimisation legislation and environmental standards;
- ✓ prevent pollution and damage to the environment; and
- ✓ protect the safety and health of our employees, site personnel and the public

Potential Source: Base Camp Construction and Occupation, Road Construction /Decommissioning

Mitigation Measure:

With respect to waste management, the following measures shall be put in place to help keep a clean site and reduce environmental pollution:

- ➢ The Contractor and the MPW would organize induction programmes on environmental, health and safety, and security issues for all construction workers.
- ➢ The contractor shall provide adequate office accommodation for his own staff and those of the Engineer's representative, workshops for his own use and living accommodation for his workers.
- ➢ Facilities to be provided such as latrines, bathing, canteen, health, water, electricity, welfare and transport, all to be supplied and maintained to adequate standards.
- ➢ Camps shall be served by proper waste disposal facilities including incinerator pits for domestic solid waste, septic tanks for foul sewage, surface water drains properly constructed to outfall or streams.

- Workshops will be required to have proper oil interceptors to collect surface water runoff from areas around refueling points and service bays.
- The contractor will be expected to transport waste oil to the nearest commercially run oil disposal operator.
- No burning of waste fuel or used tires will be allowed.
- Fuel trucks servicing plant in the field will be obliged to carry at all times, anti-spill trays and a supply of suitable material, such as sawdust, for absorption of minor spills.
- The contractor will be expected to adopt and enforce regulations to prevent indiscriminate urination or defecation outside the camp or latrine facilities.
- Strict regulations shall be instituted at the camp to ensure that the activities of workers do not pose a threat to the social order of the local community.
- Upon decommissioning the contractor shall remove all structures, above and below ground, disinfect all septic tanks, and latrine soil pits, dispose of all solid waste in an acceptable manner, disconnect all services and reinstate the area with topsoil and planting to the satisfaction of the engineer.
- If some local community interests wish to purchase the facilities and the contractor is prepared to sell the same, the contractor must satisfy the Engineer that proper planning permission has been acquired and all conditions under that permission have been met and a proper sale agreement is in force with the purchaser accepting future liability for the property and facilities.

- Adequate numbers of containers shall be provided with covers to keep rain out or to prevent loss of wastes when it is windy.
- Solid and hazardous waste containers shall be properly labelled to identify them to ensure that toxic liquid wastes (used oils, solvents and paints) are not disposed of in solid waste containers. Additionally, the project personnel

have been trained on proper collection and disposal methods of different types of solid wastes.

- Construction waste and domestic waste are collected, removed and disposed of only at designated areas.
- Wherever possible, production of construction waste and domestic waste has been minimized by reusing and reusing leftover materials wherever possible and also through proper planning and design.
- Construction workers shall be instructed in proper construction waste and domestic waste storage and handling procedures.
- If scrap metal occurs, these scraps shall either be reused or sold to companies whose business activity is dealing with scraps.
- Wood and cardboard wastes shall be reused if possible.
- Disposing of domestic waste on the construction site is prohibited for workers and visitors.
- Domestic rubbish field have been established as planned, and regularly disinfected.
- Sanitary facilities have been well planned and cleaned daily.
- Construction work camps and surroundings shall be kept in clean and neat conditions at all times.
- Collected domestic waste and construction waste will not be store in the vicinity of drainage systems or watercourses.
- No waste shall be disposed of or buried on the site. Illegal dumping, either at the construction camp, along public roads or in the surrounding areas, or into the river will not be allowed.

The contractor will be required to have and to promote a policy of a clean worksite and good disposal practices, with advice and training available to its workforce achieve this. With the adoption of the outlined mitigation measures, the impacts of wastes generated during the construction of the power plant site and transmission line are predicted to be of low significance.

e. **Impact:** Soil Erosion and Silting

Potential Source: Site preparation and clearing; Removal of vegetation, soil disturbance and poor drainage

Mitigation Measure:

- The Contractor would be directed to provide immediate control measures to prevent soil erosion and sedimentation that will cause siltation of watercourses.
- Prior to the start of the relevant construction, the contractor shall submit to the Project (Consultant) Engineer for approval, his schedules for carrying out temporary and permanent erosion/sedimentation control works as are applicable to clearing of the site.
- The Contractor would be expected to exercise care and due diligence during site preparation to avoid indiscriminate clearing of vegetation. The contractor will stagger clearing of the site so that areas will be cleared only when construction is about to commence there. Besides maintaining some vegetation on the site, the staggered clearing will limit the area exposed to help prevent massive sheet erosion.
- Under no conditions shall clearing and/or excavation without prior approval of the Project Engineer, expose a large surface area of credible earth material at one time.

f. **Impact:** Water Resources: - Water Quality/ Modification of water flow.

Potential Source: Site preparation & clearing activities; heaping of materials; chemical spillage, etc.

Mitigation Measure:

- Provide buffer zones of undisturbed vegetation between construction sites and water bodies
- For machinery and other vehicular maintenance activities, spill oil containment bonds will be put in place to avoid spillage in the project surroundings.
- The wastewater and runoff from asphalt and concrete batching plants (mobile and stationary plants) will be clarified by settlement ponds and the alkali level of waste water and run off will be neutralised to prevent water pollution.
- Waste generated from concreting/asphalting activities will not be allowed to flow into drainage ways, and receiving waters.
- The amount of daily concrete/asphalt will be determined according to the construction schedule. Mixing excess amounts of fresh concrete will be avoided by planning of order volumes for each. The person in charge will control the quality and the amount produced to avoid excess production.
- Concrete transit mixers and asphalt will be washed out only in designated areas. It will not be permitted to wash into drainage lines, open ditches or into watercourses. Designated areas with sign boards – "concrete and asphalt washout areas" will be located near batching plants, where settlement ponds will be constructed.
- For concrete and asphalt additives, material safety data sheet (MSDS) will be obtained from the manufacturer. The MSDS will be used to obtain information on hazards and safety precautions, the specific information on how to deal with spills.

- Both employees and subcontractors shall be instructed about concrete waste management techniques

g. **Impact:** Habitat (fauna) destruction/fragmentation

Potential Source: Right of way and land take

Mitigation Measure:

- The project RoW is defined along the current existing road, and none of the flora and fauna would be adversely affected.
- The Consultancy Team has consulted the Forestry Development Agency and they will be available to give advice on measures to alleviate the adverse impacts especially on wildlife.
- Schedule for construction would be adhered to so that the wildlife are not scared away because of prolonged construction.
- Construction team will ensure hunting tracts are not disturbed during the construction process during permitted seasons. However, the project team members will be educated not to engage in any form of hunting and to also report any incidences of rare or endemic species being cited during the construction process.
- The project team will coordinate with the FDA to ensure that no protected species are hunted or captured along the project corridor by communities while the project is going on.

h. **Impact**: Land form Alteration

Potential Source: Site for construction and storage of materials

Mitigation Measure:

- Any of these sites that would be established within the project vicinity will be operated and closed within the context of contract agreement established prior to construction.

i. **Impact:** Occupational Health and Safety

The AfDB's Operation Safeguards -5 refers to how to deal with Labour Conditions and Health and Safety of the human resource for a country, and for that matter this project. The labour conditions and health and safety issues on the project will be construed to the Liberian national requirements as well as those of the ILO where gaps may exist.

Potential Source: Construction activities

Mitigation Measure:

- Measures shall be designed and adhered to regarding employment and workforce policies to mitigate environmental, health and social impacts that are associated with the influx of formal and informal workers by the Contractor. Local employment and sourcing policies are used to give priorities to people within the project affected areas.
- A Safety & Health Plan (SHP) shall be prepared by the Contractor and approved by the MPW and shall be in line with the AfDB's Operational Safeguards Policy. Education and awareness training are given to every worker upon employment. MPW and contractor shall promote the need for safety awareness in all aspect of the work by conducting safety awareness programmes and campaigns, displaying posters and signs and using audio visuals. Weekly and monthly safety meetings shall be held for the workers of the Contractor.
- MPW will ensure that Contractor carries out the work in compliance with the relevant provisions of the labour law in Liberia and the Contractor Safety Rules to minimize the potential occupational safety and health hazards and prevent or minimise accidents. To further minimize the potential safety and health hazards, the MPW will ensure that the contractor employs properly trained and experienced operatives and adhered to all technical specifications relevant

to safety measures in the execution of the works. In addition, the contractor will be expected to provide an "All Risk Insurance" cover for himself, subcontractors, project management staff and all other employees.

- MPW/Contractor shall conduct formal induction sessions for all people on site, including issuing each of its employees and employees of its subcontractors with an induction health and safety booklet, and during the contract, continue with on-going training onsite health and safety matters. Road safety signs are put at the appropriate places to prevent accidents. Dangerous construction sites are always flagged with caution reflectors.
- Materials and equipment used for construction work and installation of plant and machinery would be marked to explain their potential impact. Workers would be made to always use helmets on site and other safety measures with regards to
- construction and installation works would be enforced Reasonable practical precautions would be taken and instructions given in the identification, use, handling, storage, transport and disposal of materials at the construction site.
- With the implementation of the contractor's construction Health and Safety Plan, audited by MPW, the occupational health and safety risks associated with the construction of the road will be minimised. The overall impact on occupational and public health and safety is predicted to be of low significance.

The potential for occupational health and safety hazards would be avoided when:

- Workers are provided with adequate personal protective equipment and enforced to use them;
- Technical specifications relevant to safety measures are regarded in the installation and use of equipment (e.g. diligent execution of works, general observance of safety rules leading to inherently safe systems)

- The workers have received sufficient training and experience in connection with safety measures and their observance as set out in the ESAP
- There is proper and sufficient supervision of workers.

6.8.3 POTENTIAL OPERATION AND MAINTENANCE IMPACTS

The physical impacts likely to occur in relation to the road would be mostly positive; except in the case of over speeding cars that may result in killing of livestock and persons crossing the road. This can however be averted through an intensive road safety campaign. Maintenance of the road will be the responsibility of MPW. Maintenance operations for these infrastructures will require experience, skills, materials and some equipment. However, the ever present need for cutting back vegetation, especially vegetation and tree branches from taking over the road will require unskilled labor and could be carried out by the local communities. The communities would be encouraged to seek to become involved in helping to maintain the asset that will have been provided for the county and which deserves proper maintenance.

7.0 PROVISIONAL ENVIRONMENTAL MANAGEMENT PLAN

7.1 INTRODUCTION

MPW, in line with its financiers and the successful project contractor, aims to manage the road consturction Project in line with EPA and the EU and AfDB's regulations, so that undesirable (negative) environmental and community effects are minimized, whilst positive effects are maximized. This section of the EIS presents the Provisional Environmental Management Plans (PEMP) for the proposed current project. The P-EMP is a framework that encompasses identified aspects of mitigation, management, monitoring and institutional measures that will be undertaken by the project implementers. A full Environmental and Social Management Plan (ESMP) will be prepared as part of the entire ESIA process.

The proposed Environmental Management System (EMS) for the project is structured around a Plan-Do-Check-Act model for continual improvement. The five main elements of the EMS also correspond to the elements of ISO14001, the international standard for environmental management systems. The elements are related as shown in the figure below:

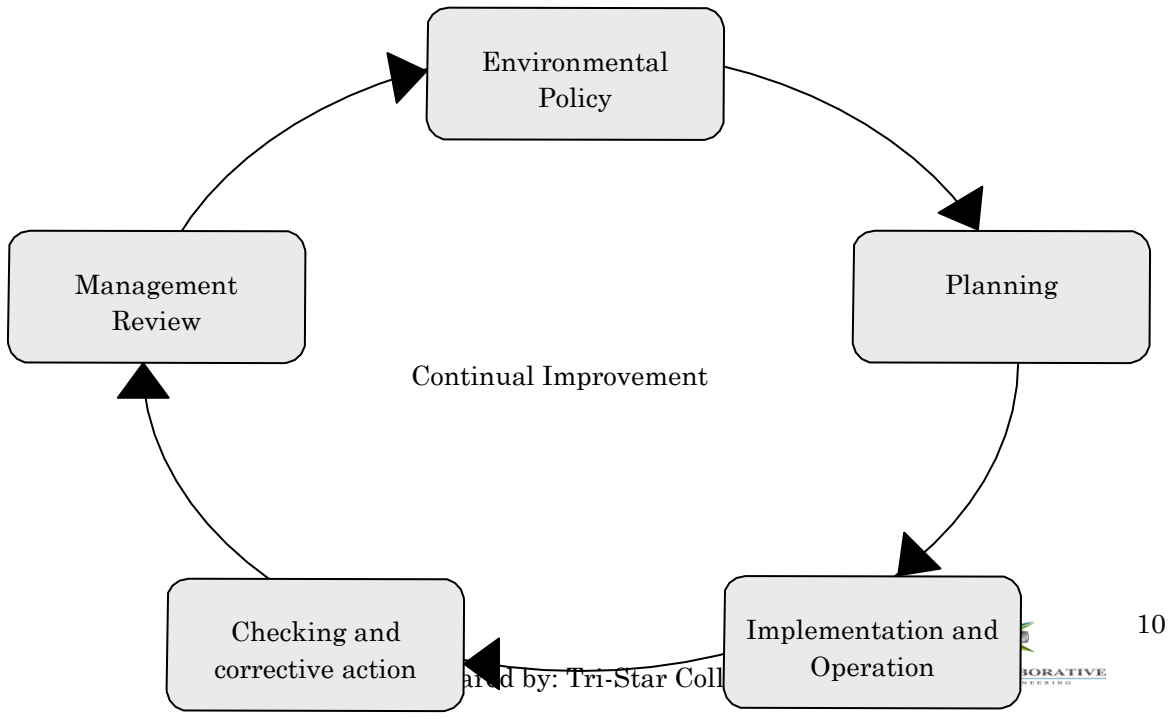


Figure 11: Plan-Do-Check-Act Model for Continuous Improvement ESMP

This section of the EIS outlines the intent and proposed form of the Environmental Management Plan (EMP) of the current project. Presented as a Provisional Environmental Management Plan (PEMP) only, the following sections include the plans that have been and will be developed to manage, mitigate and monitor environmental impacts that are predicted to occur. The plans cover the period that extends from the construction phase to operation phase of the project.

The overall scope of the EMS can be summarized as follows:

The scope of the EMS shall apply to the project implementation process and subsequent operations under MPW. The following project team members (each responsible to the Project Manager) manage these areas of the project:

a. **Lead Project Engineer** – responsible for co-coordinating the entire project. The pre-construction investigations and road alignment, laying road foundation, constructing bridges, asphalting etc. building
b. **Maintenance** - responsible for the maintenance of all mobile and stationary equipment at the project sites.
c. **Survey** - responsible for the establishment and evaluation of the RoW, on-site exploration and location control.
d. **Finance and Administration** – responsible for Finance, IT and Administration;
e. **Supply Department** - responsible for Procurement, Storage (Warehouse);

f. **Community** - responsible for community affairs, resettlement action plans, community consultation and sustainable development.
g. **Loss Control** – responsible for site security, safety;
h. **Human Resources** – responsible for town site management, medical services, catering and personnel; and
i. **Environment** – responsible for monitoring, waste management, site rehabilitation and the environmental management system implementation. The Environmental Manager reports directly to the Project Manager. The Environmental Department acts as a resource and knowledge base for overall environmental management of the project.

7.2 LAYOUT OF THE EMP

The proposed format of the EMP is planned to cover these four broad areas as follows:

a. Liberian and EU/AfDB corporate policies and legislative framework on environment, safety, health, and wellbeing, and human rights and community relations
b. Methodology
c. Environmental and Social Impacts
d. Environmental and Social Management Plan

7.2.1. ENVIRONMENTAL MANAGEMENT STRUCTURE

As documented in the EPA's Environmental laws, the GoL recognizes responsible environmental management as fundamental to its engagement in developmental projects. To facilitate environmental management practices in this project, the project implementers will establish an Environment Outfit. The Environment Manager

will report directly to the Project Manager, thereby ensuring that the environment issues are assigned the appropriate priority and the level of attention. The Environmental Manager will be aided by a Safety Superintendent, a Community Affairs and Sustainable Development (CASD) Officer, plus a team to support in the management of site issues. Environmental management is the responsibility of the entire project team and the required capacity building is provided so that people understand the correct way to carry out their tasks. There will also be monthly reports for Project Implementation Unit (PIU) of the MPW and contractors and Quarterly reports to the AfDB on such environmental issues as detailed out in the Environmental and Social Management Plan (ESMP) for the project

7.2.2 ENVIRONMENTAL AND SOCIOECONOMIC IMPACTS AND MITIGATION MEASURES

The environmental management system to be developed for the project will be used taking into consideration the following main issues:

- Incorporate environmental controls for the prevention of degradation/pollution and use best management practices throughout the operations and decommissioning;
- Regularly assess environmental conditions during construction and operation, thereby identifying all issues of environmental concern and establishing objectives and strategies for their management;
- Establish credible monitoring and verification programmes to measure environmental effects and ensure compliance with legal requirements and with environmental policy, and communicate the results in an effective manner;
- Provide training and resources to develop project team and subsequently, MPW employees and build competencies related to their environmental and social

responsibilities so ensuring that all employees are equipped to accept responsibility for the environmental in which they operate;

- An efficient environmental incident reporting system will be established and requisite reports prepared and submitted to regulators in a timely manner; and Periodic review and independent audits to verify environmental compliance.

The CASD outfit will work with stakeholders to implement the identified community-related mitigation strategies. The project team will maintain community records on local employment levels and community / project partnerships. The community team will be responsible for community liaison and dealing with the public complaints with regard to environmental and socioeconomic issues. The Project Manager will also play an important role in community relations and communication.

7.2.3 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.2.3.1 MONITORING PROGRAMMES

A monitoring programme for the project would be implemented and where necessary and required by regulation, monitoring programme will be initiated to comply with project specific requirements. Against this background, the monitoring programme will continue to evaluate short- and long-term environmental conditions and to facilitate assessment of the effectiveness of mitigation measures.

Monitoring results will be compared with predictions made in this Environmental Impact Assessment and management mitigation strategies implemented. Ongoing monitoring may identify potential impacts that were not envisaged during project conception and implementation.

7.2.3.2 DOCUMENTATION AND REPORTING

The Environmental Manager will collate monitoring and other relevant data and submit reports as required by regulatory agencies. The reports, depending on duration of project will include:

- Environmental Management Plan
- Monthly Monitoring Returns

7.2.3.3 ENVIRONMENTAL MANAGEMENT PLAN

The projects ESMP will include an environmental action plan.

7.2.3.4 OCCUPATIONAL HEALTH AND SAFETY

The project human resource form an important asset of the project implementation and their welfare, health and safety is a major concern. Management of the project will endeavor to secure a healthy and safe working environment through:

- Sound operational design and oversight with review at the inception of the project;
- Developing and maintaining an occupational health and safety programme based on best practice;
- Implementing the required Liberian regulations for power projects;
- Adopt an appropriate Safety, Health and Environmental ("SHE") standard and procedures to form the basis of internal and external auditing of the project's SHE performance;
- Develop and Implement human resource policy and management plan.
- Develop and Implement a Risk Assessment and Emergency Response Management Plan;
- Ensure that First Aid system is in place with all workers trained on how administer First Aid
- Work to ensure compliance of the safety, health and environmental standard by rewarding dedicated workers, possible expulsion of recalcitrant workers *etc.*; and
- Employ qualified and experienced personnel.

The project entity will have health and safety procedures for application to the project, which looks at the following issues: emergency response plan, occupational injury and occupational illness.

7.2.3.5 SOCIOECONOMIC ASPECTS

For the overall project activities, the implementing entity will maintain records, which will reflect the following:

- Local employment levels;
- Local Economic Development (LED); and
- MPW/Project/Stakeholder Community partnerships.

7.2.3.6 EMERGENCY RESPONSE PLAN

The Project team will develop an emergency response plan, thus forming the response to unforeseen incidents as follows:

- Identification of the potential for uncontrolled or unintentional environmentally damaging situations;
- Understanding the environmental risk presented by these situations and hazard identification;
- Establishing preventative measures;
- Preparation and implementation of effective notification and response systems; and
- Preparedness for accidents/incidents and emergencies is implemented in order to reduce risk of occurrence and to control/mitigate the environmental impacts associated with them if they should occur.

The emergency preparedness and response plan (to be developed as part of the ESMP) will include review and audit procedures, which will ensure the compliance of project staff, with the active support of MPW, to the safety, health and environmental plan of the project.

8.0 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM

8.1 OVERVIEW

Environmental monitoring ensures that impacts have been accurately predicted and that mitigation measures are being implemented as planned and has the assumed effects.

The monitoring exercise will:

- Ensure that the remedial actions recommended in the environmental assessment are incorporated in the project;
- Ensure that remedial measures are maintained throughout the operation life where appropriate;
- Identify additional remedial measures; and
- Identify corrective measures or redesign remedial measures if they are not sufficiently effective.

All major stakeholders in the project have a monitoring responsibility of some kind. However, only the Supervising (Resident) Engineer (to be named), the EPA (Nimba County), MPW and the Contractor are allocated specific and formal monitoring obligations and they should constitute the Environmental Management Team. County Police, Health authorities and other public authorities will automatically monitor some of the effects of the project during their daily work. Periodic interviews with beneficiaries of the project will also be undertaken to assess their opinions about the effect of the implementation of the project.

A brief summary of the monitoring functions to be performed by the team would include:

- Ensuring compliance with all relevant environmental and health standards.
- Liaising with relevant regulatory bodies that have a statutory duty to

- Liaising with EPA as well as MPW
- Training of project staff in safety awareness.
- Liaising with local communities.

Table 11: Summary of Monitoring Responsibilities and Output

EPA	• Overall Environmental Performance of the Project (e.g., air, noise, water, water quality, etc.)	• Instruction to Contractor and the
Project Environmental	• Overall Environmental Performance of the Project / Community relations	• Monthly Environmental Report
The Engineer (to be named) and MPW Representative	• Construction methods and materials Environmental management of construction sites • Implementation of mitigation measures for air, water, soil, traffic, occupation health and safety, s etc. • Contractor's waste management. • Rehabilitation of impact areas. • Community relations • Environmental performance of contractor's equipment	• Monthly Performance Report • Incident Reports as and when required: sites rehabilitated, and number of materials sites that have achieved restoration to original state, accidents and the like.
The Contractor	• Environmental performance of equipment and plants • Implementation of interim and permanent mitigation measures • Base camp management	• Maintenance records • Accident Reports • Mitigating actions e.g. traffic signs, safety barriers etc.
Police	• Traffic nuisances	• Police reports and instructions to
Community Health Services	• Traffic safety measures and accidents • Change of frequency of diseases	• Health reports
Local Communities	• Negative Environmental impacts	• Complaints to Contractor and

8.2 OPERATIONAL PHASE MONITORING

The FDA, EPA, MPW will be responsible for management of both direct and indirect impacts occurring after the construction phase.

Liberia has the largest remaining portion of the Upper Guinean Forest and contains unique species of flora and fauna. However, deforestation and other human activities are affecting the integrity of the forests. It is estimated that approximately 480,000 acres (192,000 hectares) of forestland is lost annually due to logging, shifting cultivation and other activities. With the proposed road improvement, these activities are expected to rise along the route. The FDA is expected to put mechanisms in place to curb these activities. The current PRS II requires improved monitoring to ensure reforestation is a key component of forest management.

8.3 COST OF MITIGATION AND MONITORING MEASURES

The cost of mitigation and monitoring measures will represent a percentage of the base construction costs and are presented in the Final Feasibility Report. The costs are based on recently completed projects in Liberia. A summary of the costs of mitigation measures would be presented in Project ESMP. The Project Financiers/Executing Agency will cover expenses related to relocation and resettlement. The cost of a road safety, training and environmental information and awareness raising campaign can be variable.

Ensuring sound and environmentally friendly operating practices by the Contractor will be achieved through the inclusion of suitable clauses in the Contract Document.

9.0 PUBLIC CONSULTATIONS

Extensive consultation with stakeholders, especially at the project inception stage, was undertaken as part of the assessment of the impacts of the project. The outcomes of the consultations were incorporated in determining the main issues of environmental and social significance. This chapter presents the stakeholders consulted and the issues both during the inception and the impact assessment stages. Pictures and Attendance list of the various community consultation sessions are in Appendix A of this EIS document.

9.1 IDENTIFICATION OF STAKEHOLDERS

Based on the mapping of stakeholders, the following were identified as the key stakeholders to be consulted with regard to the project:

- Local community: Community leaders and project affected persons,
- Planning and administrative authority: County Superintendent,
- Regulatory institutions: EPA, FDA, Community Health Services
- Policy makers: MPW,

9.2 CONSULTATION OUTCOMES

Although extensive project awareness has been created during the scoping phase and majority of the communities along the project route were aware of the proposed road project, many were aware of the potential demolition and relocation of structures that may fall within the ROW and expressed many concerns regarding this. The youth are keenly looking forward to being employed by the project contractor. The concerns of the local communities were not many as they welcomed the proposed improvements the project would bring. Attitudes may nevertheless change at the commencement of the project. In order to reduce friction and facilitate the project, it is imperative that:

- The local community be involved from the onset and made to feel a sense of ownership.
- The Executing Government Agency should incorporate the EU/AfDB's Policy Goal,

Objectives and Guiding Principles in Resettlement.

- A comprehensive Environmental and Social Management Plan (ESMP) is also recommended. This plan should address issues, which include: The rights and obligations of all stakeholders; Community Relations; Community Consultations; Local training and Recruitment and Conflict Prevention and Management

Table 12: Summary of Stakeholder Consultations

Stakeholders Consulted	Concerns Raised
Communities:	
Sekyimpa	a. RAP b. Sacred Community tree and graves c. River Bee pollution
Sarkazue	a. RAP b. Community Soccer pitch c. Possibility of silting Tuormin creek
Gbobayee	a. RAP b. Community drinking water pipe in RoW c. Graves in RoW d. Employment for locals on the project
Zorgowee	a. RAP b. Trees is RoW which may be affected used by community for construction c. Sacred River and Sacred Bush, Cemetery of Cultural Importance (since 1940) in Row will require performance of Rituals
Kialey	a. RAP b. Sacred Site Nyenyigua and grave sites in RoW c. Community Water Pump in RoW d. Employment for locals on project
Karnplay	a. RAP b. Cemetary in RoW and Sacred/Poro site c. Employment of locals mitigation of water pollution d. Commencement and duration of construction
Larpea 1 & 2	a. RAP b. Employment of locals c. Employment of locals d.
Duonplay	a. RAP b. Electrical Poles in RoW c. Commencement of construction and number of lanes d. Sacred Tree (Deh) in RoW

Loguatuo	a. RAP e. Electrical Poles in RoW b. Sacred/Poro site in RoW c. Employment of Locals
Institutional/Official Consultations	
Office of the Superintendent – Nimba County	a. RAP b. Employment for Locals c. Proper project information dissemination d. Sacred sites along project route
Environmental Protection Agency	Ensure that procedures are followed
Forestry Development Agency	Collaboration with county representatives from Agency

10.0 CONCLUSION

This Environmental and Social Impact Assessment was conducted in accordance with the Terms of Reference provided by MPW and the EU/AfDB's ESIA Procedures. The following are conclusions drawn from the study:

- The project affected communities have given unanimous approval to the project as proposed.
- A number of negative construction related impacts were identified, but these may be considered as temporary. Mitigation measures for all of these have been identified and will be included in the Environmental Social Management Plan.
- The expected range of social and economic benefits to the affected communities was clearly identified and will compensate for the temporary negative impacts during construction.
- The goal of the Road Project is to enhance rural accessibility and connection to neighbouring Cote D'Ivoire to improve the quality of life of the people of the Nimba County.
- For the project to become very useful during the operational phase, it is recommended that, complimentary projects such as road safety campaigns and traffic regulations be enforced along the route.
- The proposed project is a good developmental choice and it is recommended that all stakeholder Authorities and Agencies lend their maximum corporation.

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