



Ministry of Health and Social Welfare

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Environmental and Social Impact Assessment

Construction of the Access Road for the New Redemption Hospital
Upper Caldwell, Montserrado County, Liberia



Consultancy Services

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NON-TECHNICAL SUMMARY

Introduction

The Government of Liberia, through the Ministry of Health and with funding from the World Bank, plans to build a 2.4 km access road to the New Redemption Hospital in Upper Caldwell, Montserrado County. This road will improve access to the 155-bed hospital, a key healthcare facility for the region. The Environmental and Social Impact Assessment (ESIA), conducted by Mr. Boimah P. Massaley between April and May 2025, examines how the project might affect the environment and local communities and suggests ways to manage these impacts. This summary explains the project, its benefits, potential challenges, and how they will be addressed in simple terms.

Project Overview

The project will upgrade an existing road into a paved, all-weather asphalt road. It is divided into two parts:

- **Segment 1:** A 0.45 km stretch from ETMI Public School Junction to St. Maria Catholic School, currently a damaged asphalt road that will be repaired.
- **Segment 2:** A 1.97 km stretch from Fand Diggs Community Road Junction to the hospital, currently a gravel road that will be paved.

The road will include sidewalks, curbs, streetlights, and drainage systems to prevent flooding. The project follows the existing road path to avoid taking private land or moving people from their homes. It will be built in three stages:

1. **Pre-Construction:** Planning, surveys, and getting permits.
2. **Construction:** Building the road.
3. **Operation:** Using and maintaining the road

Why Is This Project Needed?

The current road is in poor condition, with potholes and flooding during the rainy season (May–October). This makes it hard for people to reach the hospital, especially in emergencies. The new road will:

- Make it easier and faster for patients, ambulances, and staff to get to the hospital.
- Help local businesses by improving transport for goods and customers.
- Create safer walking and driving conditions with sidewalks and lights.
- Support Liberia’s goals to improve healthcare and roads.

Benefits of the Project

- **Better Healthcare:** The road will ensure quick access to the hospital, saving lives by reducing delays for emergency care and improving the delivery of medical supplies.
- **Economic Growth:** Construction will create jobs for local people, and the improved road will help businesses grow, possibly increasing property values.
- **Safety:** Features like sidewalks, speed bumps, and lights will make the area safer for pedestrians and drivers.
- **Flood Control:** New drainage systems will reduce flooding, protecting homes and businesses.
- **Community Well-Being:** Shorter travel times and better access to services will improve daily life for residents.

Potential Challenges and Solutions

The project may cause some temporary issues, but plans are in place to manage them.

During Construction

1. **Noise and Vibration:**
 - **Issue:** Machines like bulldozers may create loud noise (up to 90 decibels) and vibrations, disturbing residents, schools, and the hospital.
 - **Solution:** Work will happen from 9 AM to 6 PM to avoid quiet hours, noise barriers will be used near the hospital and schools, and low-vibration methods will be chosen when possible. Noise will be checked weekly to stay below safe levels (55 decibels).
2. **Dust:**
 - **Issue:** Digging and moving dirt may create dust, which can affect breathing, especially for children, the elderly, and hospital patients.
 - **Solution:** Water will be sprayed twice daily on work areas, and dirt piles will be covered. Dust levels will be monitored to keep them safe (below 50 $\mu\text{g}/\text{m}^3$).
3. **Traffic Disruptions:**
 - **Issue:** Road closures may slow down travel and affect businesses or emergency vehicles.
 - **Solution:** A Traffic Management Plan will include detours, signs, and workers to guide traffic. Emergency vehicles will have priority access, and residents will get advance notice of disruptions.
4. **Pollution Risks:**
 - **Issue:** Spills from fuel or chemicals could harm soil or water, including the nearby St. Paul River (140 meters away).
 - **Solution:** Fuels will be stored safely in sealed containers, and spill kits will be ready. Waste will be sorted and taken to approved sites. Water quality will be tested monthly.
5. **Safety Concerns:**
 - **Issue:** Open trenches or equipment could be dangerous for workers and residents, especially children.
 - **Solution:** The site will be fenced, trenches covered at night, and safety talks held for the community. Workers will wear protective gear (e.g., helmets) and get daily safety training.

After Construction

1. **Traffic Noise and Air Pollution:**
 - **Issue:** More vehicles may increase noise (up to 60 decibels) and air pollution from exhaust fumes.
 - **Solution:** Trees or barriers will reduce noise, and air quality will be checked twice a year to stay within safe limits.
2. **Road Safety:**
 - **Issue:** Worn-out signs or lights could lead to accidents.
 - **Solution:** Regular checks (every three months) will ensure signs, lights, and speed bumps are working, with quick repairs if needed.
3. **Flooding and Erosion:**
 - **Issue:** Blocked drains could cause flooding or soil erosion.
 - **Solution:** Drains will be cleaned before the rainy season, and erosion controls like stone layers will protect the road and nearby areas.
4. **Growth Pressures:**
 - **Issue:** The road may attract new businesses or homes, straining water and other resources.

- **Solution:** The county will plan growth carefully, and small businesses will get training and loans to stay competitive.

How Impacts Will Be Managed

The **Environmental and Social Management Plan (ESMP)** outlines steps to reduce problems:

- **Monitoring:** Experts will check noise, dust, and water quality regularly to ensure safety.
- **Community Input:** A Community Liaison Officer will answer questions, and a hotline will let people report concerns, with quick responses (within 48 hours).
- **Training:** Workers will learn about safety, and residents will get information on avoiding construction risks.
- **Oversight:** The Ministry of Public Works, Environmental Protection Agency (EPA), and World Bank will ensure the project follows rules.

Community Involvement

Three public meetings were held in April 2025 with Riverside Communities, local leaders, and others. People support the project because it will improve hospital access and the economy, but they worry about dust, noise, and flooding. The project team will keep talking with communities through meetings, flyers, and radio updates to address these concerns.

Extra Community Benefits

The project includes:

- **Health Programs:** Education on preventing diseases like HIV/AIDS and malaria.
- **Jobs for Women and Youth:** Equal job opportunities for men, women, and young people during construction.

Conclusion

The New Redemption Hospital Access Road will bring significant benefits by improving healthcare, boosting the economy, and making Upper Caldwell safer and less flood-prone. While construction may cause temporary noise, dust, and traffic issues, these will be carefully managed to keep impacts low. With strong community support and a solid plan, the project is a valuable step toward a better future for the area. The ESIA shows it is safe and sustainable, ready for approval by the EPA.

LIST OF ACRONYMS

Acronym	Full Meaning
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic
AOI	Area of Influence
ASTM	American Society for Testing and Materials
CBD	Convention on Biological Diversity
CBO	Community-Based Organization
CBR	California Bearing Ratio
CLO	Community Liaison Officer
DCP	Dynamic Cone Penetrometer
EPA	Environmental Protection Agency
EPML	Environmental Protection and Management Law
ESAL	Equivalent Single Axle Load
ESI	Environmental and Social Impact
ESIA	Environmental and Social Impact Assessment
ESS	Environmental and Social Standards
FGD	Focus Group Discussion
FPIC	Free Prior and Informed Consent
GBV	Gender-Based Violence
GIS	Geographic Information System
GRM	Grievance Redress Mechanism
IFISH	Institutional Foundations to Improve Services for Health Project
ILO	International Labour Organization
KPI	Key Performance Indicator
MEA	Multilateral Environmental Agreement
NDC	Nationally Determined Contribution
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
NOI	Notice of Intent
OHS	Occupational Health and Safety
OTP	Open Test Pits
PAP	Project Affected Person
PMU	Project Management Unit
RAP	Reclaimed Asphalt Pavement
ROW	Right-of-Way
SDG	Sustainable Development Goal
TMP	Traffic Management Plan
TOR	Terms of Reference
TRL	Transport Research Laboratory
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

1 INTRODUCTION

This Environmental and Social Impact Assessment (ESIA) report, led by Mr. Boimah P. Massaley, evaluates the potential impacts of constructing a 2.4 km access road to the New Redemption Hospital in Upper Caldwell, Montserrado County, Liberia. Funded under the Institutional Foundations to Improve Services for Health Project (IFISH), this initiative by the Government of Liberia and the World Bank aims to enhance connectivity to the 155-bed hospital, a key medical facility for the region. The ESIA was conducted between April and May 2025, focusing on baseline conditions, impact identification, and mitigation measures.

1.1 NEED FOR THE PROJECT

The access road addresses critical challenges:

- **Healthcare Access:** Current road conditions impede timely access to the New Redemption Hospital, especially during emergencies and wet seasons. The project will provide reliable, all-weather access for patients, staff, and ambulances.
- **Economic Benefits:** Improved connectivity will boost local commerce by facilitating the movement of goods and services.
- **Social Benefits:** Reduced travel times and safer pedestrian routes will enhance residents' quality of life.
- **Development Alignment:** The project supports Liberia's goals for healthcare infrastructure and urban development in Montserrado County.

This infrastructure is integral to maximizing the hospital's role as a key referral facility.

1.2 PURPOSE AND OBJECTIVES OF THE ESIA

The purpose of this ESIA is to systematically assess the potential environmental and social impacts—both positive and negative—of the proposed access road construction. This evaluation ensures that the project is implemented in a manner that minimizes adverse effects on the environment and local communities while maximizing its socioeconomic benefits. The key objectives of the ESIA are:

- Identify and evaluate the potential environmental and social impacts of the project during both the construction and operational phases.
- Assess the significance of these impacts in accordance with national and international standards.
- Propose effective mitigation measures to avoid, reduce, or compensate for adverse impacts.
- Ensure compliance with the World Bank Environmental and Social Standards (ESSs), the 2022 EPA Revised ESIA Procedural Guidelines of Liberia, and the Environmental Protection Management Law of Liberia, 2003.
- Provide the necessary documentation and analysis to obtain an Environmental Permit from the Environmental Protection Agency (EPA) of Liberia.
- Engage stakeholders and incorporate their feedback into the project design and mitigation strategies.

These objectives align with the overarching goal of promoting sustainable development and safeguarding the well-being of affected communities and ecosystems.

The study covers the following key aspects:

1. **Geographical Area:** The assessment focuses on the 2.4 km access road corridor, divided into two segments:

Segment 1: A 0.45 km stretch from ETMI Public School Junction to St. Maria Catholic School, an existing but degraded asphalt road requiring rehabilitation.



Figure 1: Partial View of Segment 1 of the Project Corridor

Segment 2: A 1.97 km stretch from Fand Diggs Community Road Junction to the New Redemption Hospital, extending to the Central Medicine Store and a football field, currently a gravel road to be upgraded to asphalt.



Figure 2: Partial View of Segment 2 of the Project Corridor

2. **Environmental and Social Impacts:** The assessment addresses direct, indirect, and cumulative impacts on:
 - Physical Environment: Air quality, water resources, soil stability.
 - Biological Environment: Flora, fauna, and ecosystems.
 - Socioeconomic Environment: Local communities, businesses, traffic, and public health.
3. **Area of Influence (AoI):** Defined as a 500-meter radius from the project footprint, encompassing residential, commercial, institutional, and mixed-use areas.

1.3 APPROACH AND METHODOLOGIES

The ESIA was conducted using a systematic and multidisciplinary approach to ensure a robust and credible assessment. The methodologies employed by the consultant included:

- **Desk Studies:** A thorough review of existing literature, project documentation, and environmental and social data relevant to the project area.
- **Field Surveys:** Collection of baseline data on environmental parameters (e.g., water quality, air quality, noise levels, soil conditions) and social aspects (e.g., community demographics, land use, economic activities).
- **Stakeholder Consultations:** Engagement with key stakeholders, including local Riverside Communities, government authorities, and project financiers, to gather input and address concerns.
- **Impact Assessment Techniques:** Application of standardized tools and models to predict and evaluate the significance of potential impacts, incorporating both qualitative and quantitative analyses.
- **Mitigation and Management Planning:** Development of tailored mitigation measures and an Environmental and Social Management Plan (ESMP) to address identified impacts.
- **Compliance Checks:** Verification of alignment with the World Bank ESSs, Liberian environmental regulations, and international best practices.

These methodologies were applied between April and May 2025, adhering to the highest standards of accuracy and reliability, ensuring that the findings are both actionable and defensible.

1.4 TARGET GROUPS AND INSTITUTIONS

This ESIA is designed to meet the needs of a diverse range of stakeholders involved in the approval, implementation, and monitoring of the project. The primary target groups and institutions include:

1. **Regulatory Authorities:**
 - Environmental Protection Agency (EPA) of Liberia: Responsible for reviewing the ESIA and issuing the Environmental Permit.
 - Ministry of Public Works: Oversees road construction standards and compliance.
2. **Funding and Oversight Agencies:**
 - The World Bank Group: Provides financial support and ensures adherence to its Environmental and Social Standards (ESSs).
 - Ministry of Health: A key stakeholder in the hospital infrastructure development.
3. **Local Government and Communities:**
 - **Montserrado County Authorities:** Responsible for local governance and community welfare.
 - **Riverside Communities and Local Residents:** Affected populations whose feedback has been integrated into the project design.
4. **Project Implementers:**
 - **Contractor:** Responsible for executing the construction works.
 - **Supervising Engineers and Consultants:** Oversee project implementation and compliance.
5. **Other Stakeholders: NGOs and Community-Based Organizations (CBOs):** Entities with interests in environmental protection, public health, and community development.

2 PROJECT DESCRIPTION

This section provides a detailed overview of the New Redemption Hospital Access Road project, including its location, components, phases, and area of influence (AoI). It also addresses the current status of contractor selection and its implications for the Environmental and Social Impact

Assessment (ESIA). The project aims to enhance connectivity to the New Redemption Hospital, a vital healthcare facility in Upper Caldwell, Montserrado County, Liberia.

2.1 NATURE OF THE PROJECT

This is a moderate-scale infrastructure project with local significance. It involves rehabilitating and upgrading an existing road rather than constructing a new one, reducing complexity and environmental footprint. Its urban location and proximity to sensitive receptors (e.g., homes, schools) require careful impact management. The project aligns with national development priorities, balancing moderate environmental and social risks with substantial community benefits.

2.1.1 Location and Setting

The project is located in Upper Caldwell, Montserrado County, Liberia, near the St. Paul River. This urban area features a mix of residential, commercial, and institutional zones, with the Riverside Communities being the most organized and directly impacted by the project. These communities, situated along the project corridor, are susceptible to seasonal flooding due to their proximity to the river, which complicates access, especially during the wet season. The road ends approximately 140 meters from the St. Paul River, a distance that reduces direct environmental risks to the waterway. The urban setting and the river's proximity underscore the need for careful planning to mitigate potential impacts on both the environment and residents.



Figure 3: Google Earth Map of the Project Corridor

2.1.2 Area of Influence (AoI)

The AoI is defined as a 500-meter radius from the project footprint, chosen to encompass all areas likely to experience direct or indirect impacts. It includes:

- **Residential Areas:** The Riverside Communities and other nearby housing.
- **Commercial Zones:** Local businesses and petty trading hubs.
- **Institutional Facilities:** Schools, healthcare centers, and other public buildings.
- **Mixed-Use Land:** Reflecting the urban character of Upper Caldwell.

This radius ensures a comprehensive assessment of environmental and social effects, illustrating the AoI and project segments.



Figure 4: A Mix of Commercial (Right) and Residential (Left) facilities along the project corridor

2.1.3 Contractor Information

The Ministry of Health has not yet hired a construction contractor. As a result, specific details about the following are unavailable for this ESIA:

- Location and assessment of the contractor's campsite.
- Quarry site for construction materials.
- Concrete batching and asphalt plant locations.
- Borrow pits for earth materials.

This gap limits the ESIA's ability to fully evaluate related impacts. However, once a contractor is selected, these sites will be assessed, and mitigation measures will be incorporated into the ESMP, subject to approval by the supervising engineer and relevant authorities.

2.1.4 Project Components

The 2.4 km access road is divided into two segments, each with distinct characteristics and planned improvements:

Segment 1:

1. **Length:** 0.45 km
2. **Location:** From ETMI Public School Junction to St. Maria Catholic School
3. **Current Condition:** An existing asphalt road that has significantly degraded, exhibiting potholes, cracks, and poor drainage.
4. **Planned Improvements:** Rehabilitation efforts will include repairing the asphalt surface, filling potholes, resurfacing, and improving drainage to enhance durability and prevent further deterioration.

Segment 2:

1. **Length:** 1.97 km
2. **Location:** From Fand Diggs Community Road Junction to the New Redemption Hospital, extending to the Central Medicine Store and a football field.
3. **Current Condition:** An unpaved gravel road prone to erosion and flooding.
4. **Planned Improvements:** Upgrading to a paved asphalt road, incorporating drainage systems (e.g., culverts and ditches), and adding safety features such as reflectorized markers, sidewalks, curbs, and gutters to improve functionality and safety.

The project adheres to the existing alignment and right-of-way (RoW) without widening, a strategy that minimizes impacts on adjacent properties and eliminates the need for resettlement. The road’s endpoint, 140 meters from the St. Paul River, ensures that construction activities are unlikely to affect the river, supported by planned erosion control measures.



Figure 5: Partial View of the St. Paul River

2.1.5 Conceptual Design of the Road

The project is focused on providing safe, efficient, and environmentally sustainable access to the hospital while minimizing impacts on the local community and ecosystem. The road is designed as a two-lane asphalt pavement with a total width of 7 meters, including 3.5-meter lanes and 1.5-meter shoulders on each side. A central median is not included to reduce land acquisition and environmental disturbance. The design incorporates a comprehensive drainage system to manage the high rainfall typical of the area and prevent flooding.

Table 1: Design Elements

Design Element	Description
Number of lanes	2
Lane width	3.5 meters
Shoulder width	1.5 meters (each side)
Total road width	7 meters
Pavement type	Asphalt
Drainage	Longitudinal ditches and culverts

Table 2: Design Criteria

Design Criterion	Value
Design speed	50 km/h
Maximum gradient	5%
Minimum horizontal curve radius	100 meters
Sight distance	60 meters

The design criteria were selected to balance safety, efficiency, and environmental sustainability:

- A **design speed of 50 km/h** is appropriate for this semi-urban area, ensuring safe travel for vehicles, including emergency ambulances.
- The **maximum gradient of 5%** ensures the road is accessible for all vehicles while minimizing earthworks and environmental disruption.
- The **minimum horizontal curve radius** and **sight distance** comply with national road design standards for this class of road, enhancing safety for drivers and pedestrians.

2.1.6 Project Phases and Activities

The project unfolds across three phases—pre-construction, construction, and operation—each involving specific activities critical to its success.

2.1.6.1 Pre-Construction Phase

This phase focuses on preparatory work:

- **Site Surveys:** Conducting topographic and geotechnical assessments to inform design and construction plans.
- **Land and Stakeholder Engagement:** Consulting with local communities, authorities, and stakeholders to address concerns and secure approvals (no land acquisition is anticipated as the project uses the existing RoW).
- **Permits:** Obtaining environmental and construction permits, including the Environmental Permit from the Environmental Protection Agency (EPA).
- **Design Finalization:** Completing detailed engineering designs and procurement processes.

These activities will be managed to minimize disruptions, emphasizing transparent communication with affected parties.

2.1.6.2 Construction Phase

The construction phase involves the physical development of the road:

- **Clearing Topsoil and Vegetation:** Removing surface materials along the corridor.
- **Earthworks and Excavation:** Digging longitudinal ditches for drainage and preparing the roadbed.
- **Construction of Culverts and Bridges:** Installing structures to manage water flow and prevent flooding.
- **Pavement Construction:** Rehabilitating Segment 1's asphalt surface and paving Segment 2 with asphalt.
- **Erosion Control Measures:** Implementing silt fences, vegetation buffers, and other techniques to stabilize soil.
- **Drainage Improvements:** Building culverts, ditches, and gutters to address flooding risks.
- **Safety Enhancements:** Adding reflectorized markers, sidewalks, curbs, and gutters for improved safety.
- **Ancillary Works:** Installing signage and performing landscaping.

Construction will require machinery (e.g., graders, rollers) and a workforce, with timelines and impacts detailed in the ESMP to mitigate noise, dust, and traffic disruptions.

2.1.6.3 Operation Phase

Post-construction, the road enters the operation phase:

- **Maintenance:** Regular repairs and cleaning to sustain road quality.
- **Traffic Management:** Monitoring flow and addressing safety concerns (e.g., expected daily traffic includes cars, buses, and motorcycles).
- **Environmental Monitoring:** Ongoing checks on drainage and erosion control to ensure sustainability.

This phase will deliver long-term benefits, such as improved healthcare access and economic growth, while requiring minimal ongoing intervention if properly maintained.

2.1.7 Sourcing of Construction Materials

All sand and aggregates used for the project's concrete work should be sourced exclusively from licensed suppliers to prevent adverse impacts on local riverbanks and natural resources. This requirement is essential to avoid environmental degradation, such as erosion or habitat loss, caused by unregulated extraction. Suppliers should be selected based on the following criteria:

- Possession of a valid operating license from relevant authorities.
- Compliance with environmental regulations and sustainable extraction practices.
- Proximity to the project site to reduce transportation-related environmental impacts.

2.1.8 Management of Project Sites

The project involves establishing and operating temporary sites, including a campsite, quarry sites, concrete batching and asphalt plant, and borrow pits. To ensure these sites are managed sustainably, the following principles will be applied:

- **Selection:** Sites will be chosen to minimize environmental and social impacts, avoiding ecologically sensitive areas and reducing disturbance to local communities.
- **Management:** During operation, sites will implement controls for pollution prevention, waste management, resource conservation, and safety.
- **Decommissioning/Restoration:** Upon project completion, sites will be restored to their original condition or better, including equipment removal, soil stabilization, and revegetation.

The table below summarizes specific measures for each site type:

Site Type	Selection Criteria	Management Measures	Decommissioning/Restoration Plans
Campsite	<ul style="list-style-type: none"> - Located at least 500m from residential areas - On previously disturbed land if possible - Access to water and power 	<ul style="list-style-type: none"> - Installation of septic systems - Waste segregation and disposal contracts - Restrictions on nighttime activities 	<ul style="list-style-type: none"> - Demolition and removal of all structures - Grading to natural contours - Planting of native vegetation
Quarry Sites	<ul style="list-style-type: none"> - Outside protected areas - Away from water bodies - Geological surveys for suitable material 	<ul style="list-style-type: none"> - Water sprays for dust control - Sediment traps for runoff prevention - Regular safety inspections 	<ul style="list-style-type: none"> - Backfilling with overburden - Contouring to blend with surroundings - Planting of trees and shrubs
Concrete Batching and Asphalt Plant	<ul style="list-style-type: none"> - Industrial zoned areas if possible - Adequate space for material storage and vehicle movement 	<ul style="list-style-type: none"> - Enclosed mixing areas to reduce dust - Spill containment systems - Noise barriers 	<ul style="list-style-type: none"> - Removal of all equipment and materials - Cleanup of any spills - Restoration to pre-project condition
Borrow Pits	<ul style="list-style-type: none"> - Areas with suitable soil types - Avoidance of agricultural land and habitats 	<ul style="list-style-type: none"> - Phased excavation to minimize open areas - Erosion control measures (e.g., silt fences) - Access road maintenance 	<ul style="list-style-type: none"> - Regrading to stable slopes - Topsoil replacement - Seeding with native grasses

These measures ensure compliance with environmental standards and promote sustainable practices throughout the project lifecycle.

2.2 PROJECT'S ALTERNATIVE SCENARIOS

This section evaluates various alternative scenarios for constructing the New Redemption Hospital Access. The purpose is to assess different implementation options, including the "no project" scenario, and to analyze their respective environmental and social impacts. This analysis aims to identify the most sustainable and least impactful approach while ensuring the project meets its objectives of enhancing connectivity to the hospital and supporting local development.

2.2.1 Purpose of Alternative Scenarios Analysis

The analysis of alternative scenarios is a critical component of the ESIA process. It allows for systematically comparing different project execution options, including the possibility of not proceeding with the project. By evaluating the environmental and social implications of each alternative, the analysis ensures that the selected approach minimizes adverse impacts while maximizing benefits. The alternatives considered include:

1. **"No Project" Scenario:** The implications of not constructing the access road.
2. **Alternative Routes:** Different alignments for the access road that may reduce environmental or social impacts.
3. **Alternative Construction Methods:** Variations in construction techniques or materials to mitigate environmental disturbances.
4. **Alternative Timing:** Adjusting the construction schedule to minimize seasonal environmental risks.

Each alternative is assessed against this report's baseline environmental and social conditions.

2.2.2 "No Project" Scenario

The "no project" scenario considers the consequences of not constructing the New Redemption Hospital Access Road. While this option avoids any immediate environmental or social disruptions associated with construction, it perpetuates existing challenges and risks significant long-term negative impacts.

Environmental Implications

1. **Flooding and Erosion:** Without improved drainage and road infrastructure, the area remains vulnerable to seasonal flooding, particularly during the wet season (May to October). Poorly maintained drainage channels will continue to exacerbate water pooling, leading to soil erosion and sedimentation in the St. Paul River.
2. **Air and Water Quality:** The degraded road conditions will persist, contributing to dust generation (elevated PM10 levels) and runoff contamination, which could further degrade local water quality.

Social and Economic Implications

1. **Healthcare Access:** The lack of a reliable access road will continue to impede timely access to the New Redemption Hospital, especially during emergencies and wet seasons. This could delay critical medical care, increasing health risks for patients and reducing the hospital's effectiveness as a referral facility.
2. **Economic Constraints:** Local businesses and petty traders will face ongoing challenges due to poor road conditions, limiting the movement of goods and services. This stagnation could hinder economic growth and reduce opportunities for community development.
3. **Social Well-being:** Residents will continue to experience longer travel times, unsafe pedestrian routes, and disruptions during floods, negatively affecting their quality of life and access to essential services.

While the "no project" scenario avoids short-term construction impacts, it fails to address critical infrastructure needs, perpetuating environmental degradation and social challenges. The long-term consequences, particularly for healthcare access and economic development, make this scenario unsustainable.

2.2.3 Alternative Routes

Alternative routes for the access road were considered to minimize environmental and social impacts while achieving the project's objectives. The evaluation focused on alignments that could reduce disturbances to sensitive areas, avoid significant earthworks, or lessen impacts on local communities.

2.2.3.1 *Alternative Route 1: Bypass Around Residential Areas*

1. **Description:** This route would bypass densely populated residential areas by shifting the alignment slightly to the east, reducing direct impacts on homes and businesses.
2. **Environmental Impacts:**
 - **Pros:** Avoids disruption to urban vegetation and reduces dust and noise in residential zones.
 - **Cons:** Requires additional land clearing in less developed areas, potentially increasing erosion risks and impacting minor ecological features.
3. **Social Impacts:**
 - **Pros:** Minimizes temporary displacement of roadside businesses and reduces noise and dust near homes.
 - **Cons:** May increase travel distance for some residents, slightly reducing the road's convenience for local access.

2.2.3.2 *Alternative Route 2: Elevated Roadway to Mitigate Flooding*

1. **Description:** An elevated roadway design to address flooding risks in low-lying areas near the St. Paul River.
2. **Environmental Impacts:**
 - **Pros:** Reduces the risk of waterlogging and erosion by elevating the road above flood-prone zones.
 - **Cons:** Requires more extensive earthworks and materials, increasing construction-related emissions and potential sedimentation during construction.
3. **Social Impacts:**
 - **Pros:** Ensures year-round access, even during peak wet seasons, enhancing reliability for hospital users.
 - **Cons:** Higher construction costs and longer implementation timelines, potentially delaying project benefits.

While alternative routes offer some benefits, such as reduced social disruptions or improved flood resilience, they also introduce new challenges, including increased environmental impacts from land clearing or higher costs. The proposed alignment, which follows the existing right-of-way (RoW), minimizes land use changes and avoids resettlement, making it the most balanced option.

2.2.4 Alternative Construction Methods

Alternative construction methods were evaluated to reduce the project's environmental footprint and enhance sustainability. These methods focus on using eco-friendly materials and techniques that minimize disturbances to the physical environment.

2.2.4.1 Method 1: Use of Recycled Materials

1. **Description:** Incorporating recycled materials, such as reclaimed asphalt pavement (RAP), for the road base or sub-base layers.
2. **Environmental Impacts:**
 - **Pros:** Reduces the demand for virgin materials, lowering quarrying impacts and conserving natural resources.
 - **Cons:** May require additional processing and quality control to ensure material performance, potentially increasing costs.
3. **Social Impacts:**
 - **Pros:** Demonstrates commitment to sustainability, potentially enhancing community support.
 - **Cons:** Limited local availability of recycled materials may necessitate importation, increasing logistical complexity.

2.2.4.2 Method 2: Bioengineering for Erosion Control

1. **Description:** Using bioengineering techniques, such as planting native vegetation or installing coir logs, to stabilize slopes and control erosion.
2. **Environmental Impacts:**
 - **Pros:** Enhances soil stability, reduces sedimentation in the St. Paul River, and promotes biodiversity.
 - **Cons:** Requires ongoing maintenance and may delay construction if vegetation establishment is slow.
3. **Social Impacts:**
 - **Pros:** Improves aesthetics and provides long-term environmental benefits for the community.
 - **Cons:** May increase project costs and extend timelines.

Alternative construction methods, particularly the use of recycled materials and bioengineering, offer significant environmental benefits. However, their implementation must be balanced against cost, availability, and project timelines. Integrating these methods, where feasible, such as using RAP for non-critical layers or bioengineering in erosion-prone areas, can enhance the project's sustainability without compromising its objectives.

2.2.5 Alternative Timing

The timing of construction activities can significantly influence environmental impacts, particularly in regions with distinct wet and dry seasons like Liberia. Alternative timing scenarios were considered to minimize risks associated with seasonal weather patterns.

2.2.5.1 Timing Scenario 1: Dry Season Construction

1. **Description:** Concentrating major construction activities (e.g., earthworks, paving) during the dry season (November to April).
2. **Environmental Impacts:**
 - **Pros:** Reduces risks of erosion, sedimentation, and waterlogging, as rainfall is minimal.
 - **Cons:** May increase dust generation due to drier conditions, requiring enhanced dust suppression measures.
3. **Social Impacts:**
 - **Pros:** Minimizes disruptions from flooding, ensuring safer working conditions and fewer delays.
 - **Cons:** Could extend the project timeline if wet season activities are limited.

2.2.5.2 Timing Scenario 2: Phased Construction

1. **Description:** Dividing the project into phases, with critical sections (e.g., near the hospital) completed first, and less urgent sections deferred to optimal seasons.
2. **Environmental Impacts:**
 - **Pros:** Allows for targeted erosion control and reduces the area disturbed at any given time.
 - **Cons:** Prolongs the overall construction period, potentially increasing cumulative impacts.
3. **Social Impacts:**
 - **Pros:** Prioritizes access to the hospital, delivering benefits sooner.
 - **Cons:** May cause prolonged disruptions for residents and businesses along the corridor.

Dry season construction offers the most significant environmental advantages by reducing erosion and sedimentation risks. However, it must be complemented by robust dust control measures. Phased construction could be integrated to prioritize critical sections, ensuring early benefits while managing seasonal constraints.

2.2.6 Comparative Analysis of Alternatives

The following table summarizes the environmental and social impacts of each alternative scenario compared to the proposed project plan.

Table 3: Comparative Analysis of Alternative Scenarios

Scenario	Environmental Impacts	Social Impacts	Feasibility
"No Project"	Continued flooding, erosion, and poor air/water quality	Persistent healthcare access issues, economic stagnation	Not feasible due to critical needs
Alternative Route 1	Increased land clearing, potential ecological impacts	Reduced disruptions but longer travel distances	Moderate, but less optimal than proposed
Alternative Route 2	Higher emissions from earthworks, but better flood control	Improved access reliability, higher costs	High, but cost-prohibitive
Recycled Materials	Reduced resource use, potential quality control issues	Sustainability benefits, logistical challenges	Moderate, depends on material availability
Bioengineering	Enhanced erosion control, maintenance needs	Aesthetic and long-term benefits	High, recommended for specific areas
Dry Season Construction	Reduced erosion, increased dust	Fewer delays, safer conditions	High, recommended for major activities
Phased Construction	Targeted impact reduction, prolonged disruptions	Early benefits for critical sections	Moderate, useful for prioritization

2.2.7 Recommended Alternative

Based on the analysis, the preferred alternative is to proceed with the proposed project alignment, incorporating the following modifications:

- **Construction Timing:** Prioritize major construction activities during the dry season to minimize erosion and sedimentation risks, with enhanced dust suppression measures.
- **Construction Methods:** Integrate bioengineering techniques for erosion control in vulnerable areas and explore the use of recycled materials where feasible.

- **Phased Implementation:** Consider phasing the construction to complete critical sections near the hospital first, ensuring early improvements in access.

This approach balances the need for timely project delivery with environmental protection and community well-being, aligning with the project's objectives and sustainability goals.

3 POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK

This section provides an overview of the policy, legal, and institutional frameworks governing the Environmental and Social Impact Assessment (ESIA) for the New Redemption Hospital Access Road project. These frameworks ensure that the project complies with national laws, international standards, and multilateral agreements, creating a comprehensive structure to manage environmental and social risks effectively. The ESIA process integrates Liberia's national policies and legal requirements with the World Bank's Environmental and Social Standards (ESSs), supplemented by additional guidelines where necessary. A gap analysis between these frameworks identifies areas requiring enhanced measures, while adherence to national environmental quality standards and ratified multilateral agreements reinforces the project's commitment to sustainability.

3.1 POLICY FRAMEWORK

Liberia's policy framework establishes the foundation for sustainable development, balancing infrastructure development with environmental stewardship and social equity. The following key policies guide the New Redemption Hospital Access Road project:

1. **National Environmental Policy of Liberia (2003):** This policy promotes sustainable resource use while fostering economic growth. It mandates integrating environmental considerations into development planning, emphasizing public participation and ecological preservation. For this project, it ensures that construction activities minimize disruption to local ecosystems (e.g., the St. Paul River) and involve Riverside Communities in decision-making processes.
2. **Liberia's National Transport Policy (2017):** Aimed at enhancing transportation infrastructure, this policy prioritizes safe, efficient, and environmentally conscious road networks. It supports the project's objective of improving access to the New Redemption Hospital while requiring compliance with safety and environmental standards during construction and operation.
3. **Liberia's Health Sector Policy (2011):** This policy underscores the importance of accessible healthcare facilities, aligning with the project's goal of enhancing connectivity to a vital medical institution. It also mandates minimizing health risks (e.g., dust, noise, and traffic hazards) during construction to protect hospital users and nearby residents.

These policies collectively ensure that the project aligns with Liberia's broader development goals, integrating environmental protection, social well-being, and infrastructure improvement.

3.2 LEGAL FRAMEWORK

The legal framework encompasses national laws, international standards, and additional guidelines, providing a robust basis for managing the project's environmental and social impacts.

National Laws

1. **Environmental Protection and Management Law (EPML) of Liberia (2003):** The EPML is the cornerstone of environmental regulation in Liberia, mandating ESIA's for projects with significant environmental impacts. It requires an Environmental Permit from the Environmental Protection Agency (EPA) prior to construction, ensuring that potential impacts on air quality, water resources, soil stability, and local communities are thoroughly

assessed and mitigated. For this project, compliance with the EPML safeguards the urban environment surrounding the hospital.

2. **2022 EPA Revised ESIA Procedural Guidelines of Liberia:** These guidelines outline a structured ESIA process, including scoping, stakeholder consultation, impact assessment, and mitigation planning. They emphasize transparency and inclusivity, requiring public disclosure of potential impacts and mitigation measures. The project's ESIA adheres to these guidelines, ensuring regulatory compliance and community involvement.
3. **Land Rights Act (2018):** While no land acquisition is required, this law ensures that any temporary land use (e.g., for equipment staging) respects community land rights. Its relevance lies in protecting the urban Riverside Communities from unintended land-related impacts during construction.
4. **Public Health Law of Liberia (1976):** This law regulates public health standards, addressing construction-related risks such as dust, noise, and waste. It ensures that the project minimizes adverse health effects on hospital patients, staff, and nearby residents, particularly vulnerable groups like the elderly and children.

3.2.1 International Standards

World Bank Environmental and Social Standards (ESSs): As a condition of World Bank financing, the project complies with the ESSs, which provide a globally recognized framework for managing environmental and social risks. Key standards include:

- **ESS1:** Guides the ESIA process, ensuring comprehensive risk assessment and management.
- **ESS2:** Mandates safe working conditions, fair labor practices, and a grievance mechanism for workers.
- **ESS3:** Addresses pollution prevention, focusing on air, water, and soil quality.
- **ESS4:** Protects community health and safety from construction-related hazards.
- **ESS10:** Requires stakeholder engagement and transparent information disclosure.

These standards elevate the project to international best practices, enhancing its sustainability and accountability.

3.2.2 Other Applicable Standards

1. **National Road Safety Standards:** These standards ensure that the access road's design and construction prioritize user safety through features like reflectorized markers, sidewalks, and proper drainage.
2. **International Finance Corporation (IFC) Performance Standards:** Though not mandatory, these standards offer supplementary guidance on managing environmental and social risks in urban infrastructure projects, reinforcing the ESIA's robustness.

This multi-layered legal framework ensures that the project meets both national and international requirements, minimizing risks and maximizing benefits.

3.3 INSTITUTIONAL FRAMEWORK

The institutional framework delineates the roles of key entities overseeing the project:

1. **Environmental Protection Agency (EPA) of Liberia:** Reviews the ESIA, issues permits, and monitors compliance with environmental regulations.
2. **Ministry of Public Works (MPW):** Manages road planning, design, and construction, ensuring technical and safety standards are met.
3. **Ministry of Health (MoH):** Ensures the project supports hospital operations and mitigates health risks.
4. **World Bank Group:** Provides funding and technical oversight, enforcing ESS compliance.
5. **Local Government Authorities (Montserrado County):** Facilitate community engagement and address local concerns.

This collaborative structure ensures effective project governance and accountability.

3.4 GAP ANALYSIS: WORLD BANK ESS VS. LIBERIAN LAWS

A gap analysis between the World Bank Environmental and Social Standards (ESS) and Liberian national laws identifies discrepancies to ensure the New Redemption Hospital Access Road project adheres to the more stringent standard where differences exist. This process is essential for aligning national compliance with the rigorous requirements of international financing, such as those mandated by the World Bank, while enhancing environmental and social outcomes in an urban setting near a critical healthcare facility. Below, each aspect is elaborated with additional context, examples, and practical implications.

3.4.1 ESIA Process

1. **World Bank ESS:** ESS1 requires a comprehensive Environmental and Social Impact Assessment (ESIA) with extensive stakeholder engagement under ESS10. This includes public disclosure of all project documents, consultation with affected parties, and ensuring accessibility for vulnerable groups such as the elderly, disabled, or illiterate populations. This is critical in urban contexts to build trust and mitigate opposition.
2. **Liberian Laws:** The Environmental Protection and Management Law (EPML) of Liberia (2003), Part IV, mandates an ESIA for projects with significant environmental impacts, while the 2022 EPA Revised ESIA Procedural Guidelines outline procedural steps. However, these lack specificity on stakeholder engagement beyond notifying the public via newspapers and do not require detailed disclosure plans or feedback mechanisms.
3. **Gap Identified:** Liberian laws fall short in mandating proactive stakeholder inclusion and transparency. For instance, the EPML does not specify consultation frequency or methods to ensure vulnerable groups are reached, unlike ESS10's explicit requirements for inclusivity and continuous engagement.
4. **Project Approach:** The project will adopt ESS10 by conducting at least three rounds of consultations—at project inception, draft ESIA review, and pre-construction stages—involving hospital staff, Riverside Community residents, and local businesses. Documents will be made available online and at community centers, and supported by a grievance redress mechanism (GRM) with a dedicated hotline and in-person complaint boxes at the hospital.

3.4.2 Labor Standards

1. **World Bank ESS:** ESS2 emphasizes safe working conditions, fair wages, non-discrimination, and worker rights, including a formal GRM. It addresses risks like exposure to dust, noise, and heavy machinery—common in road construction—through mandatory occupational health and safety (OHS) measures.
2. **Liberian Laws:** The Decent Work Act (2015) governs labor conditions, requiring minimum wages and basic safety, but it lacks detailed OHS standards for construction. The Public Health Law (2010) focuses on general sanitation, offering no specific protections for construction workers against site-specific hazards.
3. **Gap Identified:** Liberian laws provide a weaker framework for worker safety and rights compared to ESS2. For example, there are no explicit requirements for personal protective equipment (PPE) provision or regular safety audits during construction projects.
4. **Project Approach:** The project will implement ESS2 by supplying workers with PPE (e.g., helmets, gloves, dust masks), conducting weekly safety training on machinery use and emergency response, and ensuring wages exceed the national minimum (e.g., \$5/day adjusted for urban living costs). A GRM will allow workers to report unsafe conditions anonymously via a suggestion box or supervisor hotline, with resolution tracked within 48 hours.

3.4.3 Pollution Prevention

1. **World Bank ESS:** ESS3 mandates specific measures to control air, water, and soil pollution, such as limiting dust emissions, managing stormwater runoff, and ensuring proper waste disposal. It includes quantitative targets (e.g., dust levels below WHO guidelines) and monitoring protocols.
2. **Liberian Laws:** The EPML, Part V, sets general pollution control goals but lacks construction-specific standards or enforceable limits for pollutants like particulate matter or runoff sediment. Enforcement relies on ad hoc EPA inspections rather than proactive guidelines.
3. **Gap Identified:** Liberian laws offer broad principles without actionable, sector-specific measures, unlike ESS3’s detailed requirements tailored to construction impacts.
4. **Project Approach:** The project will follow ESS3 by using water trucks for dust suppression (targeting PM10 below 50 µg/m³), installing silt curtains and sediment basins to manage runoff into the St. Paul River, and segregating waste (e.g., concrete debris, oils) for disposal at EPA-approved sites. Weekly air and water quality monitoring will use portable devices, with results publicly posted to ensure accountability.

3.4.4 Community Health and Safety

- **World Bank ESS:** ESS4 requires minimizing construction-related risks to communities, such as traffic hazards, noise, and air quality degradation, with special attention to vulnerable groups near sensitive sites like hospitals. It mandates risk assessments and mitigation plans.
- **Liberian Laws:** The Public Health Law addresses communicable diseases and sanitation but lacks provisions for managing construction-specific risks like noise exceeding 55 dBA or traffic disruptions in populated areas.
- **Gap Identified:** Liberian laws do not provide targeted guidance for protecting communities from construction impacts, unlike ESS4’s comprehensive approach.
- **Project Approach:** The project will adopt ESS4 by developing a traffic management plan (e.g., detours, flagmen, nighttime deliveries), installing noise barriers (e.g., 2-meter-high plywood panels), and limiting dusty activities during peak hospital hours (e.g., 8 AM–6 PM). A community safety officer will conduct daily site checks, and a health awareness campaign will inform residents about risks and mitigation measures via flyers and radio.

3.4.5 Land Acquisition

1. **World Bank ESS:** ESS5 governs land acquisition, involuntary resettlement, and compensation, ensuring fair processes where land is required. It includes livelihood restoration for displaced persons.
2. **Liberian Laws:** The Land Rights Act (2018) outlines land ownership and acquisition procedures, but the project uses the existing right-of-way (RoW), avoiding any need for land purchase or resettlement.
3. **Gap Identified:** No gap exists, as the project’s scope eliminates the need for land acquisition, rendering ESS5 and related Liberian provisions inapplicable.
4. **Project Approach:** Not applicable. Construction will remain within the 7-meter-wide public RoW, verified through surveys and community consultations to confirm no encroachment on private land.

Table 4: Gap Analysis of World Bank ESS and Liberian Laws

Aspect	World Bank ESS	Liberian Laws	Gap Identified	Project Approach
ESIA Process	ESS1 & ESS10: Comprehensive	EPML & ESIA Guidelines: ESIA	Weak stakeholder	ESS10: Multiple consultations,

Aspect	World Bank ESS	Liberian Laws	Gap Identified	Project Approach
	ESIA, stakeholder engagement, full disclosure	required, limited disclosure rules	inclusion and transparency	multilingual disclosure, GRM with hotline
Labor Standards	ESS2: Safe conditions, fair wages, worker rights, GRM	Decent Work Act & Public Health Law: Basic wages, no detailed OHS	Limited safety standards and grievance mechanisms	ESS2: PPE, weekly training, fair wages, anonymous GRM
Pollution Prevention	ESS3: Specific pollution controls (air, water, soil)	EPML: General pollution goals, no construction specifics	Lack of actionable, sector-specific standards	ESS3: Dust suppression, runoff control, waste segregation, regular monitoring
Community Health and Safety	ESS4: Protects against construction risks, vulnerable groups	Public Health Law: General health, no construction focus	No construction-specific risk management	ESS4: Traffic plan, noise barriers, safety officer, community outreach
Land Acquisition	ESS5: Governs land acquisition and resettlement	Land Rights Act: Applies, but no acquisition needed	No gap – project uses existing RoW	N/A – Construction within public RoW

3.4.6 Relevance and Applicability

The gap analysis bridges deficiencies in Liberian laws by integrating World Bank ESS, ensuring robust stakeholder engagement, worker safety, pollution control, and community protection. In the urban context of New Redemption Hospital, where construction impacts could disrupt healthcare delivery and residential life, this dual compliance enhances project sustainability and aligns with international best practices. It secures World Bank funding while fostering community trust and environmental stewardship.

3.5 NATIONAL ENVIRONMENTAL QUALITY STANDARDS

Liberia’s National Environmental Quality Standards (NEQS), enforced under the EPML, establish permissible limits for environmental parameters to safeguard air, water, and noise quality during construction. These standards are critical for the New Redemption Hospital Access Road project due to its proximity to sensitive receptors (hospital, schools, residences) and the St. Paul River. Below, each parameter is expanded with additional detail on impacts, mitigation, and monitoring.

3.5.1 Key NEQS Parameters and Project Compliance

PM10 (Particulate Matter)

1. **Standard:** 50 µg/m³ (24-hour mean)
2. **Relevance to Project:** Earthworks, gravel hauling, and paving can elevate PM10 levels, posing respiratory risks to hospital patients (e.g., asthmatics) and nearby residents. Urban winds may exacerbate dust dispersion.
3. **Compliance Measures:** Dust control will include twice-daily water spraying (morning and afternoon), covering sand and gravel piles with tarps, and planting temporary grass buffers along site edges. Real-time PM10 monitoring with portable meters will trigger intensified spraying if levels exceed 40 µg/m³ (a proactive buffer below the standard).

Noise (Daytime)

1. **Standard:** 55 dBA (residential areas)
2. **Relevance to Project:** Pile driving, asphalt compactors, and truck traffic could exceed 55 dBA, disrupting patient recovery, school classes, and community rest. Hospital proximity heightens the need for strict control.
3. **Compliance Measures:** Noisy tasks will be restricted to 9 AM–3 PM, avoiding peak hospital visiting hours. Equipment will use silencers, and 2-meter-high noise barriers will be installed along the hospital boundary. Noise levels will be monitored hourly with handheld decibel meters, with immediate cessation of exceedances until mitigated.

Turbidity (Surface Water)

1. **Standard:** <5 NTU (Nephelometric Turbidity Units)
2. **Relevance to Project:** Excavation and stormwater runoff could increase sediment in the St. Paul River, affecting water quality for downstream users and aquatic life (e.g., fish spawning).
3. **Compliance Measures:** Silt fences (1-meter-high geotextile barriers) and sediment traps will line the site’s river-facing edge, supplemented by straw bale check dams during rains. Weekly turbidity sampling at three points (upstream, site-adjacent, downstream) will ensure compliance, with additional controls (e.g., riprap) if levels near 4 NTU.

NO2 (Nitrogen Dioxide)

1. **Standard:** 200 µg/m³ (1-hour mean)
2. **Relevance to Project:** Diesel exhaust from bulldozers, graders, and haul trucks could elevate NO2, impacting air quality in a densely populated area with limited ventilation due to buildings.
3. **Compliance Measures:** Equipment will meet Tier 3 emission standards, with no-idling zones enforced near the hospital. Daily maintenance checks will minimize leaks, and NO2 monitoring with gas sensors will prompt equipment substitution (e.g., electric alternatives) if levels exceed 150 µg/m³ (a safety buffer)

Additional Parameters and Measures

1. **Vibration:** No NEQS exists, but construction near a hospital warrants control. Pile driving will use low-vibration methods (e.g., hydraulic pressing), monitored with seismographs to keep levels below 5 mm/s.
2. **Monitoring Program:** A dedicated environmental team will use automated stations for air (PM10, NO2) and noise, with manual water sampling. Data will be compiled into biweekly EPA reports and shared with the community via noticeboards.
3. **Community Engagement:** Residents can report exceedances (e.g., excessive dust) via the GRM, triggering same-day investigations and corrective actions like increased mitigation or schedule adjustments.

Table 5: Relevant National Environmental Quality Standards and Compliance Measures

Parameter	Standard	Relevance to Project	Compliance Measures
PM10	50 µg/m ³ (24-hour mean)	Manages dust near hospital and residences	Twice-daily spraying, tarps, grass buffers, real-time monitoring
Noise (Daytime)	55 dBA (residential areas)	Limits noise for hospital patients and community	Restricted hours, silencers, barriers, hourly monitoring

Parameter	Standard	Relevance to Project	Compliance Measures
Turbidity	<5 NTU (surface water)	Prevents river sedimentation from runoff	Silt fences, traps, bale dams, weekly sampling
NO2	200 µg/m ³ (1-hour mean)	Controls emissions in urban setting	Tier 3 equipment, no-idling, maintenance, daily monitoring
Vibration (Ad Hoc)	<5 mm/s (project-specific)	Protects hospital infrastructure and patient comfort	Low-vibration methods, seismograph monitoring

3.5.2 Relevance to the Project

NEQS compliance mitigates environmental degradation in the project’s urban and riverside setting, protecting public health—especially for vulnerable hospital patients—and preserving the St. Paul River’s ecosystem. Proactive measures like real-time monitoring and community feedback loops ensure adherence, balancing construction progress with environmental and social responsibility.

3.6 RATIFIED MULTILATERAL ENVIRONMENTAL AND SOCIAL AGREEMENTS (MEAS) APPLICABLE TO THE PROJECT

Liberia’s ratification of Multilateral Environmental and Social Agreements (MEAs) integrates global sustainability principles into the New Redemption Hospital Access Road project. These agreements enhance environmental stewardship and social safeguards, tailored to the project’s urban healthcare context. Each MEA’s relevance and application are detailed below.

3.6.1 United Nations Framework Convention on Climate Change (UNFCCC)

1. **Key Provisions:** Encourages emission reductions through efficient technologies and practices, supporting Liberia’s Nationally Determined Contributions (NDCs) under the Paris Agreement.
2. **Relevance to Project:** Construction contributes CO₂ via fuel combustion (e.g., 10 liters/hour for a grader) and material production (e.g., asphalt). Urban projects must minimize their carbon footprint to align with climate goals.
3. **Project Compliance:** Fuel-efficient Tier 4 machinery will reduce emissions by 20% compared to older models, per EPA estimates. Route optimization will cut vehicle trips by 15%, and solar-powered site offices and lighting will offset grid electricity use. Monthly fuel logs will quantify reductions, targeting a 10% emissions cut over baseline projections.

3.6.2 Convention on Biological Diversity (CBD)

1. **Key Provisions:** Promotes biodiversity conservation and sustainable resource use, even in urban areas where ecological remnants (e.g., trees, soil biota) persist.
2. **Relevance to Project:** The urban site has limited biodiversity, but roadside trees and riverbank soils could be affected by dust, erosion, or vegetation clearance, impacting local aesthetics and micro-ecosystems.
3. **Project Compliance:** Existing trees will be mapped and preserved where possible, with a 1:2 replacement ratio (two trees planted per one removed) using native species like mango or acacia. Erosion controls (e.g., mulching, silt fences) will protect soil stability, and a post-construction landscaping plan will restore green cover along the road, enhancing CBD alignment.

3.6.3 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

1. **Key Provisions:** Regulates hazardous waste management to prevent environmental harm, requiring proper storage, transport, and disposal.
2. **Relevance to Project:** Construction may generate 50–100 liters of used oil, plus batteries and asphalt residues monthly, posing contamination risks if mismanaged near the hospital or river.
3. **Project Compliance:** Hazardous wastes will be stored in sealed, labeled drums within a fenced site area, transported weekly by a licensed contractor to Monrovia’s EPA-approved disposal facility, and tracked via manifests. Spill kits will be onsite, and workers will be trained quarterly on handling protocols, ensuring no local dumping or river pollution.

3.6.4 International Labour Organization (ILO) Conventions

1. **Key Provisions:** Conventions like C155 (OHS) and C138 (Minimum Age) mandate safe workplaces, fair treatment, and no child labor, critical for construction’s 50–100 workers.
2. **Relevance to Project:** Workers face risks like falls, dust inhalation, and fatigue in Liberia’s humid climate, requiring protections beyond national laws to meet global standards.
3. **Project Compliance:** PPE (e.g., respirators, boots) will be mandatory, with daily heat breaks (15 minutes/hour above 32°C). A minimum age of 18 will be enforced via ID checks, and a worker welfare committee will oversee fair pay (e.g., \$6/day average) and rest periods. Biweekly OHS audits will ensure compliance, linked to the ESS2 GRM.

Table 6: Relevant MEAs and Project Compliance

MEA	Key Provisions	Relevance to Project	Project Compliance Measures
UNFCCC	Reduce emissions, low-carbon practices	Lowers CO2 from machinery and materials	Tier 4 equipment, route optimization, solar power, emission tracking
CBD	Conserve biodiversity, sustainable use	Protects trees and soils in urban area	Tree preservation, 1:2 replanting, erosion control, landscaping
Basel Convention	Manage hazardous waste safely	Prevents pollution from oils, batteries	Sealed storage, licensed disposal, spill kits, training
ILO Conventions	Ensure worker safety, rights, no child labor	Safeguards workforce from hazards	PPE, heat breaks, age checks, fair pay, OHS audits, GRM

3.6.5 Relevance to the Project

These MEAs elevate the project’s environmental and social performance by embedding international norms into its execution. In an urban healthcare setting, managing emissions, preserving minor ecological features, handling waste, and protecting workers are vital for community acceptance and long-term sustainability. Liberia’s MEA commitments reinforce the project’s role in advancing national and global goals, ensuring construction supports health, equity, and environmental resilience.

4 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

This section elaborates on the project's baseline environmental and social conditions. The baseline is categorized into Physical Environment, Socioeconomic Environment, Ecological Environment, and Biological Environment, establishing the conditions against which project impacts will be assessed.

4.1 METHODOLOGY

The baseline data collection was conducted between April and May 2025, utilizing primary and secondary data sources. Primary data were gathered through field surveys, sampling, and direct observations, while secondary data were obtained from existing reports, government databases, and

academic literature. The methodologies were designed to capture quantitative and qualitative information, ensuring a comprehensive understanding of the project area's current conditions. Data analysis techniques, including statistical analysis and Geographic Information System (GIS) mapping, were employed to interpret the collected data. The approach adhered to international best practices and complied with the requirements of the World Bank Environmental and Social Standards (ESSs) and Liberian environmental regulations

4.2 PHYSICAL ENVIRONMENT

The Physical Environment section provides a detailed examination of the project area's natural and physical characteristics. Understanding these elements is critical for assessing potential interactions with road construction, identifying environmental challenges, and developing appropriate mitigation measures to ensure the project's sustainability and minimal adverse impact on the surrounding ecosystem and community.

4.2.1 Topography and Drainage

The project area features a predominantly flat urban landscape with gentle slopes, a characteristic trait of Liberia's coastal regions. Elevation across the corridor varies from approximately 5 to 15 meters above sea level, with the lowest elevations occurring near the St. Paul River, located about 140 meters from the road's endpoint. This minimal topographic variation, while simplifying certain aspects of road construction such as grading, poses significant drainage challenges. The flat terrain impedes natural water runoff, particularly during the wet season (May to October), when intense rainfall—often exceeding 800 mm per month in peak periods—leads to flooding in multiple segments of the project area.

Flood-prone zones include residential neighborhoods near the ETMI Public School Junction and commercial areas along the Fand Diggs Community Road Junction. Existing drainage infrastructure, comprising a mix of natural streams and man-made channels (e.g., concrete culverts and roadside ditches), is insufficient to manage the volume of stormwater. Many of these channels are poorly maintained, with accumulated debris such as plastic waste, sediment, and vegetation further obstructing flow. For instance, culverts at key intersections are often undersized, causing water to back up into streets and properties, disrupting access and posing health risks due to stagnant water.

To address these challenges, the project design incorporates an enhanced drainage system. Proposed improvements include:

1. **Widened Culverts:** Increasing culvert diameters at critical points to accommodate peak runoff volumes.
2. **Deepened Ditches:** Excavating and lining roadside ditches to improve water capture and conveyance.
3. **Debris Management:** Implementing regular maintenance schedules and community education programs to reduce blockages.

These measures aim to mitigate flooding, enhance road accessibility, and protect adjacent properties, particularly during the wet season when drainage issues are most pronounced.

4.2.2 Geology

The geological profile of the project area is dominated by sedimentary rocks, primarily sandstone and shale, which are typical of Liberia's coastal plains. These formations are overlain by lateritic soils, a product of prolonged tropical weathering that results in iron- and aluminum-rich layers. The sedimentary bedrock provides a relatively stable foundation for construction, with adequate load-bearing capacity for a paved road. However, the lateritic overburden introduces variability—its

susceptibility to erosion under heavy rainfall and its inconsistent texture require careful management during earthworks.

The geological composition also influences the availability of construction materials:

1. **Sandstone:** Can be locally quarried for use as aggregate in concrete and asphalt production, reducing transportation costs and environmental impact.
2. **Lateritic Gravel:** Suitable for sub-base layers, though its quality varies, necessitating laboratory testing to ensure compliance with engineering standards (e.g., gradation and compaction properties).

Geotechnical considerations are paramount for this project. The presence of lateritic formations suggests potential challenges with soil stability, particularly in cut-and-fill operations or where embankments are required. To mitigate these risks, the project will involve:

- **Site-Specific Surveys:** Detailed geotechnical investigations to map subsurface conditions and assess bearing capacity.
- **Stabilization Techniques:** Use of geotextiles or chemical binders (e.g., lime) to reinforce weaker soil layers.

These geological insights will inform the road’s structural design, ensuring durability under the region’s environmental stresses, such as heavy rainfall and traffic loads.

4.2.3 Soil Quality

Soil quality in the project area, based on samples SS-001 and SS-002, reveals slightly acidic conditions with pH values of 5.32 and 6.00, respectively. The predominant soil texture is sandy loam, characterized by a mix of sand, silt, and clay that offers moderate permeability but is highly susceptible to erosion and nutrient leaching during heavy rainfall. This texture, combined with the acidic pH, has implications for both construction stability and environmental management.

Key soil parameters, summarized in Table 24, indicate that levels of organic matter, nitrate, lead, iron, zinc, and sulfate are within typical ranges for urban soils, suggesting no significant contamination or fertility constraints for non-agricultural use. However, the soil’s physical properties require enhancement to support road construction.

Table 7: Summary of Soil Quality Parameters

Parameter	SS-001	SS-002	Typical Range for Urban Soils
pH	5.32	6.00	5.5 - 7.0
Organic Matter (%)	2.5	2.8	1.0 - 5.0
Nitrate (mg/kg)	15	18	10 - 50
Lead (mg/kg)	10	12	< 50
Iron (mg/kg)	500	480	200 - 1000
Zinc (mg/kg)	25	22	10 - 50
Sulfate (mg/kg)	30	28	20 - 100

The slightly acidic pH may influence concrete durability by increasing the risk of sulfate attack or corrosion of embedded steel, necessitating adjustments in material specifications (e.g., sulfate-resistant cement). The sandy loam’s erosion potential, exacerbated by the region’s intense rainfall, requires proactive control measures, including:

- **Erosion Barriers:** Installation of silt fences and straw wattles during construction.
- **Soil Stabilization:** Application of lime or cement to improve compaction and shear strength for subgrade layers.
- **Vegetative Cover:** Temporary seeding of exposed areas to reduce surface runoff and sediment loss.

These strategies will ensure the soil supports the road structure while minimizing environmental degradation in the surrounding urban landscape.

4.2.4 Hydrology

The hydrological system of the project area is heavily influenced by its proximity to the St. Paul River, approximately 140 meters from the road's endpoint, and an interconnected network of drainage channels. These channels—comprising natural tributaries and artificial ditches—serve as the primary conduits for stormwater management in this flat, low-lying terrain. However, their effectiveness is compromised by frequent clogging with debris (e.g., household waste, silt) and inadequate capacity to handle peak flows during the wet season.

Hydrological challenges include:

1. **Flooding:** Low-gradient topography and obstructed channels cause water to pool in residential and commercial zones, particularly near the St. Paul River confluence.
2. **Channel Condition:** Many artificial drains are shallow or unlined, leading to bank erosion and sediment buildup that further restricts flow.

The project's hydrological enhancements will focus on improving water management:

1. **Upgraded Infrastructure:** Installation of larger, reinforced culverts and concrete-lined ditches to increase conveyance capacity.
2. **Natural Channel Restoration:** Clearing and regrading natural streams to restore their functionality while preserving ecological integrity.
3. **Stormwater Retention:** Exploring small detention basins in open areas to temporarily store excess runoff and reduce downstream flooding.

These interventions will not only protect the road from water damage but also improve living conditions in flood-prone neighborhoods, aligning with the project's broader social objectives.

4.2.5 Weather and Climate

The project area is situated in a tropical monsoon climate zone, marked by high humidity, distinct wet and dry seasons, and the following characteristics:

1. **Temperature:** An average annual temperature of 27°C, with monthly averages ranging from 25°C in the wet season to 29°C in the dry season (November to April).
2. **Rainfall:** Approximately 4,500 mm annually, with 85% occurring between May and October. Peak months (July and August) can see rainfall exceeding 800 mm.
3. **Humidity:** Consistently above 80%, often reaching 90% during the wet season, creating a persistently muggy environment.

These climatic conditions pose significant challenges for construction:

1. **Wet Season Disruptions:** Heavy rainfall can halt earthworks, flood excavations, and delay material delivery.
2. **Erosion Risks:** Intense downpours increase soil loss and sedimentation, threatening both the construction site and downstream water quality.
3. **Material Performance:** High humidity affects the curing of concrete and asphalt, potentially requiring additives or adjusted schedules.

To adapt, the project will prioritize major construction activities during the dry season, while wet-season efforts will focus on preparatory tasks (e.g., drainage installation) and erosion control measures such as silt traps and temporary diversions. Long-term road design will incorporate elevated alignments and robust drainage to withstand seasonal extremes.

4.2.6 Land Use Activities

The urban corridor along the proposed road is a bustling mix of residential, commercial, and institutional activities:

- **Residential:** Dense, low-rise housing dominates, with approximately 200 households within 100 meters of the alignment. These include informal settlements and planned communities, often built close to the roadway.
- **Commercial:** Roadside shops, market stalls, and petty trading activities form an economic lifeline, with vendors selling goods ranging from food to household items. These businesses rely on pedestrian and vehicular access.
- **Institutional:** Key facilities include the New Redemption Hospital (a proposed 155-bed referral center), ETMI Public School, and St. Maria Catholic School, among other institutions.

The hospital's role as a critical healthcare provider underscores the project's urgency—current road conditions, especially during floods, impede ambulance access and patient transport. Construction will temporarily disrupt these land use activities, particularly commercial operations, necessitating phased implementation and community engagement to minimize economic impacts. Post-construction, improved access will enhance connectivity, benefiting all sectors, especially healthcare delivery.

4.2.7 Noise Levels

Baseline noise levels, measured at four locations (SQ-001 to SQ-004), range from 50.21 to 52.6 dBA, well below the World Health Organization (WHO) guideline of 75 dBA for residential areas.

Additionally, 48-hour monitoring period was chosen to encompass a full cycle of daily activities, including potential differences between weekday and weekend noise patterns. Continuous data logging ensures that short-term fluctuations are captured, which could be critical for assessing community impact. While hourly or more frequent monitoring was considered, the table below presents the overall LAeq values for simplicity and clarity, calculated over the defined daytime and nighttime periods. The results show daytime and nighttime ambient noise levels at four designated locations. The table references the World Bank Group EHS Guidelines, which specify noise standards as follows:

- **Residential, institutional, and educational areas:** 55 dBA (daytime), 45 dBA (nighttime)
- **Industrial and commercial areas:** 70 dBA (daytime and nighttime)

Location	Daytime LAeq (dBA)	Nighttime LAeq (dBA)	Daytime Standard (dBA)	Nighttime Standard (dBA)	Compliance
Residential Area	53	43	55	45	Yes
School	50	40	55	45	Yes
Hospital	48	38	55	45	Yes
Commercial Area	65	60	70	70	Yes

Note: Standards are based on the World Bank Group Environmental, Health, and Safety Guidelines for noise levels in residential, institutional, educational, and industrial/commercial areas.

These levels reflect typical urban noise sources:

- **Traffic:** Moderate vehicular movement on the existing unpaved road.
- **Commercial Activity:** Market chatter and petty trading along the corridor.
- **Community Sounds:** School activities and residential interactions.

While current noise levels are acceptable, construction will introduce temporary increases from equipment such as excavators, compactors, and asphalt pavers, potentially reaching 80-90 dBA at peak activity. Mitigation will include:

- **Scheduling:** Limiting noisy operations to daytime hours (e.g., 8 AM to 5 PM) to avoid disturbing sleep.
- **Barriers:** Erecting temporary noise shields near sensitive receptors like the hospital and schools.
- **Equipment Maintenance:** Using well-maintained machinery to reduce unnecessary noise emissions.

Post-construction, traffic noise may rise slightly with improved road use, but it is expected to remain within WHO limits due to the corridor’s urban context.

4.2.8 Air Quality

Air quality in the project area, assessed at four points (AQ-001 to AQ-004), is good, with all measured pollutants falling within WHO standards. The coastal location and prevailing winds facilitate pollutant dispersion, maintaining low concentrations of key parameters (Table 4.2)

Table 8: Summary of Air Quality Parameters

Parameter	AQ-001	AQ-002	AQ-003	AQ-004	WHO Standard
CO (ppm)	1.2	1.0	1.3	1.1	9
CO2 (ppm)	400	410	405	415	1000
VOC (ppb)	50	45	55	48	100
PM2.5 (µg/m³)	10	12	11	13	25
PM10 (µg/m³)	20	22	21	23	50
SO2 (ppb)	2	1.5	2.2	1.8	20
NO2 (ppb)	10	9	11	10	40

Construction activities will temporarily elevate dust (PM10 and PM2.5) and equipment emissions (e.g., CO, NO2), particularly during earthworks and paving. To safeguard air quality:

- **Dust Control:** Regular water spraying on unpaved surfaces and covering stockpiles.
- **Emission Management:** Using low-emission machinery and enforcing idling restrictions.

These measures will ensure compliance with standards and protect community health, especially near the hospital.

4.2.9 Water Quality

Water quality analysis from borehole samples (WS-001 and WS-002) highlights elevated levels of chromium and iron, with WS-001 exceeding Liberia Water Quality Standards (LWQS) Class I limits (Table 4.3). These exceedances suggest possible contamination from natural geological sources (e.g., lateritic leaching) or anthropogenic inputs (e.g., industrial runoff), posing risks to local groundwater use.



Figure 6: Groundwater samplings

Table 9: Water Quality Parameters

Parameter	WS-001	WS-002	LWQS Class I
Chromium (mg/L)	1.15	0.031	<0.05
Iron (mg/L)	0.55	0.05	<0.1
pH	6.8	7.0	6.5 - 8.5
Turbidity (NTU)	2.0	1.5	<5.0

The elevated chromium (1.15 mg/L in WS-001) and iron (0.55 mg/L) in WS-001 exceed safe drinking water thresholds, necessitating:

- **Source Investigation:** Identifying contamination origins to prevent exacerbation during construction.
- **Mitigation:** Installing runoff controls (e.g., silt curtains) to avoid mobilizing contaminants into groundwater.
- **Community Support:** Providing alternative water sources or treatment systems for affected households.

Other parameters, such as pH and turbidity, are within acceptable ranges, indicating that with targeted interventions, water quality can be managed effectively during and after construction.

4.2.10 Assessment of Existing and Planned Infrastructure

As part of the baseline assessment, an evaluation of existing and planned infrastructure within the project area was conducted to identify any potential impacts on overhead power lines, water and sewage pipes, major underground cables, or other critical utilities. This assessment is essential to ensure that the project does not disrupt essential services or pose risks to public safety.

During the study period, no visible or documented evidence of such infrastructure was observed within the project’s area of influence. Consultations with local communities and relevant stakeholders, including local authorities and utility providers, also did not reveal any information regarding the presence of these utilities. Based on the available data, this indicates that the project is unlikely to affect existing or planned infrastructure such as power lines, water pipes, or underground cables.

To ensure comprehensive due diligence, it is recommended that the contractor conduct a final utility survey before the commencement of construction activities. This survey should involve consultations with utility companies (Such as the Liberia Electricity Corporation (LEC) and the Liberia Water and Sewer Corporation (LWSC)) and a physical inspection to confirm the absence of any undocumented infrastructure. Should any utilities be identified, appropriate mitigation measures—such as rerouting or protective barriers—should be implemented to avoid service disruptions or safety hazards

4.3 SOCIOECONOMIC ENVIRONMENT

The Socioeconomic Environment: Analyzes the demographic, economic, and social characteristics of the community surrounding the project area. This overview contextualizes the potential impacts and benefits of the project, informing strategies to maximize positive outcomes and mitigate disruptions.

Table 10: Socioeconomic Baseline Conditions

Category	Description
Demographic Profiling	The project area has a population density of approximately 5,000 residents per square kilometer, consistent with urban zones in Montserrado County. The majority of residents are working-age individuals (18-60 years), comprising about 65% of the population, indicating a robust labor force that could support project-related economic activities. The

Category	Description
	gender distribution is nearly balanced, with 52% female and 48% male, necessitating gender-inclusive planning to ensure equitable benefits
Access to Community Infrastructures	<p>Infrastructure in the area is challenged by degradation and unreliability:</p> <ul style="list-style-type: none"> • Roads: Potholed and poorly drained, exacerbating flooding and limiting mobility. • Electricity: The national grid suffers frequent outages (averaging 10 hours/day), supplemented by generators and solar panels. • Water Supply: Municipal pipes and boreholes are unreliable, with supply interruptions common. • Sanitation: Mixed facilities, with most of the households lacking formal waste disposal, leading to health risks. <p>These deficits emphasize the project’s role in improving access to services, particularly healthcare, through enhanced road infrastructure.</p>
Access to Health Services	The New Redemption Hospital, a key referral facility, serves the area alongside smaller clinics and pharmacies. Poor road conditions currently impede access, particularly during floods, delaying emergency care.
Illnesses Reported	Common illnesses include respiratory infections (dust-related), malaria (standing water), and waterborne diseases (contaminated sources). These are tied to environmental conditions that the project can indirectly address.
Sanitation Facilities	Most households rely on shared latrines, with inadequate waste management increasing disease risks. The project could facilitate future sanitation upgrades by improving access for waste collection services.
Access to Water and Usage	Water from boreholes and municipal supplies is often contaminated, impacting drinking and domestic use. Construction must avoid exacerbating this issue, potentially through temporary water provisions.
Access to Education	Schools like ETMI Public School and St. Maria Catholic School face overcrowding and resource shortages. Improved road access could reduce absenteeism, though construction requires careful management to avoid disruptions.
Acceptance Level of the Project	Community support is strong, driven by expected healthcare improvements, though concerns about dust and noise persist. Ongoing engagement will maintain this acceptance.
Ethnicity	The community reflects Monrovia’s multicultural fabric, with significant ethnic diversity. Major groups include Kpelle, Bassa, and Kru, alongside smaller populations of Mano, Gio, and Grebo. This diversity requires culturally sensitive approaches, such as multilingual outreach and respect for tribal traditions, to ensure inclusive project implementation.
Markets	Informal markets (roadside stalls, shops) are vital but vulnerable to construction disruptions. Mitigation includes phased work and temporary relocation options.
Transportation	Minibuses, taxis, and motorbikes are hampered by degraded roads. The project targets reduction in travel time and improved safety.
Energy	Frequent grid outages are offset by generators and solar panels. Enhanced road access could improve energy logistics indirectly.
Social Capital	Strong networks of leaders and organizations can support project implementation through communication and labor mobilization.
Religious Practices	Christianity and Islam dominate, with worship places central to community life. Construction will respect religious schedules.
Culture and Recreation	Festivals and sports (e.g., football at the hospital field) are key. The project will preserve these activities to maintain community well-being.

Category	Description
Gender Roles	Traditional roles see women in households and men as earners, though women's trading is rising. Gender-sensitive employment will be prioritized.
Vulnerable Groups	The elderly, children, and disabled face mobility challenges, requiring special construction measures like prioritized access routes.
Natural Resource Access	Limited to minor fishing in the St. Paul River, with minimal project impact expected due to distance.
Economic Activities and Income Sources	Petty trading, institutional jobs, informal work, and artisanal tasks yield an average income. Temporary jobs will boost local earnings.
Livelihood Income	Income variability from informal jobs necessitates minimizing disruptions through flexible scheduling and advance notice.
Food Security	Stable but sensitive to transport costs, which improved roads could stabilize.
Community Perception of Impact	<ul style="list-style-type: none"> - Economic Change: 70% expect business growth - Employment: 60% anticipate jobs - Health: 80% see better access; 50% note dust/noise concerns - Environment: 40% worry about flooding - Perception: 85% supportive; 90% want involvement
Community Involvement	Consultations via meetings and a grievance hotline ensure transparency and engagement.

4.4 ECOLOGICAL AND BIOLOGICAL ENVIRONMENT

This section evaluates the urbanized biological context, noting minimal natural ecosystems.

	Receptor	Description
1	Flora	Limited to urban trees (mango, coconut) and grasses, offering aesthetic rather than ecological value. Preservation is planned where feasible.
2	Fauna	Includes birds, insects, and rodents, with minor aquatic life in the St. Paul River (140 meters away). Impacts are negligible.
3	Sensitive Areas	No sensitive ecological zones exist due to extensive urbanization.

5 ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS

The project will entail positive and adverse environmental and social impacts on individuals and communities residing in the influence area.

5.1 RISKS SCREENING

To study the risks and impacts involved with the project, risk screening criteria based on WB ESF were employed as shown in Table 28, and the risk assessment for this project is presented in the table below.

Table 11: World Bank Risk Screening Criteria

Risk Category	Screening Criteria
High	<p>The resource/receptor would likely experience a large magnitude impact that would endure for a long time, extend over a large area, exceed national/international standards, endangers public health and safety, threatens a species or habitat of national or international significance, and/or exceeds a community's resilience and ability to adapt to change.</p> <p>The Project may have difficulty complying with the applicable ESF requirement, and significant mitigation would likely be required.</p>

Substantial	The resource/receptor would experience a clear change from baseline conditions and would approach but not exceed applicable standards. The Project would comply with the applicable ESF requirement, but mitigation would be required.
Moderate	The resource/receptor would experience a noticeable effect, but the magnitude of the impact is sufficiently small (with or without mitigation) that the overall effect would remain well within applicable standards. The Project would comply with the applicable ESF requirement, but mitigation may be required.
Low	The resource/receptor will either not be affected, or the likely effect would be imperceptible or indistinguishable from natural background variation. The Project would comply with the applicable ESF requirement and mitigation would typically not be required.

Table 12: World Bank ESS Risk Screening evaluation

E&S Risks and Impacts	Risk Rating		Rationale
	Construction	Operation	
ESS1: Assessment and Management of E&S Risks and Impacts			
Vulnerable groups	Moderate	Low	Construction may temporarily disrupt access for vulnerable groups (e.g., elderly, disabled) due to blocked pathways or dust, but effects are manageable with mitigation like alternative routes. Operation improves access, reducing risks to negligible levels.
Cumulative	Moderate	Low	Construction adds to urban stressors (e.g., noise, traffic), requiring coordinated mitigation such as phased scheduling. Operation may contribute to moderate cumulative impacts (e.g., urban growth), manageable with planning.
ESS2: Labor and Working Conditions			
Working conditions	Moderate	N/A	Workers face moderate risks (e.g., dust, heat) during construction, addressed with safety protocols like PPE. No workforce is involved in operation.
Worker accommodations	Low	N/A	No accommodations needed as workers are local or commute daily, minimizing risk.
Child Labor	Low	N/A	Strict enforcement of minimum age (18) ensures compliance, keeping risks low.
Occupational Health and Safety	Moderate	N/A	Construction involves high-risk tasks (e.g., machinery use), necessitating robust safety measures like training and emergency plans to prevent serious incidents.
ESS3: Resource Efficiency and Pollution Prevention Management			
Landscape aesthetic	Moderate	Low	Construction temporarily alters views (e.g., equipment, debris), mitigated by cleanup. Operation enhances aesthetics with landscaping, reducing impact.
Air Pollution	Moderate	Low	Dust and emissions from construction require suppression (e.g., water spraying); operational traffic increases emissions but stays within standards with monitoring.
Potential hazards caused by bitumen and other toxic chemicals	Moderate	Low	Bitumen and fuel use during construction pose spill risks, needing containment measures. Operation involves no chemical hazards.
Noise Pollution	Moderate	Low	Construction noise (e.g., 80-90 dBA) exceeds standards, requiring barriers and timing restrictions. Operational traffic noise is moderate, mitigated by design.
Solid waste management	Moderate	Low	Construction generates debris, managed via recycling and disposal. Operation produces minimal waste.
Pollution of water resources	Moderate	Low	Construction runoff or spills could affect water quality, needing controls like silt fences. Operational stormwater management reduces risks.
Land use change	Low	Low	Project follows existing right-of-way, causing no significant land use shift in either phase.
ESS4: Community Health and Safety			

E&S Risks and Impacts	Risk Rating		Rationale
	Construction	Operation	
Traffic management	Moderate	Moderate	Construction disrupts traffic, requiring detours and signage. Operation improves flow but introduces moderate pedestrian risks, managed with controls.
Traffic and Road Safety	Moderate	Moderate	Construction poses temporary hazards (e.g., trenches), mitigated by barriers. Operation has long-term safety risks if maintenance is neglected, needing ongoing upkeep.
Ecosystem Services	Low	Low	Urban setting means minimal ecosystem services are affected in either phase.
Community Exposure to Health Issues and Labor Influx	Moderate	Low	Construction may increase dust or disease vectors, mitigated by hygiene measures. Operation has negligible health impacts.
Hazardous Materials	Moderate	Low	Fuel and chemicals during construction pose moderate spill risks, managed with storage protocols. Operation involves no hazardous materials.
Emergency Preparedness and Response	Moderate	Low	Construction requires plans for spills or accidents; operation needs only basic traffic emergency protocols.
Gender Based Violence (GBV)	Moderate	Low	Labor influx during construction may elevate GBV risks, addressed with codes of conduct. Operation has no direct GBV impact.
ESS5: Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement			
Land Acquisition	Low	N/A	Project uses existing right-of-way, avoiding land acquisition or resettlement.
Economic Displacement	Low	N/A	No businesses or livelihoods are displaced by the project.
Physical Displacement	Low	N/A	No homes or structures are affected, keeping risks low.
ESS7: Indigenous Peoples			
Free Prior and Informed Consent (FPIC)	Low	Low	No indigenous communities are present in the project area, minimizing risk.
ESS8: Cultural Heritage			
Tangible Heritage	Low	Low	No known physical heritage sites are within the project footprint.
Intangible Heritage	Low	Low	No significant cultural practices or traditions are impacted by the project.
ESS10: Stakeholder Engagement and Information Disclosure			
Continued engagement of stakeholders during implementation	Moderate	Moderate	Both phases require ongoing communication to address concerns (e.g., noise, access), supported by grievance mechanisms.
Issues Related to the Project	Moderate	Moderate	Potential grievances (e.g., disruptions) in both phases need responsive systems to maintain trust.

5.2 METHODOLOGY FOR IMPACT ASSESSMENT AND MITIGATION MEASURES

This section details the methodology for developing mitigation measures for the project. It integrates quantitative and qualitative approaches to ensure a comprehensive, transparent, and World Bank-compliant assessment. The methodology systematically identifies, evaluates, and mitigates potential environmental and social impacts during the project’s construction and operational phases, aligning with the World Bank Environmental and Social Standards (ESSs) and international best practices.

5.2.1 Impact Evaluation

Impacts are evaluated using:

1. **Magnitude:** Low (minimal), Medium (noticeable), High (severe).
2. **Extent:** Site-specific (project site), Local (500m radius), Regional (beyond 500m).
3. **Duration:** Short-term (<1 month), Medium-term (1-12 months), Long-term (>12 months).
4. **Likelihood:** Unlikely (<25%), Possible (25-75%), Likely (>75%).
5. **Reversibility:** Reversible (fully recoverable), Partially Reversible (mitigable), Irreversible (permanent).
6. **Significance:** Derived from matrix (e.g., High, Regional, Long-term, Likely, Irreversible = Major).

This matrix ensures impacts are systematically assessed and prioritized for mitigation, aligning with ESIA goals and stakeholder expectations.

5.2.1.1 Significance Rating Matrix

The significance of an impact is determined by integrating the five criteria into a **Significance Rating Matrix**. This matrix classifies impacts into four levels—**Negligible, Minor, Moderate, or Major**—to guide decision-making and resource allocation for mitigation. The classification reflects the combined effect of all criteria, ensuring a nuanced and balanced assessment.

Significance Levels

1. **Negligible:** Impacts with minimal consequence, requiring no specific action beyond standard practices.
2. **Minor:** Impacts that are detectable but manageable with routine measures, posing little risk to project approval.
3. **Moderate:** Impacts necessitating targeted mitigation and monitoring to minimize effects and ensure compliance.
4. **Major:** Impacts with severe consequences, potentially requiring significant project modifications, compensation, or stakeholder consultation.

The table below provides a detailed framework for assigning significance based on combinations of the five criteria. It includes additional examples to clarify how ratings are applied.

Impact Significance Rating Matrix

Magnitude	Extent	Duration	Likelihood	Reversibility	Significance
Low	Site-specific	Short-term	Unlikely	Reversible	Negligible
Low	Local	Short-term	Possible	Reversible	Minor
Medium	Local	Medium-term	Likely	Partially Reversible	Moderate
High	Regional	Long-term	Likely	Irreversible	Major
Medium	Site-specific	Short-term	Unlikely	Reversible	Minor
High	Local	Medium-term	Possible	Partially Reversible	Moderate
High	Regional	Long-term	Likely	Partially Reversible	Major
Low	Regional	Long-term	Unlikely	Reversible	Minor

5.2.2 Positive Impacts of the Project

The construction of the 2.4 km access road is expected to bring transformative benefits to the local community and the broader region. These positive impacts span healthcare accessibility, economic growth, community safety, and environmental sustainability, while aligning with Liberia's national development goals and the World Bank's focus on sustainable development.

5.2.2.1 Improved Healthcare Accessibility

The access road will significantly enhance healthcare access for residents of Upper Caldwell and surrounding areas by connecting them to the New Redemption Hospital, a critical 155-bed referral facility.

- **Reduced Travel Time:** The new road will shorten the time it takes for patients to reach the hospital, especially during emergencies. This is vital in a region with limited ambulance services, where delays can be life-threatening.
- **Enhanced Emergency Response:** Improved road conditions will allow ambulances and medical personnel to respond more quickly and reliably, even during the wet season when flooding often disrupts travel.
- **Better Supply and Personnel Mobility:** The road will ease the transportation of medical supplies, equipment, and healthcare workers, ensuring the hospital remains well-equipped and staffed to serve the community.

These improvements will lead to better health outcomes, lower mortality rates, and an enhanced quality of life for the population.

5.2.2.2 Economic Benefits

The project will stimulate economic growth in the area, providing both immediate and long-term opportunities for residents.

- **Job Creation:** Construction of the road will generate temporary jobs for local workers, boosting household incomes and reducing unemployment during the project phase.
- **Long-Term Opportunities:** Once completed, the road may attract businesses like pharmacies or small shops near the hospital, creating permanent employment and encouraging economic activity.
- **Support for Local Businesses:** Improved transportation will lower costs and time for moving goods and services, benefiting traders, vendors, and transport operators.
- **Rising Property Values:** Enhanced infrastructure often increases property values, benefiting homeowners and potentially drawing investment to the area.

These economic gains will contribute to poverty reduction and build a more resilient local economy.

5.2.2.3 Enhanced Community Safety

The road's design prioritizes safety, addressing the needs of an urban area with significant pedestrian activity.

- **Safety Features:** Sidewalks, curbs, gutters, and reflectorized markers will reduce the risk of accidents, particularly for pedestrians near schools, markets, and the hospital.
- **Improved Lighting:** Streetlights will increase visibility at night, enhancing safety for residents and visitors while reducing the likelihood of accidents or crime.
- **Traffic Management:** Signage and traffic calming measures, such as speed bumps, will ensure safer interactions between vehicles and pedestrians.

By improving safety, the project will create a more secure environment and reduce accident-related injuries.

5.2.2.4 Environmental Benefits

The project incorporates sustainable features that will mitigate environmental risks and promote resilience.

- **Flood Prevention:** An upgraded drainage system with widened culverts and deepened ditches will manage stormwater effectively, reducing flooding—a common issue in the area during the wet season.
- **Sustainable Materials:** Where possible, the use of recycled materials like reclaimed asphalt pavement (RAP) will minimize the environmental footprint of construction.
- **Erosion Control:** Planting native vegetation along the road will stabilize slopes, prevent erosion, and enhance the area’s biodiversity and appearance.

These measures will protect the local ecosystem and strengthen the community’s ability to withstand climate challenges.

5.2.2.5 Alignment with Development Goals

The project supports Liberia’s national priorities and the World Bank’s mission of sustainable development and poverty reduction.

- **Healthcare Infrastructure:** It advances Liberia’s Health Sector Policy by improving access to a key medical facility.
- **Economic and Urban Growth:** The road aligns with the National Transport Policy, fostering efficient transportation and urban development.
- **Sustainability:** Its focus on drainage and sustainable practices reflects the National Environmental Policy and the World Bank’s Environmental and Social Standards.
- **Poverty Reduction:** By creating jobs and improving access to services, the project promotes social equity and economic inclusion.

This alignment ensures the project meets both local needs and broader developmental objectives.

5.2.3 Anticipated Adverse Impacts And Mitigation Measures

The project’s lifecycle—comprising pre-construction, construction, and operation phases—presents distinct environmental and social challenges and opportunities. This section systematically analyzes the anticipated impacts for each phase, drawing on the baseline conditions established in Section 4 and the traffic and geotechnical studies in Section 2. Mitigation measures are designed to be practical, cost-effective, and aligned with the project’s objectives, community needs, and regulatory requirements, including the World Bank Environmental and Social Standards (ESSs).

5.2.3.1 Pre-Construction Phase

The pre-construction phase serves as the foundational stage of the project, involving a range of preparatory activities critical to its success. These activities include site surveys (topographic, geotechnical, and environmental), stakeholder engagement, permitting, and finalizing project designs. Although the environmental and social impacts during this phase are generally less intense than those in the construction or operational phases, they can still disrupt daily life and shape community perceptions if not addressed proactively. By anticipating these impacts and implementing thoughtful mitigation measures, the project team can minimize inconvenience, foster trust, and ensure a seamless transition into subsequent phases. This expanded section provides a detailed exploration of the anticipated impacts and corresponding strategies to manage them effectively.

5.2.3.1.1 Anticipated Impacts

The pre-construction phase involves activities that, while temporary and relatively low-impact, can still affect the surrounding community and environment. Below are the key impacts identified:

1. **Traffic and Access Disruptions:** Site surveys and geotechnical investigations often require the use of specialized equipment, such as survey tools or drilling rigs, which may temporarily obstruct local roads, pathways, or access points. For instance, a topographic survey might necessitate closing a lane on a busy street for several hours, while geotechnical drilling could block a residential access road for a day. These disruptions can inconvenience residents by delaying commutes or limiting access to homes, while businesses—such as small shops or vendors—may experience reduced customer traffic, potentially impacting their livelihoods. In a bustling area with heavy pedestrian and vehicular activity, even short-term closures can create significant frustration.
2. **Community Anxiety and Misinformation:** The announcement of a new project often sparks curiosity and concern among residents. Without clear information, uncertainty about the project’s scope, timeline, or potential effects on land use, property values, or the environment can fuel anxiety. For example, residents might fear that the project involves land acquisition or will degrade local air and water quality, even if such outcomes are not planned. In the absence of proactive communication, misinformation can spread rapidly—perhaps through rumors that exaggerate the project’s footprint—leading to opposition or distrust. This is particularly relevant in close-knit communities where word-of-mouth plays a significant role.
3. **Minor Environmental Disturbances:** Though less significant than during construction, pre-construction activities like geotechnical drilling or vegetation clearing for survey markers can generate dust, noise, or minor debris. Dust from drilling, for instance, could temporarily affect air quality near residential areas, while noise from equipment might disturb households or schools. Debris left on roads could also pose safety hazards for pedestrians and vehicles if not promptly addressed.

5.2.3.1.2 Mitigation Measures

To manage these impacts effectively, the project team will implement a comprehensive set of mitigation measures focused on communication, community engagement, and operational planning. These strategies aim to minimize disruptions, address concerns, and establish a positive rapport with stakeholders.

1. Advance Notification and Communication

Effective communication is the cornerstone of managing disruptions during the pre-construction phase. The project team will ensure the community is well-informed about upcoming activities through the following measures:

1. **Multi-Channel Notifications:** At least one week prior to any survey or investigative work, residents and businesses will be notified via:
 - **Flyers and Posters:** Distributed in high-traffic areas like markets, schools, and community centers.
 - **Community Meetings:** Held at accessible venues to provide face-to-face explanations and answer questions.
 - **Local Radio and Digital Platforms:** Announcements on popular radio stations and a dedicated project website or social media page to reach a wider audience.
2. **Detailed Information:** Notifications will include specifics such as:
 - Dates and times (e.g., “Survey scheduled for June 10, 2025, from 8 AM to 4 PM”).
 - Affected areas (e.g., “Main Street between Market Road and School Lane”).
 - Expected disruptions and alternative routes (e.g., “Pedestrian detour via Park Avenue”).
 - Contact details for inquiries or complaints.

3. **Purpose and Benefits:** Explanations of why these activities are necessary—such as ensuring the project meets safety and environmental standards—will help residents appreciate their importance and reduce resistance.

2. Community Liaison Officer (CLO)

A dedicated Community Liaison Officer (CLO) will bridge the gap between the project team and the community, ensuring open lines of communication and responsiveness to local needs.

- **Key Responsibilities:** The CLO will:
 - Answer questions and provide accurate updates on project plans and timelines.
 - Address concerns and correct misinformation (e.g., reassuring residents that no homes will be displaced).
 - Host regular engagement events, such as monthly Q&A sessions or informal coffee hours, to maintain dialogue.
 - Gather community feedback to refine mitigation strategies or project designs.
- **Accessibility:**
Residents can reach the CLO through:
 - A toll-free phone line and email address.
 - Scheduled office hours at a local community hub.
 - Real-time updates via social media or a project-specific app.
- **Cultural Sensitivity:** In diverse communities, the CLO will tailor communication to reflect local languages, customs, and traditions, ensuring inclusivity and respect.

3. Traffic Management

Temporary traffic disruptions will be managed with practical measures to ensure safety and minimize inconvenience:

- **Flagmen and Signage:**
 - Trained flagmen will direct vehicles and pedestrians around survey sites, maintaining smooth flow and preventing accidents.
 - Temporary signage will provide clear guidance, such as “Survey Ahead: Reduce Speed,” “Detour Left,” or “Pedestrian Path Closed: Use Alternate Route.”
- **Strategic Timing:** Activities will be scheduled to avoid peak traffic hours (e.g., early mornings or late evenings) or aligned with weekends when possible. Coordination with local traffic authorities will optimize timing and reduce bottlenecks.
- **Emergency Preparedness:** Protocols will ensure emergency vehicles can bypass survey zones quickly, maintaining critical access for ambulances or fire trucks.

4. Environmental Controls

Minor environmental impacts will be addressed through targeted measures:

- **Dust and Debris Mitigation:**
 - Water sprays will suppress dust during drilling or excavation activities.
 - Survey teams will clean up debris immediately after work, ensuring roads and pathways remain safe and clear.
 - Exposed soil or materials will be covered to prevent windblown dust.
- **Noise Management:**
 - Equipment use will be limited to daytime hours (e.g., 7 AM to 7 PM) to avoid disturbing residents at night.
 - Noisy activities will be preceded by specific notifications and kept as brief as possible.

5. Stakeholder Engagement and Feedback

Engaging the community early provides an opportunity to address concerns and incorporate local insights:

- **Participatory Sessions:** During consultations, residents and businesses can voice concerns (e.g., pedestrian safety) or suggest improvements (e.g., additional signage). These sessions will be advertised widely and held at convenient times.
- **Feedback Integration:** Where feasible, community input will shape the project—for instance, adding speed bumps if traffic safety is a recurring concern.
- **Permitting Process Transparency:** The CLO will explain the permitting process, including any required public hearings, and encourage participation to enhance trust in the project’s legitimacy.

5.2.3.2 Construction Phase

The construction phase of the project encompasses a wide array of activities, including site clearing, earthworks, pavement construction, and drainage improvements. This phase represents the most intensive period of environmental and social risk due to the scale and nature of operations involved. Activities such as operating heavy machinery, handling materials, and altering the landscape can generate significant but temporary impacts on the surrounding community and environment. While these effects are short-term, their potential to disrupt daily life, degrade environmental quality, and affect vulnerable populations necessitates a proactive and robust approach to mitigation. Effective management during this phase is essential to safeguard community well-being, protect ecological integrity, and ensure the project aligns with sustainable development goals.

5.2.3.2.1 Anticipated Impacts

The construction phase introduces a range of environmental and social challenges that stem from the physical disturbance of the site and the use of heavy equipment. These impacts, if left unaddressed, could affect air quality, water resources, public health, and local livelihoods. Below is an elaborated discussion of the key anticipated impacts:

1. **Noise and Vibration:** Construction activities rely heavily on equipment such as excavators, compactors, and pile drivers, which can produce noise levels ranging from 80 to 90 decibels (dBA) at the source. This noise exceeds the World Health Organization’s recommended threshold of 55 dBA for residential areas, potentially causing disturbances to nearby residents, interrupting educational activities in schools, and compromising patient recovery in the hospital—a particularly sensitive receptor due to its need for a quiet environment. Vibration, generated by activities like pile driving or the movement of heavy vehicles, poses additional concerns. It can lead to physical discomfort for individuals, especially those in close proximity, and, in extreme cases, cause structural damage to buildings, such as cracks in walls or foundations. Older structures or those with shallow foundations are particularly vulnerable, amplifying the need for careful monitoring and control.
2. **Dust Generation:** Earthworks, material handling, and vehicle traffic on unpaved surfaces will elevate levels of particulate matter (PM₁₀)—fine particles less than 10 micrometers in diameter that can penetrate deep into the lungs. This poses a significant respiratory health risk, particularly for vulnerable groups such as children, the elderly, and patients at the nearby hospital, where pre-existing conditions like asthma or chronic obstructive pulmonary disease (COPD) could be exacerbated. Beyond health concerns, dust can reduce visibility, damage property (e.g., by settling on vehicles or homes), and degrade the quality of life for residents. In an urban context with dense populations and limited open space, dust can spread rapidly, making it a pervasive and immediate issue during dry or windy conditions.

3. **Traffic Disruptions:** The construction process will inevitably involve temporary road closures, lane reductions, or detours to accommodate equipment, materials, and workforce activities. These changes can severely disrupt local mobility, increasing travel times for residents, delaying emergency services such as ambulances or fire trucks, and affecting businesses dependent on accessibility. For example, a detour might reroute customers away from a small retail shop, leading to economic losses, or impede access to critical services during emergencies. In areas with high traffic volumes, even minor disruptions can cascade into significant congestion, heightening community frustration and posing logistical challenges for the project team.
4. **Water and Soil Contamination:** Improper storage or handling of fuels, oils, and construction waste poses a risk of spills or leaks that could contaminate soil and groundwater. A single incident, such as a fuel leak from a poorly maintained vehicle, could infiltrate the soil, reaching aquifers or surface water bodies and rendering them unsafe for drinking or agricultural use. Sediment runoff from exposed earth can also degrade water quality by clogging drainage systems or increasing turbidity in nearby streams. These impacts could have long-term consequences, affecting ecosystems and community health if not addressed promptly and effectively.
5. **Business and Property Access:** Construction activities may temporarily block or restrict access to homes, shops, or public facilities, disrupting daily routines and economic activities. For small businesses—such as roadside vendors, cafes, or service providers—restricted access can result in significant income losses, particularly if customers are unable to reach them for days or weeks. Residents may face challenges entering or exiting their properties, especially in densely populated areas where alternative routes are limited or unsafe. This impact can erode community goodwill and economic stability if mitigation measures are not carefully planned and communicated.
6. **Occupational Health and Safety (OHS) Risks:** Workers on the construction site are exposed to a variety of hazards, including operating heavy machinery, working at heights, and inhaling dust or chemical fumes. Without proper safeguards, these risks can lead to accidents (e.g., equipment-related injuries or falls), acute injuries, or chronic health issues like silicosis from prolonged dust exposure. For instance, a worker lacking adequate training or protective gear could suffer a severe injury while operating a bulldozer, while dust inhalation over weeks could impair lung function. Protecting the workforce is not only a legal and ethical priority but also critical to maintaining project timelines and morale.
7. **Public Safety Risks:** Construction sites often feature hazards such as open trenches, unsecured equipment, or unmarked zones that pose risks to the public, particularly pedestrians, children, or cyclists. An unmarked trench could cause a fall, while unattended machinery might attract curious onlookers, leading to accidents. These risks are heightened in areas with high foot traffic, such as near schools, markets, or residential zones, where children or unaware individuals are more likely to encounter dangers. Ensuring public safety requires proactive measures to secure the site and raise community awareness.

5.2.3.2.2 Mitigation Measures

To manage the identified impacts, a comprehensive suite of mitigation measures has been developed, tailored to the project's urban context and resource constraints. These measures aim to minimize environmental degradation, protect community health and livelihoods, and ensure worker and public safety. They are practical, cost-effective, and aligned with best practices, including compliance with the World Bank ESSs. Below, each category is elaborated with detailed strategies:

1. Noise and Vibration Control

Noise and vibration from construction activities require targeted interventions to protect sensitive receptors and maintain community well-being. The following measures will be implemented:

- **Scheduling of High-Noise Activities:** High-noise tasks, such as pile driving, concrete breaking, or excavation, will be scheduled between 9 AM and 6 PM to avoid disrupting peak hospital visiting hours (e.g., early mornings or late afternoons) and school sessions. This timing minimizes disturbances during critical periods, such as when students are arriving or patients are resting, ensuring that noise impacts are confined to less sensitive hours.
- **Temporary Noise Barriers:** Physical barriers, such as 2-meter-high plywood panels or acoustic curtains, will be erected around noisy equipment or adjacent to sensitive areas like the hospital and schools. These barriers can reduce noise levels by up to 10 dBA, providing a significant buffer for receptors. Placement will be optimized to interrupt the direct path between noise sources and affected areas, with regular inspections to ensure structural integrity.
- **Low-Vibration Construction Methods:** Techniques that minimize vibration, such as hydraulic pressing instead of traditional pile driving, will be prioritized where feasible. Hydraulic methods exert steady pressure rather than percussive force, reducing ground disturbance and noise. Equipment will also be fitted with vibration-dampening mounts, and operators will be trained to avoid unnecessary idling or aggressive operation that could amplify vibration.
- **Monitoring and Compliance:** Noise levels will be monitored weekly using handheld decibel meters, with thresholds set to comply with WHO guidelines (e.g., 55 dBA daytime average for residential zones). If exceedances are detected, work will be halted temporarily to adjust mitigation measures, such as repositioning barriers or rescheduling tasks.

2. Dust Suppression

Dust control is essential to protect air quality and public health, particularly in dry or windy conditions. The following strategies will be employed:

- **Water Spraying:** Unpaved surfaces, including access roads and excavation sites, will be sprayed with water at least twice daily—once in the morning and once in the afternoon—or more frequently during dry, windy weather. Water binds dust particles, preventing them from becoming airborne. Water trucks will be readily available to respond to real-time conditions, ensuring consistent suppression.
- **Stockpile Management:** Stockpiles of loose materials like soil, sand, or gravel will be covered with tarps or plastic sheeting when not in use to prevent wind erosion. Periodic spraying will keep stockpiles moist, further reducing dust. Stockpile heights will be limited to minimize wind exposure, and locations will be chosen to avoid proximity to sensitive receptors.
- **Vehicle Speed Limits:** Construction vehicles will adhere to a strict speed limit of 20 km/h on-site, reducing dust generation from tire movement on unpaved surfaces. Signs will be posted, and drivers will be trained to comply, with spot checks conducted to enforce adherence.
- **Air Quality Monitoring:** Portable PM₁₀ monitors will be deployed near sensitive areas, providing real-time data to assess dust levels. If concentrations approach regulatory limits (e.g., 50 µg/m³ over 24 hours), additional suppression measures, such as increased water spraying, will be triggered immediately.

3. Traffic Management Plan (TMP)

A well-executed Traffic Management Plan (TMP) is critical to minimizing disruptions and ensuring safety. The TMP will include:

- **Detours and Alternative Routes:** Temporary road closures will be accompanied by clearly marked detours, using reflective signs and barriers to guide traffic safely. For example, closing a main road for drainage work might redirect vehicles to a parallel street, with maps distributed to residents in advance to reduce confusion.
- **Flagmen and Signage:** Trained flagmen will direct traffic at key intersections or construction entrances, preventing bottlenecks and ensuring smooth flow. Signage will include clear warnings (e.g., “Construction Ahead: Slow Down”) and instructions (e.g., “Merge Left”), updated daily to reflect changing conditions.
- **Emergency Vehicle Priority:** Protocols will ensure emergency vehicles can navigate construction zones without delay. Flagmen will use two-way radios to coordinate rapid path clearance, and detour routes will be pre-approved by emergency services to guarantee accessibility.
- **Coordination with Authorities:** The project team will collaborate with local traffic police and municipal officials to schedule disruptive activities during off-peak hours (e.g., late nights or weekends) and avoid conflicts with community events, such as markets or festivals.
- **Driver Safety and Training:** To enhance safety, all drivers involved in project operations will be required to hold valid licenses, and their driving skills will be improved through targeted training programs focusing on defensive driving and hazard awareness. Safety aspects will be emphasized among drivers through regular briefings before trips.
- **Driver Fitness Monitoring:** Random checks for alcohol or drug impairment will be undertaken, and drivers reporting illness or taking medication that impairs function will be reassigned.
- **Trip Duration and Driver Fatigue Management:** Limits will be set for trip duration to prevent driver fatigue, with driver rosters arranged to avoid overtiredness. For instance, drivers will be scheduled to ensure adequate rest periods between shifts, reducing the likelihood of accidents due to exhaustion.
- **Speed Control and Monitoring:** Strict enforcement of site and detour speed limits (not to exceed 20 km/h near the work zone), with disciplinary measures for violations. Wherever practicable, speed governors will be installed on project trucks.
- **Vehicle Maintenance:** Regular maintenance of all project vehicles will be conducted to prevent accidents caused by equipment malfunction or premature failure. Only manufacturer-approved parts will be used during repairs to maintain vehicle reliability. Maintenance logs will be kept and reviewed monthly by the contractor to ensure compliance.

Journey Management: High-risk routes and times (e.g., nighttime or during peak pedestrian activity) will be avoided where practicable. All site transport activities will be planned to minimize unnecessary trips.

4. Pollution Prevention

Preventing contamination of water and soil requires stringent controls on hazardous materials and waste. The following measures will be enforced:

- **Hazardous Material Storage:** Fuels, oils, and chemicals will be stored in bunded areas designed to contain 110% of the stored volume, preventing spills from spreading. Drip trays will be placed under stationary machinery (e.g., generators) to capture leaks, with regular inspections to ensure proper use.
- **Waste Management:** Waste will be systematically sorted into recyclable (e.g., metal scraps), reusable (e.g., concrete for fill), and disposable categories to minimize environmental impact. Non-recyclable waste will be transported to EPA-approved sites, while licensed contractors

will manage hazardous materials (e.g., used oils). A waste log will track disposal to ensure compliance. Specifically, excavated soil and construction debris, which may include materials such as excess earth, broken asphalt, and concrete rubble, will be managed as follows:

- **Excavated Soil:** Where possible, excavated soil will be reused on-site for landscaping, backfilling, or as sub-base material if it meets engineering specifications. Any surplus soil unfit for reuse will be transported to designated EPA-approved disposal sites or repurposed for other local infrastructure projects with prior approval from relevant authorities.
- **Construction Debris:** Debris such as broken concrete, asphalt, and other non-hazardous construction waste will be assessed for potential reuse (e.g., as aggregate for road sub-base) or recycling. Non-recyclable debris will be disposed of at EPA-approved landfill sites, ensuring compliance with national waste management regulations. Hazardous construction waste (e.g., contaminated soil, used oils, or chemical containers) will be segregated and managed by licensed contractors for safe disposal at specialized facilities.
- **Spill Response:** A spill response plan will include on-site spill kits (e.g., absorbent pads, containment booms) and trained personnel to handle incidents. Any spill will be reported immediately, with containment and cleanup completed within hours to prevent environmental harm.

5. Access Maintenance

Maintaining access to businesses and properties is vital to preserving economic stability and community goodwill:

- **Temporary Access Solutions:** Blocked entrances will be mitigated with temporary pedestrian bridges, ramps, or alternate pathways. For example, a wooden walkway over a trench will ensure safe passage, while a detour path will be paved if needed for durability.
- **Advance Notice:** Property owners and businesses will receive at least 48 hours' notice of access disruptions via letters, flyers, or community meetings, allowing time to adjust operations or inform customers.

6. Occupational Health and Safety (OHS) Protocols

Protecting workers from hazards is a cornerstone of the construction phase:

- **Personal Protective Equipment (PPE):** Workers will be equipped with PPE, including helmets, gloves, safety boots, high-visibility vests, and dust masks, tailored to their tasks. Daily checks by supervisors will ensure consistent use, with replacements provided as needed.
- **Safety Training and Briefings:** Daily briefings will address specific risks (e.g., working near trenches) and reinforce emergency procedures. Workers will receive ongoing training on equipment safety, first aid, and hazard recognition, with records maintained for accountability.
- **Zero-Tolerance Policy:** Unsafe behaviors, such as bypassing safety protocols or operating machinery without certification, will trigger immediate disciplinary action, including potential dismissal. Near-misses will be reported and reviewed in safety meetings to prevent recurrence.
- **Health Monitoring:** Workers exposed to dust or fumes will undergo quarterly health screenings to detect early signs of respiratory or other occupational illnesses, with results informing adjustments to protective measures.

7. Public Safety

Safeguarding the public from construction hazards is a priority, especially in populated areas:

- **Site Security:** The site will be enclosed with sturdy fencing (e.g., chain-link or wooden panels) to deter unauthorized entry. Warning signs in local languages (e.g., “Danger: Construction Zone”) will be posted at regular intervals, visible day and night with reflective materials.
- **Trench and Excavation Safety:** Open trenches will be covered with metal plates or plywood at night or during breaks, and marked with reflective tape or barriers to prevent falls. Daily inspections will confirm compliance.
- **Community Awareness:** Safety sessions will be held for nearby schools, teaching children to avoid the site, and for residents, explaining how to navigate safely. Flyers will reinforce key messages, such as staying clear of equipment.
- **Incident Reporting:** A community hotline will allow residents to report hazards (e.g., uncovered trenches) for immediate action, fostering trust and responsiveness.

5.2.3.3 Operation Phase

The operation phase is a pivotal stage in the project lifecycle, where the focus shifts to sustaining the infrastructure's functionality and maximizing its long-term benefits. This phase involves ongoing road maintenance, traffic management, and environmental monitoring to ensure the road continues to serve its intended purpose—improving access and connectivity—while minimizing adverse effects. Unlike the construction phase, which involves temporary disruptions, the operation phase requires sustained vigilance to address challenges arising from increased traffic, infrastructure wear, and environmental pressures. Without proper management, these factors could compromise the project's economic, social, and environmental value. This section outlines the anticipated impacts of the operation phase and details mitigation measures to address them effectively.

5.2.3.3.1 Anticipated Impacts

The operation phase introduces a range of environmental and social impacts driven by heightened road use and the natural degradation of infrastructure over time. These impacts, if left unchecked, could affect community well-being, safety, and the surrounding ecosystem. The following provides an in-depth analysis of the key anticipated impacts:

1. **Increased Traffic Noise and Air Pollution:** With the road facilitating greater vehicle volumes—potentially including heavy trucks and commuter traffic—noise levels are expected to rise from a baseline of approximately 52 dBA to 60 dBA or higher, depending on traffic density and time of day. This increase could disrupt the quality of life in nearby residential areas, schools, and healthcare facilities, with potential health consequences such as sleep disturbance, stress, and hearing impairment over prolonged exposure. Concurrently, vehicle emissions are likely to elevate concentrations of pollutants such as nitrogen dioxide (NO₂), particulate matter (PM_{2.5} and PM₁₀), and carbon monoxide (CO). These pollutants pose risks to respiratory health, particularly for vulnerable groups like children, the elderly, and individuals with pre-existing conditions. In densely populated areas with limited ventilation, poor air quality could exacerbate public health challenges, making proactive management essential.
2. **Safety Hazards:** The road's safety features—such as signage, lane markers, pedestrian crossings, and lighting—are critical to preventing accidents. However, these elements are susceptible to deterioration due to weather exposure, wear from traffic, or inadequate upkeep. For instance, faded lane markers or malfunctioning lights could reduce visibility and increase the likelihood of collisions, particularly at night or during adverse weather. Near sensitive locations like schools or hospitals, where pedestrian traffic is higher, the consequences of such hazards could be severe, including injuries or fatalities. The socioeconomic costs of

accidents—medical expenses, lost productivity, and emotional toll—highlight the need for consistent safety oversight.

3. **Drainage and Erosion Issues:** Effective drainage is vital to maintaining road stability and preventing environmental damage. Neglected systems, such as clogged culverts or ditches, could lead to water accumulation on the road surface, increasing the risk of hydroplaning and structural damage. Beyond the road itself, poor drainage may trigger soil erosion along embankments or adjacent land, potentially destabilizing slopes and threatening nearby properties or ecosystems. In regions with seasonal heavy rainfall, these issues could escalate, causing flooding that disrupts traffic and damages infrastructure. Addressing these risks is crucial to preserving the road's longevity and minimizing environmental harm.

5.2.3.3.2 Mitigation Measures

To mitigate these impacts, a robust set of measures will be implemented, emphasizing proactive maintenance, community protection, and environmental stewardship. These strategies are designed to be practical, sustainable, and responsive to the project's operational demands. Below, each mitigation category is expanded with detailed actions:

1. Noise and Air Quality Management

Protecting residents from noise and air pollution requires a combination of physical interventions and monitoring efforts:

- **Noise Barriers or Vegetative Buffers:** Along residential stretches, noise barriers—such as concrete panels or earthen berms—will be installed to reduce sound transmission, potentially lowering noise levels by 5-10 dBA. Where feasible, vegetative buffers (e.g., rows of dense shrubs or trees) will serve as natural barriers, absorbing sound and improving aesthetics. These green solutions also filter airborne pollutants, contributing to cleaner air.
- **Biannual Air Quality Monitoring:** Air quality will be assessed twice yearly using portable or fixed monitoring stations to measure NO₂, PM_{2.5}, and other key pollutants. Results will be compared against national and international standards (e.g., WHO guidelines) and made publicly accessible through community boards or online platforms. If thresholds are exceeded, adaptive measures—such as traffic rerouting or vehicle emission controls—will be introduced in consultation with local stakeholders.

2. Safety Enhancements

Maintaining a safe road environment involves regular upkeep and targeted interventions in high-risk areas:

- **Quarterly Inspections and Repairs:** A maintenance crew will inspect safety features—signage, lane markers, pedestrian crossings, and lighting—every three months. Damaged or faded elements will be promptly repaired or replaced to ensure compliance with safety standards. For example, reflective paint will be reapplied to markers, and energy-efficient LED lighting will be installed to enhance nighttime visibility.
- **Speed Calming Measures:** Near schools, hospitals, and residential zones, speed bumps, raised crosswalks, or narrowed lanes will be introduced to reduce vehicle speeds and protect pedestrians. Accompanying signage will reinforce speed limits, with periodic enforcement campaigns conducted in partnership with local authorities to deter reckless driving.

3. Drainage Maintenance

Preserving road integrity and preventing erosion requires ongoing care of drainage systems:

- **Pre-Wet Season Clearing:** Ahead of the rainy season, culverts, ditches, and gutters will be cleared of debris, sediment, or vegetation to ensure unobstructed water flow. This preventive

maintenance will minimize flooding risks and extend the road’s lifespan, with clearing schedules publicized to encourage community awareness.

- **Erosion Control Measures:** In vulnerable areas, erosion control blankets (e.g., biodegradable mats) or riprap (stone layers) will stabilize soil along slopes and embankments. These interventions will reduce sediment runoff into nearby waterways, protecting both the environment and infrastructure stability. Regular checks will confirm their effectiveness, with adjustments made as needed.

5.2.3.4 Cumulative and Indirect Impacts

The project’s influence extends beyond its immediate footprint, potentially driving cumulative and indirect effects that reshape the surrounding region. While these effects can enhance economic growth and connectivity, they also pose risks of resource strain and social disruption if not carefully managed. This section examines two primary areas of concern—induced development and economic shifts—and proposes mitigation measures to harness benefits while addressing challenges.

5.2.3.4.1 Anticipated Cumulative and Indirect Impacts

The road’s improved accessibility is likely to catalyze broader changes over time, with implications for land use, resource demand, and local livelihoods:

1. **Induced Development:** Enhanced access could stimulate urban expansion, attracting new housing, businesses, or industrial projects. This growth may increase pressure on local resources—such as water supplies, arable land, and energy—potentially leading to overexploitation or habitat loss. For instance, unplanned construction could encroach on green spaces or agricultural zones, reducing ecological resilience and food security. Additionally, rapid development might overwhelm existing infrastructure, such as sewage or waste systems, compounding environmental and public health risks.
2. **Economic Shifts:** Improved connectivity may draw larger commercial entities, altering the economic landscape and challenging small businesses. Local vendors or shopkeepers could face competition from chain stores or rising costs (e.g., rent increases), risking displacement or closure. While economic growth can create jobs, it may also widen inequalities if benefits concentrate among a few, leaving marginalized groups—such as informal workers—without support. These shifts could reshape community dynamics and livelihoods, requiring strategic intervention.

5.2.3.4.2 Mitigation Measures

To manage these broader impacts, mitigation will focus on sustainable planning and economic inclusivity:

1. **Land Use Planning:** In collaboration with Montserrado County, zoning regulations will be updated to guide development responsibly. Key actions include designating growth zones to prevent sprawl, establishing protected areas for natural or agricultural land, and enforcing sustainable building standards (e.g., water-efficient designs). These steps will balance development with resource conservation, ensuring long-term environmental and social stability.
2. **Economic Support for Small Businesses:** To bolster local enterprises, the project will provide training in business skills (e.g., marketing, financial management) and offer micro-grants or low-interest loans for equipment upgrades or expansion. These initiatives will help small businesses adapt to new market conditions, maintain economic diversity, and support community resilience amid growth.

5.2.4 Significance Rating Matrix

The tables below summarize the environmental and social impacts identified for each phase of the project cycle. The significance ratings are assessed before mitigation measures are applied, providing a baseline to guide the development of targeted mitigation strategies. Each phase—pre-construction, construction, and operation—is evaluated with detailed justifications for the assigned ratings, ensuring clarity and transparency for stakeholders.

5.2.4.1 Pre-Construction Phase

The pre-construction phase encompasses initial activities such as land surveys, geotechnical assessments, stakeholder consultations, and regulatory permitting. While these activities are less invasive than later phases, they can still influence local communities and environments if not carefully managed. The table below outlines the identified impacts, followed by an in-depth explanation of each.

Table 13: Pre-Construction Phase Impacts

Impact	Nature	Magnitude	Extent	Duration	Likelihood	Reversibility	Significance
Traffic and Access Disruptions	Negative	Low	Local	Short-term	Likely	Reversible	Minor
Community Anxiety and Misinformation	Negative	Low	Local	Short-term	Possible	Reversible	Minor
Minor Environmental Disturbances	Negative	Low	Site-specific	Short-term	Likely	Reversible	Minor

5.2.4.1.1 Traffic and Access Disruptions

1. **Nature (Negative):** Temporary roadblocks or rerouting during surveys inconvenience road users.
2. **Magnitude (Low):** The intensity is minimal, with disruptions typically limited to a few vehicles or pedestrians at a time, causing slight delays (e.g., 10-15 minutes).
3. **Extent (Local):** Impacts are restricted to roads and pathways immediately adjacent to the survey sites, affecting only nearby residents or commuters.
4. **Duration (Short-term):** Each disruption lasts hours or, at most, a single day per site, with no cumulative long-term effects.
5. **Likelihood (Likely):** Surveys at multiple points along the 2.4 km corridor make some disruption inevitable.
6. **Reversibility (Reversible):** Normal traffic flow resumes immediately after survey completion, leaving no lasting impact.
7. **Significance (Minor):** The effect is noticeable but manageable with simple measures like signage or temporary traffic guides, posing minimal risk to project timelines or community well-being.

5.2.4.1.2 Community Anxiety and Misinformation:

1. **Nature (Negative):** Uncertainty about land acquisition or project impacts may cause worry among residents.
2. **Magnitude (Low):** Anxiety is generally mild, manifesting as questions or rumors rather than widespread distress, and can be addressed with clear communication.
3. **Extent (Local):** Limited to households and businesses within or near the project corridor (e.g., within 1 km).

4. **Duration (Short-term):** Peaks during initial announcements or survey activities but fades as clarity is provided, typically resolving within weeks.
5. **Likelihood (Possible):** Occurs if engagement is delayed or unclear, though proactive outreach reduces this risk.
6. **Reversibility (Reversible):** Fully mitigated through regular updates, town hall meetings, or informational flyers, restoring community confidence.
7. **Significance (Minor):** A low-level concern that requires standard stakeholder engagement practices to prevent escalation.

5.2.4.1.3 Minor Environmental Disturbances

1. **Nature (Negative):** Activities like drilling or vehicle movement generate temporary dust or noise.
2. **Magnitude (Low):** Dust may briefly reduce visibility, and noise levels may reach 50-60 dBA, well below harmful thresholds.
3. **Extent (Site-specific):** Confined to the exact locations of survey activities (e.g., a 50-meter radius), with no broader ecological impact.
4. **Duration (Short-term):** Effects last only during active survey hours, dissipating within minutes of cessation.
5. **Likelihood (Likely):** Standard survey techniques (e.g., soil sampling) commonly produce these disturbances.
6. **Reversibility (Reversible):** Natural processes (e.g., wind or rain) quickly eliminate dust and noise once activities stop.
7. **Significance (Minor):** Impacts are negligible in scope and scale, requiring only basic controls like timing surveys to avoid peak community hours.

5.2.4.2 Construction Phase

The construction phase involves intensive activities such as clearing, grading, paving, and drainage installation. This phase has the greatest potential for environmental and social disruption, necessitating detailed assessment and robust mitigation planning. The table below summarizes the impacts, followed by expanded explanations.

Table 2: Construction Phase Impacts

Impact	Nature	Magnitude	Extent	Duration	Likelihood	Reversibility	Significance
Noise and Vibration	Negative	High	Local	Medium-term	Likely	Partially Reversible	Moderate
Dust Generation	Negative	Medium	Local	Medium-term	Likely	Reversible	Moderate
Traffic Disruptions	Negative	High	Local	Medium-term	Likely	Reversible	Moderate
Water and Soil Contamination	Negative	High	Local	Long-term	Possible	Partially Reversible	Major
Business and Property Access	Negative	Medium	Local	Medium-term	Likely	Reversible	Moderate
Occupational Health and Safety Risks	Negative	High	Site-specific	Medium-term	Possible	Irreversible	Major

Impact	Nature	Magnitude	Extent	Duration	Likelihood	Reversibility	Significance
Public Safety Risks	Negative	High	Local	Medium-term	Possible	Partially Reversible	Major

5.2.4.2.1 Noise and Vibration

1. **Nature (Negative):** Heavy machinery generates disruptive noise and vibrations.
2. **Magnitude (High):** Noise levels can reach 80-90 dBA, exceeding safe exposure limits (85 dBA), while vibrations may affect nearby structures.
3. **Extent (Local):** Impacts extend up to 500 meters, affecting homes, schools, and the hospital.
4. **Duration (Medium-term):** Persists for the construction period (e.g., 6-12 months), varying with work schedules.
5. **Likelihood (Likely):** Use of equipment like bulldozers or compactors ensures noise and vibration are unavoidable.
6. **Reversibility (Partially Reversible):** Noise ceases post-construction, but vibration-induced cracks in buildings may require repair.
7. **Significance (Moderate):** Significant enough to warrant mitigation (e.g., noise barriers, restricted hours), but not catastrophic.

5.2.4.2.2 Dust Generation

1. **Nature (Negative):** Earthworks and material transport release airborne particles.
2. **Magnitude (Medium):** Dust can reduce air quality (e.g., PM10 levels exceeding 50 µg/m³), irritating residents.
3. **Extent (Local):** Affects areas within 200-300 meters of active sites.
4. **Duration (Medium-term):** Ongoing during construction, peaking in dry seasons.
5. **Likelihood (Likely):** Typical of road projects, especially in Liberia's dusty conditions.
6. **Reversibility (Reversible):** Dust settles or is controlled with water spraying, leaving no permanent impact.
7. **Significance (Moderate):** Requires consistent management to protect community health but is not a critical long-term threat.

5.2.4.2.3 Traffic Disruptions:

1. **Nature (Negative):** Road closures or detours impede local mobility.
2. **Magnitude (High):** Major delays (e.g., 30+ minutes) or rerouting can frustrate commuters and delay hospital access.
3. **Extent (Local):** Affects the 2.4 km corridor and connecting roads.
4. **Duration (Medium-term):** Lasts throughout construction, with phased impacts.
5. **Likelihood (Likely):** Essential to construction sequencing, such as paving or drainage work.
6. **Reversibility (Reversible):** Full access resumes upon completion, with no lasting disruption.
7. **Significance (Moderate):** Temporary but impactful, necessitating a detailed traffic management plan.

5.2.4.2.4 Water and Soil Contamination

1. **Nature (Negative):** Spills of fuel or chemicals can pollute local resources.
2. **Magnitude (High):** Severe if contaminants reach groundwater or nearby streams, affecting ecosystems and health.
3. **Extent (Local):** Limited to areas near spill sites but with potential downstream effects.
4. **Duration (Long-term):** Contamination can persist for years if not remediated.
5. **Likelihood (Possible):** Depends on equipment maintenance and spill response protocols.

6. **Reversibility (Partially Reversible):** Cleanup can mitigate damage, but some soil or water degradation may linger.
7. **Significance (Major):** High stakes require stringent preventive measures and contingency plans.

5.2.4.2.5 Business and Property Access

1. **Nature (Negative):** Construction blocks driveways or shop entrances.
2. **Magnitude (Medium):** Revenue losses or inconvenience are notable but not devastating for most businesses.
3. **Extent (Local):** Affects properties directly along the corridor.
4. **Duration (Medium-term):** Varies by construction stage, lasting weeks to months per section.
5. **Likelihood (Likely):** Common during roadworks near populated areas.
6. **Reversibility (Reversible):** Access is fully restored post-construction.
7. **Significance (Moderate):** Requires temporary solutions like walkways to balance community needs.

5.2.4.2.6 Occupational Health and Safety Risks

1. **Nature (Negative):** Workers face hazards from machinery or falls.
2. **Magnitude (High):** Potential for serious injury or death elevates the stakes.
3. **Extent (Site-specific):** Limited to the construction workforce.
4. **Duration (Medium-term):** Risks persist throughout active construction.
5. **Likelihood (Possible):** Reduced with proper safety training and equipment.
6. **Reversibility (Irreversible):** Severe injuries or fatalities cannot be undone.
7. **Significance (Major):** Critical priority for worker safety programs and oversight.

5.2.4.2.7 Public Safety Risks

1. **Nature (Negative):** Open trenches or unsecured equipment endanger passersby.
2. **Magnitude (High):** Serious injury risks, especially for children or hospital visitors.
3. **Extent (Local):** Affects communities within 200-300 meters of the site.
4. **Duration (Medium-term):** Ongoing during construction activities.
5. **Likelihood (Possible):** Minimized with barriers and signage.
6. **Reversibility (Partially Reversible):** Preventable, but injuries have lasting consequences.
7. **Significance (Major):** Demands proactive safety measures to protect the public.

5.2.4.3 Operation Phase

The operation phase reflects the long-term effects of the completed road, including benefits like improved hospital access and challenges like maintenance needs or induced growth. Impacts are assessed based on sustained use and upkeep. The table below details these impacts, followed by expanded rationale

Table 14: Operation Phase Impacts

Impact	Nature	Magnitude	Extent	Duration	Likelihood	Reversibility	Significance
Increased Traffic Noise and Air Pollution	Negative	Medium	Local	Long-term	Likely	Partially Reversible	Moderate
Safety Hazards	Negative	High	Local	Long-term	Possible	Partially Reversible	Major

Drainage and Erosion Issues	Negative	Medium	Local	Long-term	Likely	Partially Reversible	Moderate
Induced Development (Cumulative)	Negative	High	Regional	Long-term	Possible	Partially Reversible	Major
Economic Shifts (Cumulative)	Negative	Medium	Local	Long-term	Possible	Partially Reversible	Moderate

5.2.4.3.1 Increased Traffic Noise and Air Pollution:

1. **Nature (Negative):** Higher vehicle use elevates noise and emissions.
2. **Magnitude (Medium):** Noise may reach 60-70 dBA, and air quality may decline moderately (e.g., increased PM2.5).
3. **Extent (Local):** Impacts residents and hospital users along the road.
4. **Duration (Long-term):** Persists as long as the road is active.
5. **Likelihood (Likely):** Expected with improved accessibility driving traffic.
6. **Reversibility (Partially Reversible):** Noise barriers or trees can reduce effects, but some pollution remains.
7. **Significance (Moderate):** Requires ongoing monitoring and mitigation to maintain quality of life.

5.2.4.3.2 Safety Hazards

1. **Nature (Negative):** Poor road conditions or signage increase accident risks.
2. **Magnitude (High):** Potential for severe crashes, especially near the hospital.
3. **Extent (Local):** Affects road users and adjacent communities.
4. **Duration (Long-term):** Ongoing without consistent maintenance.
5. **Likelihood (Possible):** Depends on upkeep quality and traffic enforcement.
6. **Reversibility (Partially Reversible):** Safety features can be restored, but accidents have permanent effects.
7. **Significance (Major):** Critical to prioritize road maintenance and safety design.

5.2.4.3.3 Drainage and Erosion Issues

1. **Nature (Negative):** Poor drainage causes flooding or soil loss.
2. **Magnitude (Medium):** Disrupts road use and damages adjacent land moderately.
3. **Extent (Local):** Limited to the road and nearby areas.
4. **Duration (Long-term):** Persists if drainage systems clog or degrade.
5. **Likelihood (Likely):** Common in Liberia’s rainy climate.
6. **Reversibility (Partially Reversible):** Maintenance can fix issues, but some erosion may be permanent.
7. **Significance (Moderate):** Requires regular upkeep to prevent escalation.

5.2.4.3.4 Induced Development (Cumulative)

1. **Nature (Negative):** New road spurs unplanned growth, straining resources.
2. **Magnitude (High):** Could overwhelm water, land, or infrastructure regionally.
3. **Extent (Regional):** Extends beyond Upper Caldwell to surrounding areas.
4. **Duration (Long-term):** Effects build over years.
5. **Likelihood (Possible):** Depends on zoning and development controls.

6. **Reversibility (Partially Reversible):** Planning can mitigate, but some growth is irreversible.
7. **Significance (Major):** Requires strategic regional coordination.

5.2.4.3.5 Economic Shifts (Cumulative)

1. **Nature (Negative):** Local businesses may face competition or displacement.
2. **Magnitude (Medium):** Notable but not devastating economic adjustments.
3. **Extent (Local):** Affects the corridor and immediate vicinity.
4. **Duration (Long-term):** Sustained as markets adapt.
5. **Likelihood (Possible):** Varies with economic trends and support measures.
6. **Reversibility (Partially Reversible):** Aid programs can cushion impacts, but shifts persist.
7. **Significance (Moderate):** Calls for targeted support to vulnerable businesses.

5.3 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

This Environmental and Social Management Plan (ESMP) outlines the measures to manage and mitigate the environmental and social impacts identified in the Environmental and Social Impact Assessment (ESIA). The ESMP ensures compliance with Liberia's Environmental Protection and Management Law (2003), the 2022 EPA Revised ESIA Procedural Guidelines, and the World Bank's Environmental and Social Standards (ESSs). The matrices outline mitigation measures, responsibilities, monitoring protocols, estimated costs, and prioritization levels for managing the project's environmental and social impacts.

Table 15: Environmental and Social Mitigation Plan

Category	Impact (Project Phase)	Mitigation Measures	Implementation Responsibility	Monitoring and Evaluation	Estimated Cost (USD)
Health and Safety	Occupational Health and Safety Risks (Construction)	<ul style="list-style-type: none"> - Conduct daily safety briefings before work begins - Provide PPE (helmets, gloves, safety boots, etc.) - Implement first aid stations and emergency response plans, including evacuation drills - Enforce safety protocols (e.g., no unauthorized access, mandatory PPE usage) 	Contractor	<ul style="list-style-type: none"> - Weekly safety audits by site supervisors - Incident reporting and analysis - Worker feedback sessions 	\$15,000 (PPE: \$10,000; Training: \$5,000)
Health and Safety	Community Safety Risks (Construction)	<ul style="list-style-type: none"> - Erect fencing around the site perimeter - Cover open trenches at night with barriers or plates - Conduct community safety talks monthly to inform residents 	Contractor	<ul style="list-style-type: none"> - Regular checks of fencing and trench covers - Community meetings to address safety concerns 	\$5,000
Social	Traffic Disruptions (Construction)	<ul style="list-style-type: none"> - Implement a Traffic Management Plan (TMP) with detours, signage, and trained flagmen - Prioritize emergency vehicle access through designated routes 	Contractor	<ul style="list-style-type: none"> - Traffic flow observations daily - Review of public complaints via a log 	\$10,000 (Signage: \$5,000; Flagmen: \$5,000)
Social	Community Concerns and Grievances	<ul style="list-style-type: none"> - Establish a Grievance Redress Mechanism (GRM) with a hotline and complaint boxes - Appoint a Community Liaison Officer (CLO) to handle issues 	Project Management Unit	<ul style="list-style-type: none"> - Track number and resolution of grievances - Conduct community satisfaction surveys quarterly 	\$10,000 (Staffing and materials)
Social	GBV and SEA/SH	<ul style="list-style-type: none"> - Develop a code of conduct prohibiting GBV and SEA/SH, signed by all workers - Provide mandatory training with case studies and role-playing - Establish a confidential hotline and designated ombudsperson for reporting 	Contractor, Project Management Unit	Zero reported incidents	5,000

Social	Child Labor	<ul style="list-style-type: none"> - Verify worker ages using government-issued IDs or birth certificates - Include child labor prevention reminders in daily morning sessions - Conduct random spot checks of worker ages 	Project Management Unit	Zero instances of underage workers	3,000
Social	Forced Labor	<ul style="list-style-type: none"> - Ensure all workers sign voluntary employment agreements - Include forced labor prevention education in daily morning sessions - Provide posters and handouts on workers' rights - Monitor for signs of coercion (e.g., restricted movement) 	Contractor, Project Management Unit	Zero cases of involuntary employment	3,000
Social	Communicable Diseases	<ul style="list-style-type: none"> - Include disease prevention in health and safety training, covering relevant diseases such as mpox (e.g., hygiene, vaccination if applicable, symptom recognition) - Provide PPE (e.g., masks, gloves) where necessary - Establish protocols for isolating and treating infected individuals - Collaborate with local health authorities for guidance and support 	Contractor, Project Management Unit	Disease incidence rate below 1%	5,000
Environmental	Noise and Vibration (Construction)	<ul style="list-style-type: none"> - Schedule high-noise activities between 9 AM and 6 PM - Install temporary noise barriers around key areas - Use low-vibration construction methods (e.g., quieter machinery) 	Contractor	<ul style="list-style-type: none"> - Weekly noise level measurements - Vibration monitoring near sensitive structures 	\$15,000 (Barriers: \$10,000; Equipment: \$5,000)
Environmental	Dust Generation (Construction)	<ul style="list-style-type: none"> - Conduct twice-daily water spraying throughout the 180-day construction period - Cover stockpiles with tarps - Enforce vehicle speed limits (20 km/h) on-site 	Contractor	<ul style="list-style-type: none"> - Biweekly air quality tests for PM10 - Visual inspections for dust control compliance 	\$18,000 (Water spraying: \$18,000)

					\$100/day for 180 days)
Environmental	Water and Soil Contamination (Construction)	- Store fuels and oils in bunded areas to contain spills - Use drip trays under machinery - Implement a spill response plan with trained staff and kits	Contractor	- Regular inspections of storage areas - Monthly water and soil sampling	\$6,000 (Storage: \$5,000; Spill kits: \$1,000)
Environmental	Impact on Hospital Operations (Construction)	- Implement stricter noise and dust controls near the hospital (e.g., additional barriers, enhanced spraying) - Coordinate with hospital management for sensitive activities (e.g., surgeries)	Contractor	- Regular meetings with hospital staff - Additional noise and dust monitoring near hospital	\$5,000 (Additional equipment and coordination)
Environmental	Traffic Noise and Air Pollution (Operation)	- Install permanent noise barriers or vegetative buffers along roads - Promote cleaner vehicle technologies via public awareness campaigns	Ministry of Public Works	- Quarterly noise level measurements - Biannual air quality monitoring	\$25,000 (Barriers: \$20,000; Campaigns: \$5,000)
Environmental	Drainage and Erosion Issues (Operation)	- Clear culverts and ditches annually before the wet season - Use erosion control blankets or riprap on vulnerable slopes	Ministry of Public Works	- Inspections before and after wet season - Monitor erosion and sedimentation	\$10,000/year (Maintenance budget)

5.3.1 Environmental and Social Management and Monitoring Plan

This plan integrates mitigation measures with detailed monitoring protocols to ensure their effectiveness throughout the project lifecycle. It specifies parameters, locations, responsibilities, and indicative costs, providing a comprehensive framework for tracking and managing environmental and social impacts.

Table 16: Environmental and Social Monitoring Plan

Impact/Mitigation	Monitoring Criteria/Indicators	Assessment Method	Frequency	Responsibility	Estimated Cost (USD)
Occupational Health and Safety Risks	- Number of accidents (e.g., falls, equipment-related injuries) - PPE compliance rate (e.g., % of workers wearing helmets, gloves) - Training attendance (e.g., % of workers completing safety courses)	- Daily site inspections by safety officers - Review of accident and training logs - Anonymous worker surveys on safety practices	Weekly inspections, monthly reports	Environmental and Social Officer (ESO)	\$2,000/month (ESO duties)

Impact/Mitigation	Monitoring Criteria/Indicators	Assessment Method	Frequency	Responsibility	Estimated Cost (USD)
Community Safety Risks	<ul style="list-style-type: none"> - Number of community incidents (e.g., unauthorized entries, near-misses) - Fence integrity (e.g., breaches, damage) - Condition of safety signage 	<ul style="list-style-type: none"> - Visual inspections of fences and signage - Community feedback via meetings and GRM - Incident reporting logs 	Weekly	ESO	Included in ESO duties
Traffic Disruptions	<ul style="list-style-type: none"> - Traffic flow delays (e.g., average delay time in minutes) - Number of complaints via GRM - Number of vehicles diverted 	<ul style="list-style-type: none"> - Manual traffic counts at key points - Review of GRM records for traffic-related complaints 	Daily during peak hours	Contractor	Included in TMP costs
Noise and Vibration	<ul style="list-style-type: none"> - Noise levels (dBA, target: <55 dBA at residential areas) - Vibration (mm/s, target: <5 mm/s near sensitive structures like hospitals) 	<ul style="list-style-type: none"> - Sound level meters at site boundaries and near sensitive receptors (e.g., schools, hospitals) 	Weekly	Environmental Officer	\$5,000 (Equipment rental)
Dust Generation	<ul style="list-style-type: none"> - PM10 levels (target: <50 µg/m³, 24-hour mean) - Visual dust observations (e.g., dust plumes, stockpile coverage) 	<ul style="list-style-type: none"> - Portable air quality monitors for PM10 at site and community locations - Daily visual inspections of dust suppression measures 	Daily	Environmental Officer	\$3,000 (Monitoring equipment)
Water and Soil Contamination	<ul style="list-style-type: none"> - Spill incidents (number and severity, e.g., volume of spills) - Water quality (turbidity in NTU, pH, oil/grease levels) - Soil contamination (e.g., hydrocarbon presence) 	<ul style="list-style-type: none"> - Weekly inspections of fuel storage and machinery - Monthly water sampling from nearby water bodies - Soil sampling if spills occur 	Weekly inspections, monthly sampling	Environmental Officer	\$2,000 (Sampling and testing)
Waste Management	<ul style="list-style-type: none"> - Volume of waste generated (tons) - Segregation compliance (e.g., % of waste properly sorted) - Disposal method compliance (e.g., hazardous waste handling) 	<ul style="list-style-type: none"> - Weekly waste monitoring and volume tracking - Visual checks of segregation bins - Review of disposal receipts 	Weekly	Environmental Officer	\$1,500 (Audits and tracking)

Impact/Mitigation	Monitoring Criteria/Indicators	Assessment Method	Frequency	Responsibility	Estimated Cost (USD)
Traffic Noise and Air Pollution	<ul style="list-style-type: none"> - Noise levels (dBA, target: <60 dBA along road) - Air quality (PM10 <50 µg/m³, NO2 <40 µg/m³ annually) 	<ul style="list-style-type: none"> - Fixed noise monitors along the road - Portable analyzers for PM10 and NO2 at key points 	Quarterly	Ministry of Public Works	\$5,000/year (Monitoring)
Drainage and Erosion Issues	<ul style="list-style-type: none"> - Culvert condition (e.g., blockages, damage) - Erosion extent (e.g., gullies, soil loss in tons) - Sedimentation in water bodies 	<ul style="list-style-type: none"> - Pre-season inspections of drainage systems - Visual and photographic assessments of slopes - Sediment sampling in nearby streams 	Quarterly	Ministry of Public Works	\$10,000/year (Maintenance and monitoring)
GBV and SEA/SH	<ul style="list-style-type: none"> - Number of reported incidents - Effectiveness of reporting mechanisms (e.g., response time, resolution rate) - Implementation of prevention measures (e.g., training completion rates) 	<ul style="list-style-type: none"> - Review of incident reports and GRM logs - Surveys or interviews with workers and community members - Evaluation of training program effectiveness 	Quarterly	Safeguarding Officer or ESO	\$3,000/quarter (Training, hotline maintenance, staff time)
Child Labor	<ul style="list-style-type: none"> - Number of underage workers identified - Compliance with age verification procedures - Effectiveness of awareness campaigns (e.g., worker knowledge) 	<ul style="list-style-type: none"> - Review of employment records and age documentation - Spot checks of worker ages - Worker surveys on child labor awareness 	Monthly	HR or ESO	\$1,000/month (Staff time, awareness materials)
Forced Labor	<ul style="list-style-type: none"> - Number of complaints received - Compliance with voluntary employment agreements - Worker awareness of rights (e.g., through surveys) 	<ul style="list-style-type: none"> - Review of employment contracts and agreements - Confidential worker interviews - Monitoring for signs of coercion (e.g., restricted movement) 	Quarterly	HR or ESO	\$1,500/quarter (Staff time, awareness materials)
Communicable Diseases	<ul style="list-style-type: none"> - Disease incidence rates - Compliance with health protocols (e.g., % of workers following hygiene) 	<ul style="list-style-type: none"> - Health screenings and medical record reviews - Inspections of health and safety plan implementation 	Monthly	Health and Safety Officer	\$2,500/month (Medical supplies,

Impact/Mitigation	Monitoring Criteria/Indicators	Assessment Method	Frequency	Responsibility	Estimated Cost (USD)
	practices) -	- Worker surveys on health practices			testing kits, staff time)

Monitoring Protocols

A key improvement to this plan involves equipping both the **Supervision Consultant** and the **Contractor** with **portable, hand-held monitoring devices**. These devices play a vital role in maintaining environmental compliance and fostering community trust, as outlined below:

1. **It** enables real-time, on-site assessments of critical environmental parameters, such as noise levels, air quality (e.g., PM10 and PM2.5), and water quality. This allows the Supervision Consultant to efficiently evaluate the Contractor's adherence to environmental standards and contractual obligations.
2. In instances of regulatory non-compliance, these devices provide immediate, actionable data to guide corrective measures. For example, if noise levels exceed permissible limits (e.g., 55 dBA near residential areas), the Contractor can be directed to adjust operations or implement additional mitigation strategies, such as noise barriers.
3. The data collected from portable monitoring devices serves as a valuable resource for resolving complaints from local residents. For instance, if concerns are raised about dust or noise, the Supervision Consultant can use the data to verify the issue and implement solutions, enhancing transparency and community engagement.

Implementation Measures

- **Device Specifications:** Devices should include sound level meters, air quality monitors (for PM10 and PM2.5), and water quality testing kits (e.g., for turbidity and pH).
- **Training:** Both the Supervision Consultant and Contractor must receive training on device operation to ensure accurate use and interpretation of data.
- **Data Reporting:** Monitoring data should be logged digitally and included in regular compliance reports submitted to the Project Management Unit (PMU) and relevant authorities.
- **Frequency:** Devices should be used during routine inspections (e.g., Daily) and in response to specific incidents or complaints (Daily monitoring for noise, dust, and contamination; daily for traffic management).

Climate Change Impacts Assessment and Mitigation

The project's climate impacts and vulnerabilities are assessed to minimize its carbon footprint and enhance resilience, aligning with Liberia's commitments under the UNFCCC.

1. Greenhouse Gas Emissions:

- **Impact:** it is anticipated that the Construction will emit CO₂ from machinery (e.g., 10 liters/hour for graders) and material production (e.g., asphalt).
- **Mitigation:** Use Tier 4 machinery (20% emission reduction), optimize routes (15% fewer trips), and employ solar power for site operations (e.g., lighting), targeting a 10% emissions cut.

2. Climate Vulnerability:

- **Impact:** it is anticipated that the area's flood risk (e.g., 800 mm/month peak rainfall) could destabilize the road, given its flat terrain and proximity to the St. Paul River (140 meters).
- **Mitigation:** Design includes elevated sections, enhanced drainage (e.g., widened culverts), and erosion controls (e.g., vegetative buffers) to withstand wet season extremes.

3. Adaptation Measures:

- Prioritize dry-season construction (November–April) to avoid weather delays.
- Use climate-resilient materials (e.g., durable asphalt per pavement design) to ensure longevity under temperature (25–29°C) and humidity (>80%) stresses.

Outcome: These measures reduce the project's climate impact and enhance its resilience, supporting Liberia's NDCs and sustainable infrastructure goals.

5.3.2 Implementation Arrangements

The successful execution of the ESMP relies on a well-coordinated structure involving multiple stakeholders with clearly defined roles and responsibilities. This framework ensures that mitigation measures are implemented effectively, monitored consistently, and adjusted as needed to address emerging challenges. The implementation arrangements promote accountability, transparency, and community engagement throughout the project lifecycle, from construction to operation.

5.3.2.1 Key Stakeholders and Their Roles

1. Contractor:

- **Role:** The contractor is the primary entity responsible for carrying out construction activities and implementing the ESMP's mitigation measures on the ground.
- **Responsibilities:**
 - Deploy mitigation measures such as dust suppression (e.g., water spraying), noise control (e.g., muffler use), and traffic management (e.g., signage and detours).
 - Provide training to workers on safety protocols (e.g., proper use of personal protective equipment, PPE) and environmental safeguards (e.g., waste segregation).
 - Maintain detailed records of mitigation activities, including logs of water spraying frequency, waste disposal receipts, and incident reports (e.g., spills or accidents).
 - Submit weekly progress reports to the ESO, highlighting compliance with the ESMP and any challenges encountered.

2. Environmental and Social Officer (ESO):

- **Role:** The ESO serves as the on-site overseer, ensuring that the contractor adheres to the ESMP and that environmental and social safeguards are effectively implemented.
 - **Responsibilities:**
 - Conduct regular site inspections (e.g., weekly) to verify the application of mitigation measures, such as checking noise barrier placement or dust control effectiveness.
 - Perform internal monitoring of key parameters (e.g., noise levels, air quality) using portable equipment and document findings.
 - Review contractor records and reports for accuracy and completeness.
 - Prepare monthly compliance reports for submission to the Project Management Unit (PMU) and Environmental Protection Agency (EPA), summarizing mitigation performance, incidents, and community feedback.
3. **Project Management Unit (PMU):**
- **Role:** The PMU acts as the central coordinating body, ensuring that the ESMP is fully integrated into the project’s planning, budgeting, and execution phases.
 - **Responsibilities:**
 - Incorporate ESMP requirements into the contractor’s contract and ensure sufficient budget allocation for mitigation and monitoring activities.
 - Facilitate communication between the contractor, ESO, local authorities, and community representatives to resolve issues promptly.
 - Organize quarterly stakeholder meetings to provide updates on project progress and ESMP implementation.
 - Review ESO reports and escalate significant concerns (e.g., repeated non-compliance) to the EPA or World Bank for guidance.
4. **Environmental Protection Agency (EPA) and World Bank:**
- **Role:** These entities provide high-level oversight, ensuring that the project complies with national environmental laws and the World Bank’s ESSs.
 - **Responsibilities:**
 - Conduct semi-annual audits to assess ESMP implementation, involving site visits, document reviews, and interviews with project staff and community members.
 - Verify that the project adheres to environmental permits (e.g., construction permits) and funding conditions (e.g., World Bank loan agreements).
 - Provide technical advice or corrective actions if non-compliance is identified, such as mandating additional mitigation measures.
 - Approve major project milestones (e.g., completion of construction) based on compliance evidence.
5. **Grievance Redress Mechanism (GRM):**
- **Role:** The GRM ensures that community members and other stakeholders have a accessible and responsive channel to voice concerns or complaints related to the project.
 - **Responsibilities:**
 - Establish multiple reporting avenues, including a toll-free hotline (available 24/7), complaint boxes placed at key locations (e.g., hospital entrance, community centers), and an online portal (if feasible).
 - Assign a Community Liaison Officer (CLO) to log grievances, investigate issues, and coordinate resolutions within 48 hours of receipt.

- Maintain a grievance register documenting each complaint, the response provided, and the resolution timeline, with summaries shared monthly with the PMU and EPA.
- Conduct follow-up with complainants to confirm satisfaction with resolutions and identify recurring issues for broader action.

This multi-tiered structure ensures a system of checks and balances, with each stakeholder contributing to the project’s environmental and social integrity. The contractor executes, the ESO monitors, the PMU coordinates, the EPA and World Bank oversee, and the GRM engages the community—collectively safeguarding the project’s success.

5.4 TRAINING AND CAPACITY BUILDING

To ensure the project effectively manages environmental and social risks, comprehensive training and capacity-building programs will be implemented for project staff, contractors, and local communities. These initiatives aim to equip stakeholders with the skills and knowledge needed for sustainable project execution and long-term impact management.

1. **Worker Safety Training:** All construction workers will receive regular safety training, focusing on task-specific hazards such as operating heavy machinery (e.g., graders, rollers) and working at heights. Sessions will cover the use of personal protective equipment (PPE) (e.g., helmets, gloves, safety boots), hazard recognition, and emergency response procedures. Training will occur weekly, with practical demonstrations and refreshers tailored to the project’s 12–18-month construction phase.
2. **Community Awareness Sessions:** Monthly sessions will educate Riverside Community residents on construction-related hazards, such as avoiding active work zones and navigating temporary traffic changes. Topics will include safety around equipment and reporting unsafe conditions. These will be held in accessible locations (e.g., community centers) and supported by flyers in English.
3. **Stakeholder Engagement Training:** The Community Liaison Officer (CLO) and Project Management Unit (PMU) staff will undergo training in communication and conflict resolution. This will enhance transparent engagement with stakeholders, including vulnerable groups (e.g., elderly, disabled), ensuring their concerns are addressed throughout the project lifecycle. Training will occur quarterly, emphasizing inclusivity per ESS10.
4. **Environmental Management Training:** Contractors and project staff will be trained on environmental best practices, including waste management (e.g., segregation of debris), pollution prevention (e.g., spill containment), and erosion control (e.g., silt fence installation). Workshops and on-site demonstrations will occur bi-monthly, aligning with the ESMP’s requirements.

Delivery: Programs will combine workshops, on-site practical sessions, and informational materials (e.g., posters, handbooks), ensuring accessibility and effectiveness across all stakeholder groups.

5.4.1 Compliance Monitoring

Compliance monitoring is a critical component of the ESMP, designed to verify that mitigation measures are implemented as planned, residual impacts are within acceptable limits, and the project adheres to its environmental and social commitments. The monitoring framework combines internal and external processes to provide ongoing oversight and foster continuous improvement.

5.4.1.1 1. Internal Monitoring

- **Frequency:** Monthly
- **Conducted by:** Environmental and Social Officer (ESO)

- **Scope:**
 - Evaluate the effectiveness of mitigation measures, such as checking whether noise barriers reduce levels below 55 dBA or water spraying keeps PM10 under 50 µg/m³.
 - Review incident logs, including accidents (e.g., worker injuries), environmental spills (e.g., fuel leaks), and near-misses (e.g., equipment malfunctions).
 - Assess community feedback collected via the GRM, identifying trends (e.g., frequent noise complaints) that may require adjustments to mitigation strategies.
 - Monitor key environmental parameters using field equipment, such as sound level meters for noise, dust samplers for PM10, and water testing kits for runoff quality (e.g., turbidity, pH).
- **Reporting:** The ESO compiles monthly reports detailing monitoring results, incidents, community input, and recommended corrective actions (e.g., repairing a damaged noise barrier). These reports are submitted to the PMU and EPA for review and action.

6 External Monitoring

- **Frequency:** Based on the EPA Permit Condition and the Requirements of the World Bank
- **Conducted by:** Certified EPA EIA Evaluator/consultants
- **Scope:**
 - Perform comprehensive audits of ESMP implementation, including physical inspections of construction sites, operational road segments, and mitigation installations (e.g., vegetative buffers).
 - Review internal monitoring records, contractor logs, and GRM data to assess consistency and reliability of reporting.
 - Verify compliance with national regulations (e.g., NEQS), World Bank ESSs, and project-specific commitments outlined in the ESMP.
 - Engage with local communities through interviews or focus groups to gather independent feedback on project impacts and grievance resolution effectiveness.
- **Reporting:** Audit findings are documented in detailed reports, including compliance status, areas of concern (e.g., inadequate dust control), and recommendations for improvement (e.g., enhanced worker training). These reports are shared with the PMU, EPA, and World Bank, triggering corrective actions if needed.

This dual-layered monitoring approach ensures accountability at both the operational and regulatory levels. Internal monitoring provides real-time insights for immediate adjustments, while external audits offer an independent perspective to validate long-term compliance. Together, they ensure that the project remains aligned with its environmental and social goals, delivering benefits to the community while minimizing harm.

7 STAKEHOLDER ENGAGEMENT

The Liberia EPA Revised ESIA Procedural Guidelines (2022) and the World Bank Environmental and Social Standards (ESSs 10) mandate that stakeholder consultations be integral to the environmental assessment process. Throughout the ESIA study, public consultation meetings took place with communities that could be affected or have an interest in the area near the proposed project site, as well as in the broader Project Area of Influence (PAI). A total of three public meetings were organized near the project. The specifics of these meetings and the methodology used are outlined in this chapter.

7.1 STAKEHOLDER IDENTIFICATION

Stakeholders can basically be grouped as follows:

1. **Directly Interested Parties:** Individuals and institutions with a direct stake in the project and significant influence on its outcome, primarily the Government of Liberia (GOL), represented by the Ministry of Health, and other organizations and financing institutions like the World Bank.
2. **Indirectly Interested Parties:** The broader population of Liberia, particularly those expecting improved access to the Hospital and the community, such as the Riverside Community, along with hospital personnel. While supportive of the project, they have little direct influence on its outcome.
3. **Involved Parties:** Line ministries and agencies that may not have a direct interest but play a role in project preparation and implementation, such as the Environmental Protection Agency (EPA) and other entities like the Ministry of Public Works.
4. **Affected Parties:** Residents directly impacted by the project, primarily those living in the construction area. Although they are the most directly affected, they have minimal influence on project outcomes.

The focus of the participatory process in the development lies clearly on this latter group. While at least some of the directly interested stakeholders (like MOH and World Bank as Clients for the ESIA) and some of the involved parties (mainly EPA as the institution finally deciding on issues related to environmental impacts) are involved in any way, and also automatically receive (and have to comment) the reports, it is important that the main stakeholders, the affected parties (PAPs, project affected persons) receive adequate information on the project and are also enabled to voice their concerns and suggestions.

7.2 CONSULTATION AND PUBLIC PARTICIPATION

Before starting the ESIA process, a public notice inviting feedback was published in local newspapers and shared with Project Affected Communities, following Liberia's Environmental Procedural Guidelines. This Notice of Intent (NOI) included an overview of the project's details and outlined planned activities by the Ministry of Health (MOH). To enhance visibility, survey teams posted additional notices and conducted informal interviews, public consultations, and Focus Group Discussions (FGDs) at various locations. Copies of the notice and project area maps were distributed at meetings, with contact information provided for those unable to attend. Discussions were held with individuals, officials, and civil society organizations to gather feedback for the report.

7.3 RESULTS OF PUBLIC CONSULTATION

Formal public meetings were held in communities along the project corridor from 23- 25 April 2025 to introduce the project and gather insights on social and community structures. The summary results from these consultations are discussed below.

Table 17: Summary results of Public Consultation

Issues	Comments
The prevalent mode of transport within the two districts	Motorcycles, private transport and public transport (buses), trucks

<p>Whether they find the roads useful and its benefits after upgrading of road to an asphalt standard.</p>	<p>All of them agreed that the road is useful in terms of:</p> <ol style="list-style-type: none"> 1. Access of markets especially when taking farm produce and inputs; 2. Carrying out private business easily; 3. Easy access the hospital to seek service; 4. Low transport costs due to low vehicle maintenance; 5. Increased property value; 6. New transport routes; 7. Increased local investments 8. Saves time; 9. Reliable roads (all weather); 10. Improves economy and development; 11. Commuter transport; and Improved road safety.
<p>Disadvantages of upgrading current road to asphalt standard</p>	<ol style="list-style-type: none"> 1. Accidents; 2. Loss of property and livelihoods; 3. Change of socio-cultural setup of the community; 4. Air pollution; 5. Discharge of runoff to nearby home thus destroying crops and soil erosion issues;
<p>Effects that the deterioration of the road has had on the community</p>	<ol style="list-style-type: none"> 1. Delay of the reach to their homes 2. Dusts pollution 3. Waste of time and unreliable means of transport; 4. Accidents; 5. Breakdown of vehicles; hence increase in transport costs; 6. Delays in accessing social amenities like hospitals and schools; 7. Hinders communication; and 8. Slowed down economic growth of the area.
<p>How the road upgrading will impact on the community</p>	<ol style="list-style-type: none"> 1. Easy transportation of agricultural produce hence improved livelihoods of the community; 2. Opening up of the place for investments; 3. Increased urbanization 4. Establishment of institutions e.g. schools and etc.; 5. Reduced transportation costs and fares;
<p>Major concerns regarding the upgrading of the road to asphalt standard</p>	<ol style="list-style-type: none"> 1. Drainage and erosion concerns 2. Road should be constructed to standard so that it can last longer; 3. Disruption of services; 4. Health and safety standards should be followed; 5. Pollution; 6. Incidences of accidents may increase; 7. Increase in crime rate due to improved road

7.4 PUBLIC DISCLOSURE

Once the final ESIA report is ready, the MOH, the World Bank, the Contracting Entity, and the EPA will disclose it in Liberia. Newspaper adverts will also be placed. A summary of the ESIA will be hosted in the affected areas. More consultations during the construction and operation phases should follow the initial consultations during the design phase and ESIA study.

7.5 COMPLEMENTARY INITIATIVES

As a policy, gender mainstreaming and inclusivity are among the development pillars of most international funding institutions. As such, it ensures that project design will have to include complimentary initiatives that will improve the socio-economic conditions of the local communities. The complementary initiatives are proposed based on the general understanding of the project area, constraints grasped during the ESIA study and consultations held.

1. **Prevention of Communicable Diseases:** Infrastructure and transport projects pose risks of HIV/AIDS spread among construction workers and communities, exacerbated by long-haul drivers. The project will include awareness programs on HIV/AIDS and collaborate with local NGOs and health authorities for ongoing prevention efforts. Additionally, all workers will receive impregnated mosquito nets and access to timely medical care to combat malaria.
2. **Gender Mainstreaming and Sensitization:** Efforts will be made to create job opportunities for both men and women, promote awareness against gender-based violence, ensure compliance with the Workers Code of Conduct, and provide business training for women traders.
3. **Youth Empowerment:** With high youth unemployment in the area, the project will create job opportunities for young people as direct labor or suppliers. The Contractor will collaborate with youth associations to facilitate their involvement in the construction process.

8 CONCLUSION AND RECOMMENDATION

The New Redemption Hospital Access Road project will have both positive and negative environmental and social impacts throughout its lifecycle. The Environmental and Social Management Plan (ESMP) provides mitigation measures to ensure the project's environmental and social sustainability.

8.1 ENVIRONMENTAL IMPACT STATEMENT (EIS)

The project's environmental impacts are manageable, with significant benefits like improved healthcare access and economic growth outweighing temporary disruptions. Key positive effects include enhanced drainage to reduce flooding, benefitting from the area's 4,500 mm annual rainfall, and landscaping with native species like mango trees to enhance aesthetics and biodiversity.

Negative impacts will involve temporary noise levels of 80–90 dBA, dust generation, and traffic disruptions during construction. These will be addressed through barriers, water spraying, and Traffic Management Plans. Risks of water and soil contamination from spills will be managed with proper storage. During operation, traffic noise may reach 60 dBA, and air quality will be maintained within WHO limits through monitoring.

8.2 RECOMMENDATIONS

Recommendations include strictly enforcing ESMP implementation with weekly monitoring by an Environmental and Social Officer (ESO). It is also essential to engage the community by appointing a Community Liaison Officer (CLO) and establishing a grievance hotline. Construction should be scheduled for the dry season from November to April to reduce erosion risks. Additionally, climate resilience can be achieved by using durable materials, such as sulfate-resistant cement, to withstand heavy rainfall. Post-construction audits should be conducted annually for three years to evaluate drainage and traffic safety.

8.2.1 Further Studies and sub-plan Required Once the Contractor is Available

Once the Contractor has been hired by the Ministry of Health, A Contractor Environmental and Social Management Plan (CESMP) should be developed to capture the following assessment. These studies will assess the impacts of ancillary activities:

1. **Campsite Environmental Assessment:** Evaluates flood risks, waste, and sanitation needs.
2. **Quarry Site Assessment:** Analyzes dust, noise, and post-extraction rehabilitation.
3. **Asphalt and Concrete Batching Plant Assessment:** Assesses emissions, water use, and noise controls.
4. **Borrow Pit Assessment:** Evaluates erosion risks and land restoration.
5. **Traffic Impact Study for Ancillary Sites:** Identifies haul route congestion and safety measures.

The contractor must also develop these sub-plans in addition to the ESMP:

1. **Traffic Management Plan (TMP):** Outlines detours, signage, and emergency access strategies.
2. **Waste Management Plan:** Details waste segregation, recycling, and disposal procedures.
3. **Occupational Health and Safety (OHS) Plan:** Specifies PPE, safety briefings, and health monitoring.
4. **Community Safety Plan:** Includes site security, trench coverage, and community education.
5. **Erosion and Sediment Control Plan:** Describes silt fences and vegetative buffers to prevent soil loss.

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ANNEXURES

ANNEX 1: LABORATORY RESULTS OF BASELINE SAMPLES COLLECTED.

UL CIVIL ENGINEERING LABORATORY
College of Engineering
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Analytical Results

Order ID: *UL LAB/0067/2025*
Client: Ministry of Health
Location: Upper Caldwell, Montserrado County, Liberia
Type of Report: Environmental and Social Impact Assessment Report
Activities: Construction of New Redemption Hospital Access Road (2.34km)
Date of Assessment: April 21, 2025
Sample Matrix: water, soil, air and noise
Analysis Start Date: April 29, 2025
Laboratory: University of Liberia Civil Engineering Laboratory

Table 1: Water Sample Information

Sample Code	Type	Location	GPS Coordinates (29 N UTM)		Date	Time
			X	Y		
WS-001	Borehole-1	Project Site	0307768	0709373	04-21-25	12:46 p.m.
WS-002	Borehole-2	Project Site	0307736	0709299	04-21-25	12:50 p.m.

WS=Water Sample

Table 2: Air Quality Sampling Information

Code	Location	Coordinates (29 N UTM)		Date	Time
		X	Y		
AQ-001	Presumed end of the corridor	0307768	0709373	04-21-25	12:57 p.m.
AQ-002	New Redemption Hospital-Main Facility	0307736	0709299	04-21-25	1:10 p.m.
AQ-003	Riverside Community	0308662	0708054	04-21-25	1:23 p.m.
AQ-004	Corridor Junction	0309021	0708221	04-21-25	1:33 pm

AQ=Air Quality



Table 3: Soil Sample Information

Sample Code	Location	GPS Coordinates (29 N UTM)		DATE	TIME
		X	Y		
SS-001	Project Site	0346090	0680867	04-21-25	1:33 p.m.
SS-002	Riverside Community	0308662	0708054	04-21-25	1:23 p.m.

Note SS=Soil Sample

Table 4: Sound Monitoring Point

Code	Location	Coordinates (29 N UTM)		Date	Time
		X	Y		
SQ-001	Presumed end of the corridor	0307768	0709373	04-21-25	12:57 p.m.
SQ-002	New Redemption Hospital-Main Facility	0307736	0709299	04-21-25	1:10 p.m.
SQ-003	Riverside Community	0308662	0708054	04-21-25	1:23 p.m.
SQ-004	Corridor Junction	0309021	0708221	04-21-25	1:33 p.m.

SQ=Sound Quality

Table 5: Water Quality Results

Parameters	Instrumentation	WS-001	WS-002	LQWS Class I
pH	Multi-meter	7.50	7.30	6.5- 8.0
Turbidity (NTU)	Turbidity Meter	4.0	3.9	≤5.0
Electric Conductivity (μS/cm)	EC Meter	18.0	16.0	1000
Total Dissolved Solids (mg/l)	Gravimetric Analysis	8.18	7.0	≤ 500
Total Suspended Solids (mg/l)	Gravimetric Analysis	9.0	8.4	≤ 10
Sulfate (mg/l)	Colorimeter	0.66	0.25	≤ 150.0
Chloride (mg/l)	Photometer	0.76	0.65	250



Nitrate (mg/l)	Colorimeter	0.83	0.18	≤ 40.0
Chromium (VI) (mg/l)	Spectrometry	1.15	0.031	≤ 0.05
Iron (mg/l)	Colorimeter	0.55	0.05	≤ 0.1
Cadmium (mg/l)	Spectrometry	≤ 0.001	≤ 0.001	ND

NOTE: The values in **BOLD** are above the permissible limit of the Liberia Water Quality Standard; n.d.= not detectable, ppm= Parts per million; mg/L= Milligram per liter; μS/cm= micro-Siemens per centimeter; LWQS Class I=Liberia Water Quality Standards

Table 6: Air Quality Results

Parameter	Unit	Analytical Method (Instrumentation)	AQ1	AQ2	AQ3	AQ4	WHO Standard
CO	Ppm	Air Quality Meter	6.0	5.9	6.0	5.74	50.00
CO ₂	Ppm	Air Quality Meter	7.0	7.10	6.45	6.10	5000
VOC	Ppm	Air Quality Meter	<0.001	<0.001	<0.001	<0.001	0.75
PM _{2.5}	Ppm	Air Quality Meter	6.0	6.20	5.39	6.33	35.00
PM ₁₀	Ppm	Air Quality Meter	6.0	5.01	5.22	6.21	50.0
SO ₂	PPM	Air Quality Meter	0.05	0.05	0.041	0.005	2.0
NO ₂	Ppm	Air Quality Meter	0.001	0.001	0.001	0.001	1.00

Table 7: Soil Quality Results

Parameters (Unit)	Instrumentation	SS-01	SS-02
Ph	pH Meter	5.32	6.00
Organic Matter (%)	Gravimetry	54.0	52.0
Organic Carbon (%)	Gravimetry	0.54	0.53
Nitrate (ppm)	Colorimeter	<0.001	<0.001
CEC	Digital Titration	<0.001	<0.001
Lead (ppm)	Spectrophotometer	<0.001	<0.001



Iron (ppm)	Colorimeter	0.44	0.46
Zinc (ppm)	Colorimeter	0.06	0.05
Sulfate (ppm)	Colorimeter	<0.001	<0.001

Table 8: Sound Quality Results

Parameter	Unit	Analytical Method (Instrumentation)	SQ1	SQ2	WHO Standard
Sound Level	dBA	Sound Quality Meter	52.6	50.21	75.0

Signed: Alex B. Momo
Chemical Analyst



ANNEX 2: RECORD OF STAKEHOLDERS' PARTICIPATION

Meeting Minutes

Two formal consultation meetings were held with key stakeholders along the project corridor to introduce the project and collect feedback. The meetings were conducted with the Riverside Community and the Township Commissioner. The detailed minutes of these meetings are provided below.

Riverside Community Consultation

Date: April 23, 2025

Time: 10:00 AM - 12:00 PM

Location: Riverside Community Center, Upper Caldwell

Attendees:

- Community Leaders:
- Residents: Approximately 50 attendees
- Project Team: Project Manager, Environmental Consultant, Community Liaison Officer

Discussion Summary:

The assessment team introduced the New Redemption Hospital Access Road project, outlining its goals and anticipated benefits. The Riverside Community expressed enthusiastic support, recognizing the project's potential to enhance healthcare access and spur local development.

Key Points Raised by Residents:

- **Project Support:** Residents unanimously pledged overwhelming support for the initiative, highlighting the need for improved infrastructure.
- **Road Widening Inquiry:** Questions were raised about whether the project includes widening the existing road, potentially impacting nearby properties.
- **Bridge Construction Inquiry:** Residents asked if a bridge over the St. Paul River is part of the project to improve connectivity.
- **Property Damage Concerns:** Concerns were voiced regarding the fate of properties that might be damaged due to construction activities.
- **Community Access Road Inquiry:** Residents inquired whether the project would rehabilitate the community access road linking to nearby communities.

Recommendations from the Community:

- Propose extending the road and constructing a bridge to enhance regional connectivity.
- Emphasize job creation opportunities for local residents during the construction phase.
- Suggest extending the road to connect additional neighboring communities.
- Stress the need for a high-quality, durable road to withstand local conditions.

Action Items:

- The project team will evaluate the feasibility of road extension and bridge construction, with findings to be shared in a future meeting.
- Clarification on road widening and community access road rehabilitation will be provided at the next consultation.
- A strategy to address potential property damage will be developed and communicated to the community.

Consultation with Township Commissioner

Date: April 25, 2025

Time: 2:00 PM - 3:30 PM

Location: Township Commissioner's Office, Upper Caldwell

Attendees:

- Township Commissioner:

- Project Team: Project Director, Lead Engineer

Discussion Summary:

The Township Commissioner welcomed the New Redemption Hospital Access Road project and committed his full support, underscoring its importance to the community.

Key Points Raised by the Commissioner:

- **Project Support:** The Commissioner expressed enthusiasm and pledged his backing for the project's success.
- **Local Employment:** He urged that employment opportunities prioritize local residents to maximize community benefits.
- **Road Durability:** He emphasized that the Ministry of Health (MOH) and contractor must ensure the road is built to high standards for long-term durability.
- **Ongoing Commitment:** He reiterated his readiness to assist the project in any way possible.

Action Items:

- The project team will coordinate with local authorities to facilitate hiring local workers where feasible.
- Quality control measures will be established, with regular updates on construction progress and standards provided to the Commissioner.



Community consultation held in Riverside at the chairman’s residence



Meeting Held with the Township Commissioner

ANNEX 3: CHANCE FIND PROCEDURES FOR THE NEW REDEMPTION HOSPITAL ACCESS ROAD PROJECT

Introduction

The Chance Find Procedures (CFP) are designed to address the possibility of encountering cultural heritage artifacts, archaeological remains, or other significant finds during the construction of the New Redemption Hospital Access Road in Upper Caldwell, Montserrado County, Liberia. These procedures ensure that any discoveries are handled in a manner that complies with national laws, the World Bank Environmental and Social Standard 8 (ESS8) on Cultural Heritage, and international best practices. The objective is to protect cultural heritage while minimizing disruptions to project timelines.

Legal and Policy Framework

These procedures are guided by:

1. **Liberia's National Cultural Policy:** Emphasizes the protection and preservation of cultural heritage sites and artifacts.
2. **Environmental Protection and Management Law (EPML) of Liberia (2003):** Mandates the protection of cultural resources during development projects.
3. **World Bank ESS8 (Cultural Heritage):** Requires identification, protection, and management of cultural heritage encountered during project activities, ensuring consultation with relevant authorities and stakeholders.

Definition of Chance Finds

A "chance find" refers to any tangible or intangible cultural heritage discovered unexpectedly during construction activities. This may include, but is not limited to:

- Archaeological artifacts (e.g., pottery, tools, or human remains)
- Historical structures or remnants (e.g., old foundations or walls)
- Burial sites or graves
- Sacred sites or objects of cultural or religious significance

Scope and Applicability

These procedures apply to all project phases (pre-construction, construction, and operation) and cover all personnel, contractors, subcontractors, and supervising consultants working on the 2.4 km access road project. The procedures are particularly relevant during earthworks, excavations, and site clearing activities along the project corridor, including ancillary sites such as campsites, borrow pits, and quarry locations once identified.

Chance Find Procedures

The following steps outline the protocol to be followed in the event of a chance find during project activities:

1. **Immediate Cessation of Work at the Find Site**

Upon discovery of a potential cultural heritage item or site, all construction activities within a 10-meter radius of the find must stop immediately to prevent further disturbance or damage.

The site supervisor or worker who identifies the find must notify the Contractor's Site Manager within one hour of the discovery.

2. **Securing the Area**

The Contractor shall secure the area by erecting temporary fencing, barriers, or signage to prevent unauthorized access and protect the find from further disturbance or looting.

No materials or debris shall be placed on or near the find, and no further excavation or movement of soil shall occur within the secured zone until clearance is provided by the relevant authorities.

3. **Notification of Authorities**

The Contractor shall inform the Project Management Unit (PMU) and the Environmental and Social Officer (ESO) within 24 hours of the discovery.

The PMU, through the ESO, shall notify the following entities within 48 hours:

- **Ministry of Information, Cultural Affairs and Tourism (MICAT):** Responsible for cultural heritage in Liberia.
- **Environmental Protection Agency (EPA):** As the oversight body for environmental and social compliance.
- **Local Community Leaders:** To ensure transparency and respect for local cultural values, especially if the find is linked to sacred or communal significance.

A detailed report of the find, including photographs (without moving the items), GPS coordinates, and a description of the context (e.g., depth, surrounding materials), shall be prepared by the ESO and submitted to the above authorities.

4. **Assessment by Qualified Experts**

MICAT, in collaboration with the EPA, shall appoint a qualified archaeologist, cultural heritage expert, or relevant professional to assess the significance of the find within 7 days of notification.

The expert shall determine whether the find constitutes cultural heritage under national law and ESS8, and recommend appropriate actions (e.g., preservation in situ, excavation, or relocation).

During this period, the secured area shall remain off-limits to construction activities, though work may continue in other unaffected areas of the project site if deemed safe by the ESO.

5. **Development and Implementation of a Management Plan**

Based on the expert's assessment, MICAT and the EPA, in consultation with the PMU and World Bank, shall develop a management plan for the find. Possible outcomes include:

- **Preservation in Situ:** Adjusting the project design (e.g., rerouting a small section of the road) to avoid disturbance, if feasible.
- **Excavation and Documentation:** Systematic removal and recording of artifacts by experts for storage in a national museum or repository, if preservation in situ is not possible.
- **Relocation:** Moving the find to a culturally appropriate location with community consent, if applicable (e.g., reburial of human remains).

The Contractor shall implement the management plan under the supervision of the expert and ESO, ensuring compliance with all recommendations.

Costs associated with implementing the management plan (e.g., expert fees, excavation, or design adjustments) shall be borne by the project budget, as agreed with the PMU and World Bank.

6. Resumption of Work

Construction activities at the find site shall only resume after receiving written clearance from MICAT and the EPA, confirming that the management plan has been fully implemented and the site poses no further cultural heritage risks.

The ESO shall document the resolution process and include it in the monthly compliance report to the PMU, EPA, and World Bank.

Training and Awareness

- All project personnel, including contractors and subcontractors, shall receive training on the Chance Find Procedures prior to commencing work. Training will cover:
 - Recognition of potential cultural heritage finds (e.g., bones, pottery shards, unusual structures).
 - Immediate actions to take upon discovery (e.g., stopping work, notifying supervisors).
 - Importance of cultural heritage protection under national and international frameworks.
- Training sessions shall be conducted during project induction and refreshed quarterly during safety briefings, with attendance records maintained by the Contractor.
- Informational posters and flyers summarizing the CFP shall be displayed at all work sites and camps in English and, if necessary, local languages to ensure accessibility.

Roles and Responsibilities

- **Contractor:** Ensures immediate work stoppage, secures the find site, and notifies the PMU and ESO. Implements the management plan as directed and provides necessary resources (e.g., barriers, personnel).
- **Environmental and Social Officer (ESO):** Coordinates notification to authorities, oversees documentation of the find, monitors implementation of the management plan, and reports progress to the PMU and regulatory bodies.
- **Project Management Unit (PMU):** Facilitates communication between the Contractor, authorities, and the World Bank; ensures funding and logistical support for the management plan; and integrates CFP compliance into overall project oversight.
- **Ministry of Information, Cultural Affairs and Tourism (MICAT):** Leads the assessment and decision-making on cultural heritage finds, appoints experts, and approves management plans.
- **Environmental Protection Agency (EPA):** Provides regulatory oversight to ensure compliance with environmental and social safeguards related to cultural heritage.
- **World Bank:** Reviews compliance with ESS8 and provides technical guidance or funding support if significant finds necessitate project adjustments.

Monitoring and Reporting

- The ESO shall include updates on any chance finds in monthly environmental and social compliance reports submitted to the PMU, EPA, and World Bank. These updates will detail the nature of the find, actions taken, timelines, and outcomes.
- In the event of a significant find (e.g., a burial site or major archaeological discovery), an interim report shall be submitted within 72 hours of discovery to all relevant parties, ensuring timely decision-making.
- Community engagement through the Community Liaison Officer (CLO) will ensure local stakeholders are informed of discoveries, particularly if they involve culturally sensitive elements (e.g., graves), with opportunities for input during the management plan development.

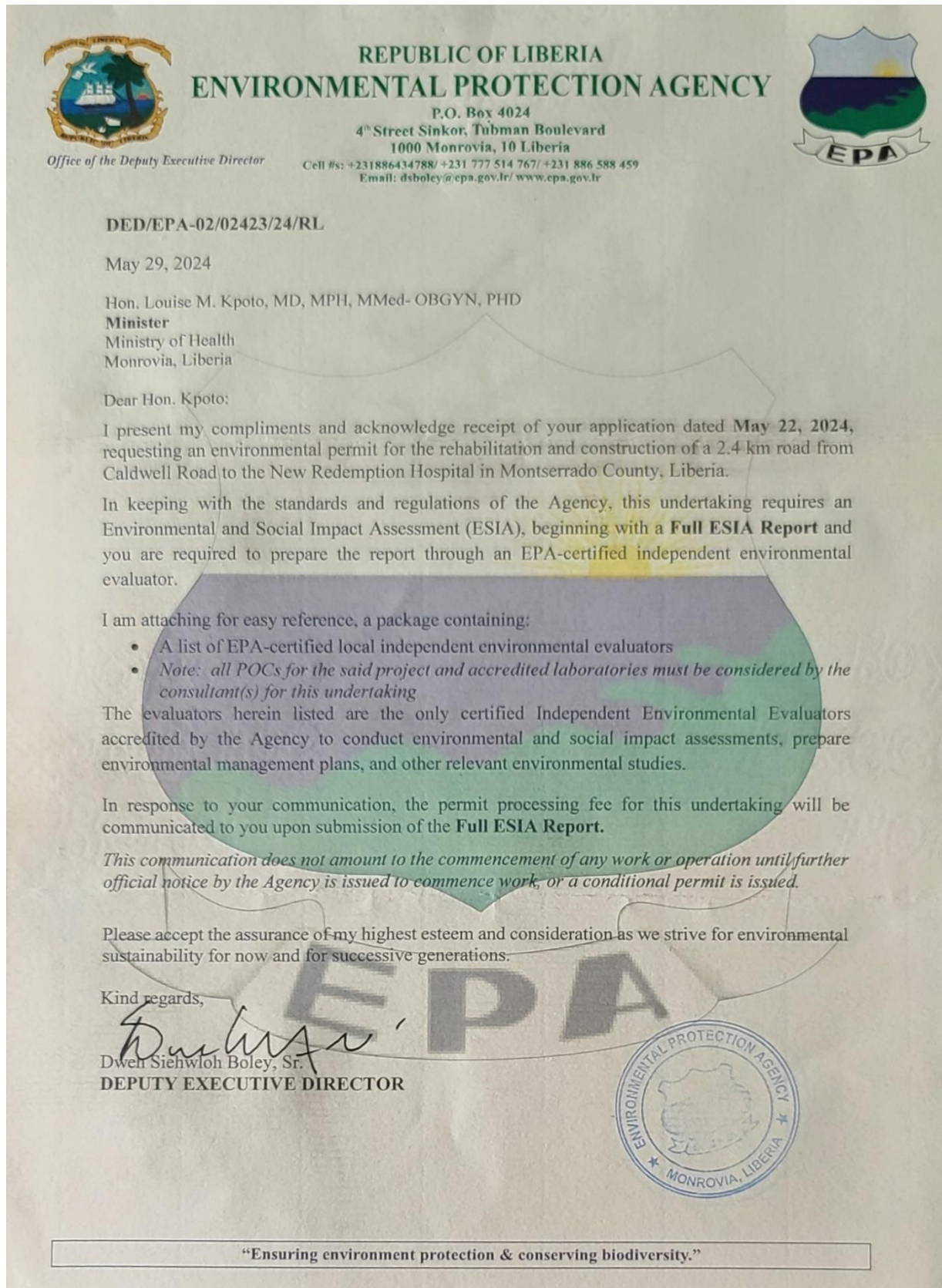
Documentation and Record-Keeping

- All chance finds shall be documented in a Chance Find Log maintained by the ESO, including:
 - Date and time of discovery
 - Location (GPS coordinates and site description)
 - Description of the find (with photographs)
 - Actions taken (e.g., notifications, assessments, management plan details)
 - Clearance documentation from authorities
- Copies of the log and related correspondence shall be archived by the PMU and made available for review during EPA or World Bank audits.

Conclusion

The Chance Find Procedures ensure that any cultural heritage discovered during the construction of the New Redemption Hospital Access Road is protected and managed responsibly. By adhering to these protocols, the project demonstrates its commitment to safeguarding Liberia's cultural legacy while maintaining progress toward its development goals. These procedures will be integrated into the Contractor's Environmental and Social Management Plan (CESMP) once the contractor is appointed, ensuring practical implementation during construction activities.

ANNEX 4: EPA RESPONSE LETTER



Office of the Deputy Executive Director

**REPUBLIC OF LIBERIA
ENVIRONMENTAL PROTECTION AGENCY**

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DED/EPA-02/02423/24/RL

May 29, 2024

Hon. Louise M. Kpoto, MD, MPH, MMed- OBGYN, PHD
Minister
Ministry of Health
Monrovia, Liberia

Dear Hon. Kpoto:

I present my compliments and acknowledge receipt of your application dated **May 22, 2024**, requesting an environmental permit for the rehabilitation and construction of a 2.4 km road from Caldwell Road to the New Redemption Hospital in Montserrado County, Liberia.

In keeping with the standards and regulations of the Agency, this undertaking requires an Environmental and Social Impact Assessment (ESIA), beginning with a **Full ESIA Report** and you are required to prepare the report through an EPA-certified independent environmental evaluator.

I am attaching for easy reference, a package containing:

- A list of EPA-certified local independent environmental evaluators
- *Note: all POCs for the said project and accredited laboratories must be considered by the consultant(s) for this undertaking*


The evaluators herein listed are the only certified Independent Environmental Evaluators accredited by the Agency to conduct environmental and social impact assessments, prepare environmental management plans, and other relevant environmental studies.

In response to your communication, the permit processing fee for this undertaking will be communicated to you upon submission of the **Full ESIA Report**.

This communication does not amount to the commencement of any work or operation until further official notice by the Agency is issued to commence work, or a conditional permit is issued.

Please accept the assurance of my highest esteem and consideration as we strive for environmental sustainability for now and for successive generations.

Kind regards,


Dwen Siewwloh Boley, Sr.
DEPUTY EXECUTIVE DIRECTOR



"Ensuring environment protection & conserving biodiversity."