REPUBLIC OF LIBERIA

Ministry of Public Works



Paving of the Buchanan-Cestos City Junction Corridor (60.9 km)

Project ID No.: xxxx

Submitted to: **The Environmental Protection Agency of Liberia** **Mamba Point, Bright Building 307-A** **Old CID Road, Monrovia, Liberia**	
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Project Title: Paving of the Buchanan-Cestos Junction Road Corridor (60.9km)		
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

FINAL DRAFT

November 12, 2026

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DISCLOSURE

The draft Environmental and Social Impact Assessment and Environmental and Social Management Plan (ESIA/ESMP) was prepared for the proposed Liberia Economic Corridor Project by the Ministry of Public Works (MPW), through its Infrastructure Implementation (IIU), with support from Royal Environmental Group-Liberia and independent consultants. It covers the proposed upgrading and paving of the 60.9 km Buchanan–Cestos Junction section of the Coastal Corridor, proposed for co financing by the World Bank Group and the African Development Bank. The proposed works principally cover upgrading activities from unpaved to asphalt pavement surface standard which will include clearing/grubbing, earthworks, drainage installation, placement of coarse aggregates as well as two asphaltic layers. The draft ESIA/ESMP and Biodiversity Action Plan (BAP) have been prepared and assessed in accordance with the applicable environmental and social requirements of the Government of Liberia and the World Bank Group. The draft ESIA/ESMP is being disclosed to inform stakeholders of the key assessment and consultation findings and the proposed mitigation and management measures, and to facilitate further consultation on the proposed activities and their potential environmental and social risks and impacts. The document will be updated and finalized following completion of the requisite data and information gaps prior to the commencement of civil works. Feedback received during the disclosure and consultation process will inform finalization of the ESIA/ESMP where appropriate by the MPW PIU. The draft Biodiversity Action Plan (BAP) is also disclosed which is an integral part of the project's ESIA/ESMP documentation.

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LEGAL & PROFESSIONAL CERTIFICATIONS

Legal and Policy Compliance Statement

This Environmental and Social Impact Assessment (ESIA) for the *Pavement of the Buchanan–Cestos Junction Road (60.9 km)* has been prepared in conformity with the applicable national laws of the Republic of Liberia, the requirements of the Environmental Protection Agency (EPA) of Liberia, African Development Bank (AFDB) Integrated Safeguard System (ISS), the World Bank Environmental and Social Framework (ESF) and Good International Industry Practice (GIIP).

Specifically, the ESIA has been prepared to comply with:

1. **Environmental Protection and Management Law (EPML), 2002** of the Republic of Liberia, which establishes the overarching legal framework for environmental protection and management and mandates ESIA for projects likely to have significant environmental and social impacts.
2. **EPA ESIA Procedural Guidelines (2026)**, which specify screening, scoping, impact assessment, public participation, decision-making, and follow-up requirements, and define the contents and format of ESIA reports to be submitted for environmental permitting.
3. **EPA Act, 2002** and relevant sector laws and regulations applicable to roads and associated facilities, including legislation on land, water, forestry, public health, labor, cultural heritage and gender-based violence.
4. AfDB ISS (Updated ISS, 2023), including the Environmental and Social Policy and the 10 Operational Safeguards (OS1–OS10), which set the Bank's requirements for assessment and management of environmental and social risks and impact in Bank-financed operations. World Bank's ESF, taking into consideration the applicable Environmental and Social Standards (ESSs). The assessment identifies potential environmental and social risks and impacts associated with the proposed project and recommends appropriate mitigation measures, monitoring requirements and management actions to ensure compliance with the applicable World Bank requirements.
5. World Bank's ESF, 2018 taking into consideration the applicable Environmental and Social Standards (ESSs). The assessment identifies potential environmental and social risks and impacts associated with the proposed project and recommends appropriate mitigation measures, monitoring requirements and management actions to ensure compliance with the applicable World Bank requirements.
6. International standards and GIIP including IFC Performance Standards on Environmental and Social Sustainability and the World Bank Group Environmental, Health and Safety (EHS) Guidelines, 2007

The ESIA adopts a risk-based approach following WB ESF mitigation hierarchy (anticipate and avoid, minimize or reduce, mitigate and compensate or offset), addresses environmental and social impacts across the project's area of influence, and integrates cross-cutting issues such as climate change, gender, GBV/SEAH, and vulnerability, as required by the national framework and the World Bank ESF.

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Professional Responsibility and Independence

This ESIA has been prepared by a multi-disciplinary team of national and international experts commissioned by the Ministry of Public Works (MPW) / Infrastructure Implementation Unit (IIU). The assessment has been undertaken in an independent, objective, and professional manner, based on the best available information, field surveys, laboratory analyses, and stakeholder consultation.

Declaration of Independence

- The ESIA team confirms that it has no financial interest in the construction, operation, or maintenance of the project other than agreed professional fees for ESIA services.
- The content of this ESIA reflects the professional judgment of the authors and has not been unduly influenced by the project proponent, financing institution, or any other stakeholder.
- The team has exercised due care and diligence in data collection, impact assessment, and formulation of mitigation measures and management plans.

DOCUMENT CONTROL AND DISTRIBUTION LIST

Version	Date	Status	Description of Change	Prepared by	Reviewed by
1.0	February 27, 2025	Draft ESIA for Disclosure	Complete ESIA, including ESMMP and summary RP	MPW	RE-GROUP ESIA Team
2.0	December 10, 2025	Final ESIA (for EPA Permit)	Revised following comments from MPW and AfDB.	RE-GROUP ESIA Team	Patrick M. Scere
3.0	July 16, 2026	Final ESIA - Revised for Bank Clearance	Harmonized with the cleared RP and revised SEP/GM budgets; corrected ESMMP budget consistency, RP impact figures, annex references, and document control.	Royal Environmental Group-Liberia / MPW PIU	Abraham Bility
4.0	24 October, 2026	World Bank ESF Compliant ESIA	Gaps identified and made compliance with World Bank ESF	Individual International Consultants: Zahid Shakeel Senior Environmental Consultant Beageorge Cooper Senior Social Consultant	WB E&S Team
5.0	8 November, 2026	Reviewed by WB E&S Team	Comments addressed	Individual International Consultants: Zahid Shakeel Senior Environmental Consultant Beageorge Cooper Senior Social Consultant	WB E&S Team
6.0	11 November, 2026		World Bank Comments addressed	Individual International Consultants: Zahid Shakeel Senior Environmental Consultant Beageorge Cooper Senior Social Consultant	

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbrevia-tion	Meaning
AADT	Average Annual Daily Traffic
AAQMPt	Ambient Air Quality Monitoring Point
AfDB	African Development Bank
ANMPt	Ambient Noise Monitoring Point
AoI	Area of Influence
BAP	Biodiversity Action Plan
BCR	Benefit-Cost Ratio
BDL	Below Detection Limit
BOQ	Bill of Quantities
CBD	Convention on Biological Diversity
CBO	Community-Based Organization
CEC	County Environmental Committee
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CFP	Chance Finds Procedure
CHS	Community Health and Safety
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CoC	Code of Conduct
COVID-19	Coronavirus Disease 2019
CRC	Convention on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
CSO	Civil Society Organization
C-ESMMP	Contractor Environmental and Social Management and Monitroing Plan
DAI	Direct Area of Influence
DBST	Double Bituminous Surface Treatment
DEC	District Environmental Committee
DLP	Defects Liability Period
E&S	Environmental and Social
ECOWAS	Economic Community of West African States
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EOHS	Environmental and Occupational Health and Safety
EPA	Environmental Protection Agency of Liberia
EPML	Environmental Protection and Management Law of Liberia
ERP	Emergency Response Plan
ESA	Environmental and Social Assessment
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management Monitoring Plan
ESMS	Environmental and Social Management System
ESPA	Environmental and Social Performance Audit
ESRM	Environmental and Social Risk Management
FDA	Forestry Development Authority
FGD	Focus Group Discussion
FPIC	Free, Prior and Informed Consent
GBV	Gender-Based Violence
GBV/SEA/SH	Gender-Based Violence, Sexual Exploitation and Abuse, and Sexual Harassment

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Acronym/Abbreviation	Meaning
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GIS	GeogRP hic Information System
GoL	Government of Liberia
GPS	Global Positioning System
GRC	Grievance Redress Committee
GM	Grievance Mechanism
HIV	Human Immunodeficiency Virus
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HSE	Health, Safety and Environment
IAI	Indirect Area of Influence
IBAT	Integrated Biodiversity Assessment Tool
IFC	International Finance Corporation
IIU	Infrastructure Implementation Unit
ILO	International Labour Organization
ISS	Integrated Safeguards System
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
KII	Key Informant Interview
KPI	Key Performance Indicator
LLA	Liberia Land Authority
LMP	Labour Management Procedures
LNP	Liberia National Police
LRD	Liberian Dollar
LTIFR	Lost-Time Injury Frequency Rate
LWQS	Liberia Water Quality Standards
M&E	Monitoring and Evaluation
MFDP	Ministry of Finance and Development Planning
MIA	Ministry of Internal Affairs
MICAT	Ministry of Information, Cultural Affairs and Tourism
MME	Ministry of Mines and Energy
MoA	Ministry of Agriculture
MoGCSP	Ministry of Gender, Children and Social Protection
MoH	Ministry of Health
MoL	Ministry of Labour
MoT	Ministry of Transport
MPW	Ministry of Public Works
MRU	Mano River Union
MRU/RDTFP	Mano River Union Road Development and Transport Facilitation Programme
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
NoI	Notice of Intent
NPV	Net Present Value
NTFP	Non-Timber Forest Product
NTPS	National Transport Policy and Strategy
NTU	Nephelometric Turbidity Unit
OHS	Occupational Health and Safety
OS1–OS10	Operational Safeguards 1–10 of the AfDB Integrated Safeguards System
PAC	Project-Affected Community

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Acronym/Abbreviation	Meaning
PAP	Project-Affected Person
PCR	Physical Cultural Resources
PFMU	Project Financial Management Unit
PIU	Project Implementation Unit
$PM_{2.5}$	Particulate Matter with an Aerodynamic Diameter of 2.5 Micrometres or Less
PM_{10}	Particulate Matter with an Aerodynamic Diameter of 10 Micrometres or Less
POPs	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PRTP	ECOWAS Priority Road Transport Programme
QA/QC	Quality Assurance and Quality Control
RP	Resettlement Plan
RIT	RP Resettle Implementation Team
ROW	Right-of-Way
SEA	Sexual Exploitation and Abuse
SEA/SH	Sexual Exploitation and Abuse and Sexual Harassment
SEBS	Socio-Economic Baseline Survey
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment
SME	Small and Medium-Sized Enterprise
SMS	Short Message Service
SOP	Standard Operating Procedure
SSATP	Sub-Saharan Africa Transport Policy Programme
SSPt	Soil Sampling Point
TDS	Total Dissolved Solids
TMP	Traffic Management Plan
ToR	Terms of Reference
TSS	Total Suspended Solids
UL	University of Liberia
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VAC	Violence against Children
VOC	Vehicle Operating Cost
VOCs	Volatile Organic Compounds
WASH	Water, Sanitation and Hygiene
WBG	World Bank Group
WHO	World Health Organization
WMP	Waste Management Plan
WSPt	Water Sampling Point

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GLOSSARY OF KEY TERMS

Definitions are consistent with the Liberian legal framework, the EPA ESIA Procedural Guidelines, the AfDB ISS, WB ESSs, and GIIP; wording is adapted to the context of this project. (epa.gov.lr)

1. **Affected Communities:** People and groups living within the project's area of influence who are, or may be, directly or indirectly affected by project activities, whether positively or negatively.

2. **Area of Influence (AoI):** The geogRP hic area over which the project's environmental and social impacts may occur. For the project, it includes the 250 m corridor on each side of the road centerline; the locations of camps, borrow pits, quarries, and access roads; communities and ecosystems potentially affected by induced development; associated facilities; and areas for cumulative impacts.

3. **Associated Facilities**: Facilities or activities that are not financed by the AfDB World Bank but are necessary for the project to be viable and would not have been constructed or expanded without the project. More precisely these include the facilities or activities that are not funded as part of the project and, in the judgment of the World Bank, are: (a) directly and significantly related to the project; (b) carried out, or planned to be carried out, contemporaneously with the project; and (c) necessary for the project to be viable and would not have been constructed, expanded or conducted if the project did not exist. For facilities or activities to be Associated Facilities, they must meet all three criteria (e.g. some access roads, power connections or material sources).

4. **Chance Finds (procedure)** : A chance find is archeological material encountered unexpectedly during project construction or operation. **A chance find procedure** is a project-specific procedure which will be followed if previously unknown cultural heritage is encountered during project activities (WB ESF). Physical cultural heritage (such as artefacts, graves, sacred trees, shrines or structures) unexpectedly encountered during project construction or operation, requiring specific procedures to protect and manage them. (AFDB)

5. **Critical Habitat:** Areas with particularly high biodiversity importance and value, including habitat of significant importance to Critically Endangered and Endangered species, endemic or restricted-range species, key congregator or migratory species, highly threatened or unique ecosystems, or areas supporting important ecosystem services. Projects in such areas require stringent assessment, mitigation, and, where appropriate, offsets. (WB-ESF)

6. **Cumulative Impacts:** Impacts on the environment and society that result from the incremental effects of the project added to the effects of other existing, planned, or reasonably foreseeable developments, rather than from the project alone.)

7. **Displacement (Physical and Economic):** Physical displacement refers to loss of shelter and the need to relocate. Economic displacement refers to the loss of income or means of livelihood (e.g., land, business, access to natural resources) as a result of project-related land acquisition or access restrictions.

8. **Environmental and Social Impact Assessment (ESIA):** A systematic process to identify, predict, evaluate, and manage the potential environmental and social impacts of a proposed

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project, including analysis of alternatives, development of mitigation measures, and preparation of an Environmental and Social Mitigation and Monitoring Plan (ESMMP).

9. **Environmental and Social Mitigation and Monitoring Plan (ESMMP):** A set of site-specific, time-bound measures and procedures that describe how identified E&S impacts will be avoided, minimized, mitigated, or compensated, and how monitoring, reporting, and institutional responsibilities will be implemented. (World Bank)
10. **Good International Industry Practice (GIIP):** The exercise of professional skill, diligence, prudence and foresight that would reasonably be expected from qualified and experienced practitioners in the same sector, globally, under similar circumstances. In this ESIA, IFC Performance Standards, GIIP is represented principally by the World Bank Group EHS Guidelines·
11. **Grievance Mechanism (GM)** A formal, accessible and transparent process through which individuals or groups can raise concerns or complaints about the project and receive timely, fair and documented responses, without fear of retaliation.
12. **Habitat (Natural and Modified):** plants and/or animals' native species of largely native origin and/or where human activity has not essentially modified area's primary ecological functions and species composition. Modified habitat refers to areas that have been significantly altered by human activity (e.g., agricultural land, settlements, long-existing road corridors), but that may still host biodiversity and ecosystem services AFDB).
13. **Mitigation Hierarchy:** A stepwise approach to managing risks and impacts: (i) avoid impacts where feasible, (ii) minimize or reduce remaining impacts, (iii) restore or rehabilitate affected environments and livelihoods, and (iv) offset or compensate for significant residual impacts. (MFISEASH)
14. Operational Safeguards (OS1–OS10): The ten environmental and social safeguard standards of the AfDB ISS covering: assessment and management of risks and impacts; labour and working conditions; resource efficiency and pollution prevention; community health, safety and security; land acquisition and resettlement; biodiversity and living natural resources; vulnerable groups; cultural heritage; financial intermediaries; and stakeholder engagement and information disclosure. (AFDB).
15. **Project Affected Persons (PAPs)** Individuals, households, or entities that experience negative impacts from project activities—such as loss of land, housing, assets, income, or access to resources—regardless of their legal rights to the affected land or assets. (AFDB).
16. **Resettlement Plan (RP):** A time-bound plan that sets out the procedures and measures to mitigate adverse effects of land acquisition and restrictions on land use, including compensation, relocation assistance, livelihood restoration, and grievance redress, in line with AFDB OS5 and World Bank ESS5 and national requirements.
17. **Stakeholder Engagement Plan (SEP):** A plan that describes the strategy, methods, timetable and responsibilities for engaging with project stakeholders throughout the project life-cycle, including specific measures to reach vulnerable groups and ensure meaningful participation.
18. **Disadvantaged or Vulnerable Groups:** Disadvantaged or vulnerable refers to those who may be more likely to be adversely affected by the project impacts and/or more limited

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than others in their ability to take advantage of a project's benefits. Such an individual/group is also more likely to be excluded from/unable to participate fully in the mainstream consultation process and as such may require specific measures and/ or assistance to do so. This will take into account considerations relating to age, including the elderly and minors, and including in circumstances where they may be separated from their family, the community or other individuals upon whom they depend·

19. **Project Workers**: Project worker refers to: (a) people employed or engaged directly by the Borrower (including the project proponent and the project implementing agencies) to work specifically in relation to the project (direct workers); (b) people employed or engaged through third parties to perform work related to core functions of the project, regardless of the location (contracted workers); (c) people employed or engaged by the Borrower's primary suppliers (primary supply workers); and (d) people employed or engaged in providing community labor (community workers). This includes full-time, part-time, temporary, seasonal and migrant workers. Migrant workers are workers who have migrated from one country to another or from one part of the country to another for purposes of employment (WB-ESF).

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EXECUTIVE SUMMARY

0.1 Overview of the Project and Alternatives

This Executive Summary presents the main findings of the Environmental and Social Impact Assessment prepared for the paving of the Buchanan–Cestos City Junction Road Corridor under the Mano River Union Road Development and Transport Facilitation Programme, Phase V, Lot I. It replaces the previous Non-Technical Summary and is aligned with the main ESIA report, Version 03, dated July 16, 2026. However, it is aligned with World Bank ESF considering the World Bank ESSs.

The project covers approximately 60.9 km, including the link to the Port of Buchanan, and is located in Grand Bassa and Rivercess Counties. The proposed works will transform the existing seasonal laterite road into an all-weather bituminous asphalt road, thereby improving transport reliability, access to markets and essential services, road safety, and regional trade connectivity. The figures 1-4 illustrate the alignment of various corridors as captioned against each.

The project development objective is to improve road infrastructure and cross-border transport connectivity within the Mano River Union area in order to facilitate trade, movement of people, regional integration, post-conflict economic recovery, and poverty reduction. Specifically, the project seeks to provide an all-weather, safe and efficient road link between Buchanan and Cestos City Junction; reduce vehicle operating costs and travel time; improve access to markets, health care, education, administrative services and the Port of Buchanan; and stimulate agricultural production, trade and private-sector investment along the corridor.

Table ES-1: Project Overview

Project Element	Description
Project name	MRU/RDTFP Phase V Lot I – Paving of Buchanan–Cestos Junction Road Corridor, including the link to the Port of Buchanan
Project type	Upgrade of existing laterite road to paved standard with bituminous asphalt surfacing
Length and location	Approximately 60.9 km from Buchanan, Grand Bassa County, to Cestos City Junction, Rivercess County, including the link to the Port of Buchanan
Main road works	Two-lane carriageway, paved shoulders, drainage structures, culverts, bridges, road safety features, pedestrian facilities and localized realignments
Associated facilities	Construction camps, equipment staging areas, material storage areas, asphalt and concrete batching plants, crushing plants, borrow pits, quarries, temporary diversions, spoil sites and haul roads. These associated facilities will be finalized before the mobilization of the Contractor to the site, considering E&S aspects for selection. However, they may be reflected in the C-ESMP, if not identified at this stage.
Project phases	Planning and design, pre-construction, construction, quality control and environmental monitoring, operation and maintenance, and reinstatement of temporary facilities
World Bank ESF Risk Classification	High overall, comprising Substantial Environmental Risk and High Social Risk under the World Bank Environmental and Social Framework (ESF).
Liberia EPA Category and Requirement	Category A (Major) under the 2021 Revised Environmental and Social Impact Assessment/Strategic Environmental Assessment Procedural Guidelines, requiring a full Environmental and Social Impact Assessment (ESIA), including an Environmental and Social Management Plan (ESMMP), EPA technical review and public hearing, and issuance of an environmental permit prior to project implementation.

0.2 Alternatives Considered

The ESIA considered several alternatives including the no-project option, alignment and route alternatives, design alternatives, and construction method/material-source alternatives. The no-

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project alternative was rejected because it would perpetuate poor access, high transport costs, long travel times, community isolation, and road safety risks.

Major new or greenfield realignments were also rejected because they would require greater land acquisition, more vegetation clearance, higher cost, and more disruption to communities. Considering the multiple indicators evaluation criteria including key E&S considerations, the preferred alternative is to upgrade the existing alignment given the comparative advantage of limited local realignments for safety and geometry, climate-resilient drainage, erosion and scour protection, licensed material sources, and progressive rehabilitation of borrow pits and quarries.

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0.3 Project Site, Area of Influence, Baseline Conditions, and Valued Environmental and Social Components

The project road starts at Buchanan in Grand Bassa County and ends at Cestos City Junction in Rivercess County. It passes through or provides access to 44 towns and villages, including Buchanan, Big Joe Town, Gio Town, Nyon Behn Town, Gbediah Town and Yarpah Town.

For the purposes of the ESIA, the Direct Area of Influence (DAoI) comprises the full physical footprint of the Project and all areas within which direct construction or operational impacts may reasonably occur. This includes the existing and proposed Right of Way(RoW), road works, bridges and drainage structures, temporary construction areas, diversions, safety zones, and immediately affected land uses and sensitive receptors. It also includes project related facilities and activities located outside the road corridor, including borrow pits, quarries, worker camps, construction yards, batching and crushing plants, spoil disposal sites, access roads and haul routes, where these form part of the Project.

A corridor extending approximately 250 m on each side of the existing road centreline may be used as an initial spatial screening and baseline assessment area for impacts such as dust, noise, vibration, access disruption, community health and safety, and effects on adjacent land uses. This corridor does not constitute a fixed boundary of the DAoI Where project activities, facilities or direct impact pathways extend beyond this area, the DAoI extends accordingly.

The Indirect Area of Influence (IAoI) includes communities, environmental receptors and geogRP hic areas that may experience reasonably foreseeable secondary or induced effects associated with the Project. These include communities dependent on the road for access to markets and services, downstream rivers and wetlands, areas influenced by changes in accessibility and economic activity, and locations potentially affected by induced development, land use change, in migration, increased pressure on natural resources or other indirect E&S effects.

The existing road corridor has been substantially modified through more than five decades of use as a laterite road and through adjacent settlement, agriculture, logging, small businesses and other human activities. Field surveys did not record sensitive or critical species within the surveyed road corridor. This finding should not, however, be interpreted as applying to the entire Project Area of Influence, particularly ancillary facility locations and areas outside the surveyed corridor. Natural habitats, forests, wetlands and other sensitive receptors within the wider landscape therefore remain relevant to the assessment and to subsequent site-specific screening of project facilities. Baseline conditions and key E&S sensitivities are summarized below:[1]

The Project corridor is characterized by a humid tropical climate, high rainfall, lateritic soils and rolling terrain, making it vulnerable to soil erosion, sedimentation, slope instability and drainage issues, particularly during the rainy season. Important water resources, including the Timbo, Gbowee and New Cess Rivers, streams and wetlands, support domestic use, fishing and agriculture and are sensitive to construction-related pollution, sedimentation and water abstraction.

Existing air quality is mainly influenced by road dust, vehicle emissions and biomass burning, while nearby settlements, schools, health facilities and businesses are sensitive to construction-related dust, noise and vibration. The biological environment is largely modified by agriculture, settlements and other human activities, although secondary forests, wetlands and riverine habitats

[1] Appendix-7.10

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remain within the wider landscape. Corridor ancillary facilities may also affect sensitive habitats and require site-specific screening.

The road connects 44 towns and villages, supporting agriculture, trade, fishing, transport and access to essential services. Improved connectivity may generate economic benefits but could also increase migration, induce development and pressure on natural resources. Key social concerns include road safety, community health, labour influx, SEA/SH risks and the vulnerability of disadvantaged groups.

Potential cultural heritage resources include graves, cemeteries, shrines and sacred trees, requiring appropriate screening, consultation and chance-find procedures. Residential and commercial structures, agricultural land, crops, economic trees and community assets may also be affected by land acquisition or temporary occupation, resulting in physical or economic displacement, access restrictions and livelihood disruption requiring appropriate mitigation and coordination with the resettlement plan/RP..

0.4 Institutional and Legal Framework for ESMMP Implementation

The ESIA has been prepared in accordance with Liberia's national legal framework, EPA requirements, and the World Bank Environmental and Social Framework (WB-ESF). The ESMMP will be implemented under the leadership of MPW through the IIU/PIU, with regulatory oversight by EPA and supervision support from AfDB and World Bank, and implementation support from the Supervision Consultant and relevant national and local institutions.

Table ES-2: Institutional Roles and Responsibilities for ESMMP Implementation

Institution / Actor	Roles and Responsibilities for ESMMP Implementation
MPW / IIU / PIU	Serves as the Project Implementation Entity and is responsible for overall safeguards coordination, ESMMP implementation oversight, contractor ESMMP review and approval, stakeholder engagement, GM operation, RP resettlement plan coordination and consolidation of environmental and social monitoring reports.
Contractor	Responsible for day-to-day implementation of site-level mitigation measures, occupational health and safety, traffic management, pollution prevention, labour management, waste management, biodiversity protection, worker code of conduct, emergency response and site reinstatement.
Supervision Consultant	Monitors contractor compliance, verifies implementation of mitigation measures, issues corrective instructions, reviews reports, confirms closure of non-compliances and reports performance to the PIU.
Environmental Protection Agency	Reviews and approves the ESIA, issues environmental permits, undertakes compliance inspections and enforces national environmental requirements.
Liberia Land Authority	Supports land administration, land verification and land-related dispute resolution in coordination with the resettlement plan/RP process.
Forestry Development Authority	Provides oversight where vegetation clearance, forest resources, protected species or biodiversity issues require technical review.
Ministry of Gender, Children and Social Protection	Supports GBV/SEA/SH referral pathways, vulnerable group issues and survivor-centred response coordination.
Ministry of Health	Supports public health coordination, communicable disease awareness and emergency response linkages.
Liberia National Police / Traffic Authorities	Support traffic safety, enforcement and management of traffic diversions during construction.
County, district and community authorities	Support local coordination, consultations, grievance handling, land-related verification, public awareness and community monitoring.
AfDB, WB and co-financiers	Review ESIA, ESMMP, resettlement plan/RP and monitoring reports, conduct supervision missions and ensure compliance with applicable financing safeguards requirements.

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The key applicable requirements include the Environmental Protection and Management Law, EPA Act, EPA ESIA Procedural Guidelines applicable to major road projects, sector laws on land, water, forestry, public health, labour, roads and cultural heritage, and the applicable World Bank Environmental and Social Standards (ESS1, ESS2, ESS3, ESS4, ESS5, ESS6, ESS8 and ESS10). Where national, African Development Bank and World Bank requirements differ, the Project will apply the requirement that provides the higher level of environmental and social protection, subject to applicable national law and lender requirements.

0.5 Key Environmental and Social Risks and Impacts

The ESIA identifies a range of E&S risks and impacts across the pre-construction, construction and operational phases. Many construction-related impacts are expected to be localized and temporary; however, several material risks and impacts are assessed as **High or Substantial prior to mitigation**, including land acquisition and physical and economic displacement, occupational health and safety, community health and road safety, GBV/SEA/SH, habitat disturbance, sedimentation and water quality impacts, cultural heritage risks, and induced access and land-use pressures.

Permanent or longer-term impacts include land acquisition *and displacement, vegetation and habitat loss, physical alteration of the road corridor and ancillary sites, and potential changes in land use and natural resource pressure associated with improved access. The significance of residual impacts will depend on the effective implementation of the resettlement plan/RP, ESMMP, design measures and other applicable management instruments. The key material risks and impacts are summarized below.*

Table ES3: E&S Risk assessment

Code	Risk	Quantitative Estimate	Initial Risk Rating (Pre-Mitigation)	Potential Consequence	Mitigation Measures	Residual Risk Rating
I-04	Soil erosion	Exposed soils, cut slopes, embankments and drainage outlets within the 250 m corridor. Erosion rate to be established using site-specific information.	Construction / Moderate to Substantial	Soil loss, gully formation, sediment movement and slope instability.	Slope stabilization; erosion and sediment control; timely revegetation; lined drains where necessary; inspection after heavy rainfall.	Low to Moderate
I-05	Water quality deterioration	Rivers, streams, seasonal wetlands and downstream water users near construction and crossing locations. TSS changes to be established through baseline data and assessment.	Construction / Moderate	Increased turbidity, sediment deposition, water-quality deterioration and aquatic habitat degradation.	Implement sediment-control measures; prevent direct discharge of untreated runoff; manage fuels and hazardous materials; monitor upstream and downstream water quality.	Low to Moderate

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I-11	Community health and safety	Settlements, pedestrians, road users, schools, markets and other sensitive receptors near construction fronts and diversions.	Construction / Substantial	Traffic accidents, pedestrian injuries, access restrictions and public safety concerns.	Traffic Management Plan; speed limits; barriers and warning signs; safe pedestrian access; community awareness; incident reporting and emergency response.	Moderate
I-12	Communicable disease and labour influx	Workforce size, local/non-local worker proportions, worker accommodation and access to community services; figures to be confirmed during project planning.	Construction / Moderate to Substantial	Disease transmission, social tension and pressure on local services.	Labour Management Procedures; worker code of conduct; adequate accommodation, sanitation and healthcare access; health awareness and communicable-disease prevention.	Low to Moderate
I-13	GBV/SEA/SH risks	Worker-community interaction, labour influx, vulnerable groups and availability of referral services.	Construction / Moderate to Substantial	GBV/SEA/SH incidents, exploitation, survivor harm, social conflict and under-reporting.	Enforce worker codes of conduct; provide confidential and accessible reporting channels; establish survivor-centred referral pathways; train workers; apply appropriate sanctions.	Substantial
I-14	Occupational health and safety	Workers exposed to machinery, excavation, traffic, dust, noise, heat and hazardous materials.	Construction / Substantial	Worker injury, occupational illness, heat stress, respiratory exposure and potentially fatal accidents.	Contractor OHS Plan; task-specific risk assessments; appropriate PPE; equipment inspection; worker training; emergency preparedness; incident reporting and corrective action.	Low to Moderate
I-15	Cultural heritage	Known and potential heritage receptors identified through available records, consultation and desktop screening. Number of affected sites remains unconfirmed.	Pre-construction and construction / Substantial if significant heritage resources are affected	Damage or loss of heritage resources, disruption of customary practices and community conflict.	Avoidance and micro-siting; consultation with relevant communities and authorities; protection of cemeteries, sacred trees and shrines; implement a Chance Finds Procedure.	Low to Moderate, subject to receptor significance and successful avoidance

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Table ES-4: E&S Impact Assessment

Code	Impact	Quantitative estimate / receptor	Initial significance	Mitigation measures	Residual significance
I-01	Land take and permanent land-use change	Permanent project footprint to be verified from final design and the land acquisition schedule.	Permanent / Moderate to Substantial	Minimize the footprint; avoid unnecessary land take; implement ESS5-compliant compensation and resettlement measures.	Moderate; potentially Substantial where displacement remains significant
I-02	Vegetation loss	Vegetation affected by the road footprint and ancillary facilities; hectares and habitat types verified in the ecological baseline and BAP of the project.	Construction / Moderate to Substantial	Minimize clearance; demarcate limits; prohibit unauthorized clearing; restore temporarily disturbed areas; implement biodiversity mitigation where required.	Low to Moderate; potentially Substantial for sensitive habitats
I-03	Economic tree crop and useful plant loss	5,656 economic tree crops across 61 farms, subject to reconciliation with the verified resettlement plan/RP inventory.	Construction / Moderate	Inventory and value affected assets; provide applicable compensation and livelihood restoration; verify replacement or restoration outcomes.	Low to Moderate, subject to livelihood restoration outcomes
I-06	Air quality deterioration	PM10 estimate of 150–300 µg/m³ requires verification; receptors include nearby settlements and sensitive facilities.	Construction / Moderate	Suppress dust; cover transported materials; maintain equipment; manage haul roads; monitor air quality at sensitive receptors.	Low to Moderate
I-07	Noise and vibration	Construction noise estimate of 70–90 dB(A) requires defined measurement conditions; sensitive receptors to be mapped.	Construction / Moderate to Substantial	Maintain equipment; restrict noisy activities where practicable; provide advance notification; monitor noise and assess vibration where warranted.	Low to Moderate, subject to receptor sensitivity
I-08	Physical and economic displacement	1,093 PAPs and 500 business-income-loss cases, subject to RP reconciliation; physical relocation numbers to be confirmed.	Pre-construction / Substantial	Implement the resettlement plan/RP and livelihood restoration measures; provide compensation and applicable assistance before displacement and land possession, consistent with ESS5.	Moderate; potentially Substantial until livelihood restoration is demonstrated
I-09	Cropland and livelihood impacts	Temporary disturbance of 120–180 ha and compensable farmland loss of 6 ha require reconciliation and spatial verification.	Pre-construction and construction / Moderate to Substantial	Minimize agricultural land take; restore temporary occupation areas; compensate eligible losses; maintain farm access and implement livelihood restoration measures.	Low to Moderate; potentially Substantial for unresolved livelihood impacts
I-10	Temporary access disruption	Potentially affected population of 1,000–2,000 requires verification through settlement and access mapping.	Construction / Moderate	Provide safe temporary access, signed diversions and pedestrian routes; maintain access to essential services; notify communities and respond to complaints.	Low to Moderate
I-16	Waste generation	Estimated 5–10 m³/day of mixed camp waste requires verification	Construction / Moderate	Implement a Waste Management Plan; segregate waste; provide suitable sanitation; use authorized disposal	Low to Moderate

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		against workforce and camp arrangements.		arrangements; manage hazardous waste separately.	

0.6 Stakeholder Consultations and Disclosure

Stakeholder engagement was undertaken through community meetings, key informant interviews, focus group discussions, household and socio-economic surveys, informal discussions and transect walks. Consultations were conducted with county authorities, district administrations, line ministries, traditional leaders, women's groups, youth, farmers, traders, motorcycle taxi riders, PAP households, environmental and gender/GBV service providers, and local communities along the 60.9 km corridor.

Consultations were held in Buchanan, Big Joe Town, Yarpah Town and other corridor communities during the ESIA preparation period. The consultations provided stakeholders with information on the project scope, anticipated environmental and social impacts, land acquisition and compensation process, road safety risks, potential labour influx impacts, GBV/SEA/SH risks, access disruptions, protection of water sources and cultural heritage, and the proposed ESMMP and resettlement plan/RP measures. Stakeholders expressed broad support for the project, subject to fair compensation, timely disclosure, protection of livelihoods, local employment opportunities, road safety measures, transparent grievance handling and continued engagement during implementation. The feedback received from stakeholders is summarized below.[2]

Stakeholder consultations in Buchanan City and surrounding communities involved county authorities, line ministries, CSOs, transport unions, PAPs, women, youth and community representatives. Key concerns included road safety, traffic management, local employment, port traffic, market access, ROW and compensation. The Project will address these through road safety measures, transparent recruitment, resettlement plan/RP disclosure and a Traffic Management Plan, with implementation monitored by MPW/IIU, the supervision consultant and contractor.

In Big Joe Town and nearby settlements, consultations with traditional leaders, women, youth, farmers, traders and affected households highlighted concerns regarding dust, noise, construction safety, roadside business disruption, pedestrian crossings and drainage impacts on agricultural land. These concerns will be incorporated into the ESMP, engineering design and Traffic Management Plan through dust and noise controls, safe crossings, adequate drainage and continued business access.

In Yarpah Town and Rivercess corridor communities, discussions focused on structure relocation, crop compensation, protection of water sources, youth employment, cultural heritage and GBV/SEA/SH risks associated with labour influx. Proposed measures include resettlement plan/RP implementation, compensation at replacement cost, water-source protection, transparent recruitment, worker Codes of Conduct and a GBV/SEA/SH Action Plan. MPW/IIU, resettlement specialists and the contractor will oversee implementation and grievance resolution.

Across the full 60.9 km corridor, socioeconomic surveys, asset inventories, key informant interviews and community consultations addressed PAP eligibility, asset valuation, livelihood impacts, temporary access restrictions and grievance procedures. Findings will inform the resettlement plan (RP), livelihood restoration measures and construction planning, while the resettlement team and MPW/IIU will ensure proper documentation, compensation monitoring and follow-up engagement.

[2] Appendix-7.10

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Consultations with sectoral agencies and civil society organizations addressed biodiversity, water resources, cumulative impacts, road safety, GBV/SEA/SH prevention and vulnerable groups. Recommendations included strengthening environmental management measures, involving relevant CSOs, establishing survivor-centred referral pathways and undertaking targeted engagement with disadvantaged groups. MPW/IIU and technical specialists will incorporate relevant recommendations into the ESIA/ESMP and Stakeholder Engagement Plan and monitor their implementation.

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0.7 Environmental and Social Management Plan

The ESMMP translates ESIA findings into practical mitigation, monitoring, reporting and institutional measures for the Contractor, Supervision Consultant, MPW/IIU/PIU and other responsible actors. It includes impact-specific measures, thematic sub-plans, environmental monitoring, risk management, GM, capacity building and budgeted implementation arrangements. Detailed ESMMP mitigation, monitoring and implementation matrices are provided in the main ESIA and its appendices.

Risk and Impact Management Measures:

Table 5: Key Environmental and Social Impact Management Measures

Impact area	Significance before mitigation	Key mitigation and management measures	Implementation and verification
Land acquisition, physical and economic displacement and livelihood loss	**High**	Apply the mitigation hierarchy to avoid and minimize additional land take; implement the resettlement plan/RP before displacement; compensate eligible Project Affected Persons (PAPs) at replacement cost; provide relocation, transitional and livelihood restoration assistance; provide differentiated support to vulnerable PAPs.	MPW/IIU/PIU; compensation and required assistance completed before displacement or civil works in affected sections; resettlement plan/RP monitoring and completion verification.
Vegetation clearance and habitat disturbance	**Moderate**, with associated **Substantial biodiversity risk**	Limit clearance to the approved Project footprint; avoid riparian and other sensitive areas; establish no-go areas; progressively restore disturbed areas; rehabilitate borrow pits, quarries and temporary facilities; control invasive species.	Contractor under the C-ESMMP, with Supervision Consultant/PIU oversight and Forestry Development Authority involvement where required.
Soil erosion, slope instability, sedimentation and water quality	**Moderate**, with associated **Substantial risk** at sensitive water receptors	Stage clearing and earthworks; install and maintain drainage, silt tRP s and sediment controls; stabilize slopes; maintain buffers along watercourses; prohibit untreated discharges; implement spill prevention and response; monitor water quality.	Contractor and Supervision Consultant/PIU; controls installed before and during earthworks, with additional inspection after heavy rainfall and incidents.
Air quality and dust	**Moderate**	Water active work areas and haul routes; cover fine materials during transport; enforce speed limits; maintain equipment; avoid unnecessary idling; undertake additional controls near settlements and sensitive receptors.	Contractor; routine inspection and air quality monitoring, with corrective action in response to exceedances or complaints.
Noise and vibration	**Moderate at sensitive locations**	Restrict high-noise activities near schools, health facilities and residential receptors; maintain equipment and silencers; provide advance notice; use temporary barriers or other controls where necessary.	Contractor and Supervision Consultant; monitoring at sensitive receptors and during high-noise activities.
Temporary disruption of access and livelihoods	**Moderate**	Maintain safe access to homes, farms, businesses, schools, health facilities and community services; provide safe diversions and	Contractor under the Traffic and Access Management Plan, with Supervision

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Impact area	Significance before mitigation	Key mitigation and management measures	Implementation and verification
		pedestrian access; notify affected users in advance; restore temporary access promptly.	Consultant/PIU oversight and grievance tracking.

Table 6: Environmental and Social Risk Management Measures

Risk area	Inherent risk rating	Preventive and management measures	Key implementation requirement
resettlement plan/RP non-compliance, delayed compensation or livelihood restoration failure	**High**	Complete compensation and livelihood restoration requirements before displacement; maintain accessible grievance channels; monitor resettlement plan/RP implementation; provide corrective action where commitments are delayed or incomplete.	No civil works in affected areas before applicable resettlement plan/RP requirements are completed and verified.
Occupational health and safety	**High**	Implement Occupational Health and Safety (OHS) Plan; task-specific risk assessments and method statements; personal protective equipment; toolbox talks; competent supervision; emergency preparedness; incident notification and investigation; worker grievance mechanism.	Contractor C-ESMMP and OHS Plan approved before mobilization and monitored throughout construction.
Community traffic and road safety	**Substantial**	Traffic Management Plan; speed controls; trained drivers; signage; traffic marshals; safe pedestrian crossings and diversions; road safety awareness; emergency response and accident investigation.	Particular attention to settlements, schools, markets, health facilities and vulnerable road users.
Gender-based violence, sexual exploitation and abuse and sexual harassment (GBV/SEA/SH) and worker-community interaction	**Substantial**	Worker Codes of Conduct; SEA/SH prevention and response measures; worker induction and training; service-provider and referral pathways; confidential survivor-centred reporting; sanctions for misconduct.	SEA/SH complaints handled through confidential survivor-centred channels rather than the ordinary grievance process.
Habitat fragmentation, invasive species and induced pressure on natural resources	**Substantial**	Avoid sensitive habitats; control clearance; progressive restoration; restrict illegal hunting and logging by workers; screen ancillary facilities; monitor induced access, habitat disturbance and natural-resource pressures.	Site-specific screening before development of borrow pits, quarries, camps, access roads and other ancillary facilities.
Sediment release and water quality degradation	**Substantial**	Maintain erosion and sediment controls; protect watercourse buffers; manage fuels and hazardous materials; prevent untreated discharge; implement spill response; monitor downstream water quality.	Controls operational before earthworks or activities at water crossings and monitored throughout works.

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Risk area	Inherent risk rating	Preventive and management measures	Key implementation requirement
Cultural heritage and chance finds	**Substantial**	Prioritize avoidance; verify known cultural heritage within the Project footprint; consult affected communities and relevant authorities; implement the Chance Finds Procedure; apply culturally appropriate measures where impacts cannot be avoided.	Cultural heritage screening to cover the road footprint and ancillary facilities before disturbance.
Waste, spills and associated community/environmental health risks	**Moderate**	Waste segregation and licensed disposal; camp sanitation; bunded fuel storage; spill kits; trained handlers; incident response and remediation.	Requirements incorporated into the C-ESMMP and relevant site management plans.

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ENVIRONMENTAL, OCCUPATIONAL HEALTH AND SAFETY CLAUSES FOR CONTRACTS

The Environmental, Occupational Health and Safety clauses shall be inserted into works contracts. Summary points are listed below: These shall be enforced through the Contractor ESMMP and Supervision Consultant monitoring:

1. Construction Site Hygiene, Health and Safety
2. HIV/STI and Communicable Disease Prevention
3. Worker Conduct and Community Relations
4. Gender Equality and GBV/SEA/SH Prevention
5. Cultural Heritage and Chance Finds
6. Traffic Management and Road Safety
7. Pollution Prevention, Waste and Hazardous Materials Management
8. Rehabilitation of Temporary Facilities and Disturbed Areas
9. Preparation and Implementation of the C-ESMP
10. Labour Management and Workers' Rights
11. Occupational Health and Safety Management
12. Worker Grievance Mechanism
13. Community Engagement and Grievance Redress
14. Biodiversity and Natural Resource Conservation
15. Water Resources and Drainage Protection
16. Erosion, Sediment and Slope Stability Management
17. Air Emissions, Dust, Noise and Vibration Control
18. Land Access, Property Protection and Livelihoods
19. Emergency Preparedness and Response
20. Subcontractor and Supply-Chain Compliance
21. Security Personnel and Protection of Communities
22. Resource Efficiency and Climate Resilience
23. E&S Monitoring, Reporting and Corrective Action

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24. ESHS Training and Competency

25. Non-Compliance and Contractual Enforcement

Environmental Monitoring Matrix

The summary monitoring matrix below identifies the main monitoring parameters, approaches, responsibilities, and reporting channels. The detailed ESMMP budget shall identify each mitigation and monitoring measure, quantity, unit rate, duration, implementing party, oversight party, funding source, monitoring indicator, and BOQ or contract reference. Contractor site-level mitigation and OHS obligations shall be priced in the works BOQ and detailed in the approved Contractor ESMMP before mobilization.

The E&S Monitoring Plan establishes 22 monitoring parameters [3]covering the key environmental, social, health and safety aspects of Project implementation. Monitoring will focus on air quality and dust, noise and vibration, surface water quality, soil erosion, biodiversity protection, material sources, waste management and hazardous materials. It will also assess occupational and community health and safety, traffic management, drainage, flood risks, labor conditions, worker accommodation and resource use.

Social safeguards monitoring will cover land acquisition, compensation, livelihood restoration, stakeholder engagement, grievance redress, GBV/SEA/SH prevention, cultural heritage protection and temporary land occupation. Contractor ESMMP implementation, subcontractor compliance, emergency preparedness, site reinstatement and final environmental closure will also be regularly assessed.

Monitoring will be undertaken through site inspections, field measurements, laboratory testing, document reviews, stakeholder consultations and compliance audits. The frequency will vary according to nature and level of risk, ranging from daily site checks and weekly inspections to monthly and quarterly monitoring, with additional assessments following incidents, complaints or extreme weather events.

The Contractor, Supervision Consultant and PIU E&S Team will share monitoring and oversight responsibilities, supported by relevant government authorities, accredited laboratories and technical specialists where required. Monitoring costs will primarily be incorporated into the Contractor's ESMMP and relevant management plans, while resettlement plan/RP implementation, specialist assessments and independent monitoring will be separately budgeted where applicable. Findings will be documented through monthly and quarterly E&S reports, inspection records, laboratory results, incident notifications and corrective-action registers to ensure compliance and timely resolution of identified issues.

[3] Appendix 7.10

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Risk Management Matrix

Table ES-7: Impact Management Matrix

Code	Impact	Management Measure	Completion Deadline	Cost / Funding Source	Indicator	Implementation	Oversight
IM-01	Land take and physical/economic displacement affecting 1,093 PAPs	Implement the cleared resettlement plan (RP); compensate eligible PAPs at replacement cost; provide livelihood restoration and vulnerable-person assistance.	Before displacement and before civil works in affected sections	Cleared resettlement plan/RP budget: USD 5,047,158.69	Compensation completed; livelihood restoration tracked; resettlement plan/RP Completion Audit undertaken	PIU E&S Team / PFMU	WB /AfDB Independent Monitor
IM-02	Vegetation loss and habitat disturbance	Limit clearing to approved areas; protect sensitive areas; progressively restore disturbed sites and rehabilitate borrow pits and quarries.	Before clearing, during construction and before demobilization	Priced works BOQ and approved C-ESMMP	Clearing within approved footprint; restoration and closure verified	Contractor	Supervision Consultant / PIU / FDA
IM-03	Dust, noise and temporary access disruption	Apply dust suppression, equipment maintenance, working-hour controls, community notification and safe temporary access measures.	Throughout construction	Priced works BOQ and approved C-ESMMP	Monitoring completed; access maintained; complaints resolved	Contractor	Supervision Consultant / PIU
IM-04	Economic tree, crop and livelihood losses	Verify affected assets, pay compensation and implement livelihood restoration in accordance with the RP .	Before clearance or land entry	Cleared resettlement plan/RP budget	Eligible assets compensated; livelihood support documented	PIU E&S Team / PFMU	WB /AfDB Independent Monitor
IM-05	Positive access, trade and service-delivery impacts	Maintain road-safety features and support inclusive local employment and procurement.	Construction and operation	Works contract and MPW operational budgets	Travel-time and access improvements documented; benefits monitored	Contractor / MPW	PIU / relevant authorities

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Risk and impact classification color legend: **Critical/Very High** **High/Substantial/Major** **Moderate-High** **Moderate/Medium** **Low-Moderate** **Low/Minor** **Positive/Beneficial** **Not applicable/Mixed.** Written ratings are retained for accessibility and black-and-white printing.

Code	Risk	Risk Nature / Description	Risk Level	Prevention Measure	Preparedness / Management Action	Alert Notification Officer	Supervision
RM-01	Hydrocarbon spill at camp, workshop or water crossing	Soil and water contamination; public health nuisance	Substantial	Bunded fuel storage, spill kits, trained handlers, no refuelling near watercourses	Stop source, contain spill, notify PIU and EPA where required, clean up and document corrective action	Contractor HSE Manager	Supervision Consultant / PIU / EPA
RM-02	Major traffic accident involving project vehicle	Community injury, death, conflict or work stoppage	Substantial	Traffic Management Plan, speed limits, trained drivers, signage, marshals near schools/markets	Emergency response, medical referral, incident notification, investigation and corrective measures	Contractor Project Manager / HSE Manager	Supervision Consultant / PIU / Traffic Police
RM-03	Uncontrolled erosion or sediment release	Siltation of water bodies, farm damage and drainage failure	Moderate to Substantial	Drainage sequencing, sediment tRP s, slope stabilization, wet-season controls	Stabilize exposed areas, repair drainage, remove sediment, and intensify monitoring	Contractor HSE Manager	Supervision Consultant / PIU
RM-04	GBV/SEA/SH allegation	Survivor harm, community conflict, reputational and compliance risk	Substantial	Codes of Conduct, worker training, GBV/SEA/SH Action Plan, confidential channels	Immediate survivor-centred referral, non-identifying reporting, sanctions and case confidentiality	PIU GBV/SEA/SH focal point / Contractor focal point	PIU / MoGCSP / AfDB as required
RM-05	Chance find of grave, shrine or cultural object	Cultural heritage loss, community conflict and work delays	Substantial	Pre-work consultation, cultural heritage screening, chance-find induction	Stop works, secure area, notify PIU and local authorities, consult the community before any action	Contractor Site Manager	PIU / Supervision Consultant / local authorities
RM-06	Borrow pit wall failure or unsafe quarry operation	Worker/community injury, slope instability and land degradation	Substantial	Approved designs, restricted access, safe slopes, drainage and supervision	Stop use, evacuate area, stabilize site, investigate and rehabilitate	Contractor HSE Manager	Supervision Consultant / EPA / PIU

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Code	Risk	Risk Nature / Description	Risk Level	Prevention Measure	Preparedness / Management Action	Alert Notification Officer	Supervision
RM-07	Community grievance escalation	Work stoppage, conflict, loss of social licence	Moderate to Substantial	Active GM, community liaison, advance notice, transparent communication	Register grievance, investigate, agree on a resolution, and escalate where needed	PIU CLO / Contractor CLO	PIU E&S Team / GRC
RM-08	Flooding during construction	Damage to works, sediment release, and community access disruption	Moderate	Climate-resilient drainage, wet-season planning, temporary drainage and culvert protection	Suspend unsafe works, clear drains, restore access, and inspect water crossings	Contractor Project Manager	Supervision Consultant / PIU

ESMMP Implementation[4]

The E&S Management and Monitoring Plan (ESMMP) integrates impact mitigation and risk management measures into a unified implementation framework covering the key environmental and social impacts associated with Project construction. The principal measures address soil erosion, slope instability, sedimentation, water pollution, dust and air emissions, noise and vibration, vegetation loss, biodiversity disturbance, land acquisition, livelihood impacts and cultural heritage protection. These will be managed through erosion and sediment controls, appropriate drainage, wastewater and spill management, dust suppression, noise control, restricted vegetation clearance, habitat restoration, implementation of the resettlement plan/RP and application of the Chance Finds Procedure.

The ESMMP also addresses construction-related risks, particularly traffic and community safety, occupational health and safety (OHS), labour influx, GBV/SEA/SH and potential social tensions. Key measures include implementing the Traffic Management Plan, providing safe diversions and signage, enforcing PPE requirements, conducting worker inductions and safety training, applying Labour Management Procedures (LMP), enforcing worker Codes of Conduct and maintaining confidential, survivor-centred grievance and referral mechanisms. Implementation deadlines will generally extend from the pre-mobilisation and pre-construction stages throughout construction and site reinstatement. Compensation and livelihood restoration must be completed in accordance with the resettlement plan/RP before displacement and commencement of civil works in affected sections.

Implementation costs will primarily be covered through the Contractor's ESMMP, OHS and traffic management budgets, while resettlement plan/RP activities and other specialised interventions will be financed through their respective project allocations. The Contractor and PIU E&S Team, supported by the Supervision Consultant and relevant specialists, will be responsible for implementing the prescribed measures. Oversight will be provided by the Supervision Consultant, PIU and relevant authorities, including the EPA,

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Forestry Development Authority (FDA), traffic police and local authorities, as applicable. AfDB and independent monitoring arrangements will provide additional oversight of resettlement commitments.

Performance will be assessed through measurable indicators, including the effectiveness of erosion and pollution controls, completion of environmental restoration, compliance with approved vegetation-clearance limits, completion of compensation and livelihood restoration, functional traffic and safety arrangements, worker training and Code of Conduct compliance, and timely resolution of grievances and incidents. Regular inspections, monitoring reports and corrective-action tracking will ensure that identified impacts and risks are appropriately managed throughout Project implementation.

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KEY ESMMP IMPLEMENTATION INDICATORS

The following key indicators will be used to assess the implementation effectiveness of the ESMMP during construction of the Buchanan–Cestos City Junction Road Corridor. Performance will be monitored through Contractor reports, Supervision Consultant inspections, PIU E&S monitoring, incident records, grievance registers and periodic compliance audits.

1. **Implementation of mitigation measures**: At least 95% of mitigation measures scheduled for implementation during the reporting period are implemented by their respective deadlines and verified through site inspections or documented supervision records. Any overdue measures shall be recorded, assigned to a responsible party, and addressed through corrective action.
2. **Environmental and social incident management:** All serious environmental and social incidents (including SEA/SH) are reported within the applicable contractual and project reporting timeframes, investigated, and addressed through documented corrective and preventive actions. No serious incident shall remain without an assigned response, responsible person, and corrective-action plan. Closure shall be verified and documented; the occurrence and recurrence of serious incidents shall also be monitored.
3. **Management of ancillary facilities:** All active borrow pits, quarries, worker camps, detours, stockpile areas, and other applicable ancillary facilities shall have the required approvals and site-specific management plans before use. Progressive rehabilitation shall be implemented in accordance with approved plans, and closure shall be verified through documented inspections.
4. **Grievance redress and stakeholder concerns:** At least 90% of grievances shall be acknowledged and processed within the timeframes established in the project GM. Grievances remaining unresolved beyond the prescribed timeframe shall be recorded, escalated, and tracked until resolution or documented referral. Sexual exploitation and abuse/sexual harassment (SEA/SH) concerns shall be handled through safe, confidential, and survivor-centred procedures, with appropriate referral pathways and strict protection of personal information.
5. **Worker induction and training**: 100% of workers shall complete the required OHS, environmental and social awareness, SEA/SH and Code of Conduct induction before commencing work. Refresher training shall be delivered at the intervals specified in the approved training plan and whenever required by changes in work activities, identified risks, or incidents. Training attendance and competency records shall be maintained.
6. **Define the measurement basis**: Calculate the 95% mitigation target using measures due in the reporting period, rather than all measures in the ESIA regardless of their implementation schedule.
7. **Separate reporting from outcomes:** Reporting every serious incident is essential, but a low number of reported incidents alone does not demonstrate good performance. Track incident severity, recurrence, response time, and corrective-action closure as separate measures.

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8. **Clarify the GM target**: Define "processed" according to the approved GM—for example, acknowledged, assessed, responded to, or resolved within the applicable timeframe. These are different stages and should not be treated as equivalent. World Bank guidance supports quantitative monitoring of grievance handling and overdue cases.
9. **Apply the training indicator to all workers:** Include direct employees, subcontractor personnel, and other workers covered by the project's labour management arrangements.
10. **Assign evidence and accountability:** The Contractor should maintain the underlying records; the Supervision Consultant should verify them; and the PIU should consolidate and report performance.

The Contractor shall report performance against these indicators monthly. The Supervision Consultant shall verify the reported information through site inspections and document reviews, while the PIU shall consolidate performance data, identify recurring deficiencies, and ensure timely implementation of corrective actions. Performance shall be assessed against the approved ESMMP, applicable Liberian requirements, and the project's World Bank environmental and social commitments.

GRIEVANCE MECHANISM

The project will operate an accessible, locally based, empowered and transparent GM covering compensation, construction impacts, community safety, access disruption, labor issues and E&S concerns. Complaints may be received through community representatives, GRC members, the PIU, the Contractor, local authorities or other agreed local channels. The GM will include community-level, county-level and project-level escalation channels, with records maintained by the PIU and verified through supervision reporting.

To strengthen accessibility and independence, the GRC structure shall include community representation, women and youth representation, PAP representation where relevant, local authority participation and PIU oversight. The Contractor shall not have sole control over grievance intake, screening, resolution or closure; all project-level grievance records and closure decisions shall be subject to PIU oversight and GRC/community verification. SEA/SH complaints shall bypass ordinary grievance committees and shall be handled through a confidential, survivor-centred referral pathway with non-identifying reporting only. The GM shall be disclosed in affected communities before commencement of civil work and shall remain operational throughout resettlement plan/RP implementation and construction.

Institutional Arrangements for ESMP Implementation:

Table ES-8: Institutional Arrangements for EESMP Implementation

Institution / Actor	Specific Mission in ESMP Implementation
MPW / IIU / PIU	Overall ESIA leadership, safeguards coordination, resettlement plan/RP oversight, stakeholder engagement, GM management, reporting to EPA and AfDB, and approval of C-ESMP
PIU E&S Unit/Team	Day-to-day environmental and social oversight, monitoring, grievance follow-up, review of reports, coordination with EPA, local authorities and the Supervision Consultant
Contractor	Preparation and implementation of C-ESIMMP and sub-plans, worker training, OHS, traffic safety, waste management, pollution control and site restoration

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Institution / Actor	Specific Mission in ESMP Implementation
Supervision Consultant	Routine monitoring, verification of mitigation measures, non-compliance notices, certification of corrective actions and reporting to the PIU
EPA	Environmental permitting inspection, enforcement and review of compliance with permit conditions
County and community structures	Support for local coordination, consultation, grievance management, community awareness and monitoring of commitments
AfDB, WB and co-financiers	Safeguards supervision, review of reports, support for corrective actions and compliance monitoring under financing requirements

Estimated Budget for Environmental and Social Measures

The total quantified environmental and social safeguards allocation presented in Table ES-14 is USD 6,251,533.69. This comprises two main components: USD 5,047,158.69 for implementation of the Resettlement RP and USD 1,204,375.00 for non- resettlement plan/RP &S implementation measures. A 5% of USD 6,251,533.69 (resettlement plan/RP & ESMMP) should be allocated as contingency budget.

The resettlement plan/RP allocation covers compensation, livelihood restoration, implementation support, resettlement-related grievance management, monitoring and the resettlement plan/RP Implementation Completion Audit. The non- resettlement plan/RP allocation comprises USD 700,250.00 for PIU-managed ESMMP implementation and monitoring, including permitting, safeguards capacity building, monitoring visits, right-of-way clearance support, communicable-disease awareness and independent environmental and social audits; USD 173,750.00 for implementation of the SEP and project-wide GM; USD 120,000.00 for implementation of the BV/SEA/SH Action Plan; and USD 210,375.00 for implementation of the BAP.

The SEP and project-wide GM *allocation consists of USD 48,500.00 for stakeholder engagement and disclosure activities and USD 125,250.00 for operation of the project-wide GM. The SEP component includes USD 9,000.00 for GBV/SEA/SH stakeholder awareness and communication of referral pathways. These activities are separate from the USD 120,000.00 GBV/SEA/SH Action Plan allocation, which finances specialist prevention and response measures, worker training, service-provider arrangements and survivor-centred support.*

Contractor site-level environmental, social, health and safety obligations, including occupational health and safety, traffic management, dust and erosion control, waste management, spill response, camp management, restoration and other C-ESMMP measures, are financed through the priced civil works BOQ and are therefore not included in the quantified PIU/RP allocation. This separation is intended to avoid double counting between PIU-managed safeguards costs and Contractor implementation costs. The ESIA provides indicative cost estimates for Contractor-implemented E&S mitigation measures, duly reconciled with the Engineer's Estimate. The Contractor will be required to submit a costed C-ESMP, including site-specific management plans, for approval by the Supervising Consultant and PIU prior to mobilization.

Table ES-9: Detailed ESMMP and RP Budget and Funding Sources

Budget Item	Coverage	Source of Funds / Responsibility	Amount (USD)	Local Currency Equivalent (LRD) [OO26.1]	Exchange Rate Reference

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RP implementation and related costs	Compensation, livelihood restoration, RP implementation support, resettlement-related grievance handling, RP monitoring and the one-time RP Implementation Completion Audit.	Bank / MPW / MFDP / Government of Liberia, as applicable	5,047,158.69	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
EPA permitting, license renewal and monitoring visits	EPA permitting acquisition and annual PIU/EPA/MME site visits.	PIU/MPW project funds	24,250.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
PIU safeguards capacity building	Training for the PIU Environmental and Social Safeguard Officers.	PIU/MPW project funds	60,000.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
PIU ESMMP monitoring site visits	Monthly monitoring by the PIU safeguards and technical team over the implementation period.	PIU/MPW project funds	456,000.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
ROW clearance implementation	Implementation support following RP compensation.	PIU/MPW project funds	35,000.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
Communicable-disease awareness and prevention	Six HIV/AIDS, COVID-19 and other communicable-disease campaigns.	PIU/MPW through qualified public-health service providers	75,000.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
Annual independent E&S performance audits	Four annual audits at USD 12,500.00 per year.	PIU/MPW through an independent, qualified and EPA-certified auditor	50,000.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
RP Implementation Completion Audit	One-time independent audit after completion of compensation and livelihood-restoration activities and before project closure. Financed within the cleared USD 100,000 RP monitoring allocation under RP Budget Item B.2; no additional amount is added here.	Cleared RP budget / PIU-PFMU	Included in RP budget	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
Consolidated SEP and project-wide GM	Core stakeholder engagement and disclosure (USD 48,500.00) plus project-wide GM implementation (USD 125,250.00).	PIU/MPW project funds	173,750.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342

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GBV/SEA/SH Action Plan implementation	Specialist prevention, training, referral and survivor-centred support.	PIU/MPW/MoG-CSP and qualified service providers	120,000.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
Biodiversity Action Plan implementation	Avoidance, pre-clearance checks, monitoring, restoration and capacity building.	PIU/MPW, independent biodiversity specialist and Contractor, as applicable	210,375.00	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342
Total quantified PIU/RP safeguards allocation	Cleared RP and PIU-managed ESMMP/SEP/GM/GBV/BAP costs; excludes C-ESMMP costs embedded in the priced works contract.	Combined project sources	6,251,533.69	To be calculated using the agreed PIU/PFMU project exchange rate	US$1 = LRD 170.342

Note: The LRD equivalent remains subject to calculation using the agreed PIU project exchange rate, as specified in the original table.

0.15 Overall Conclusion and Environmental and Social Acceptability

The ESIA concludes that the Buchanan–Cestos Junction Road Project is strategically important for Liberia and the Mano River Union region. It will improve connectivity between inland producers, coastal ports and neighboring countries, reduce travel time and transport costs, enhance access to services, improve road safety and stimulate local economic activity. The existing road corridor is already modified by long-term human activity and does not traverse protected areas or critical habitats within the direct 250 m Area of Influence.

The main adverse impacts relate to land acquisition, vegetation loss, erosion, dust, noise, water pollution, road safety, OHS, labour influx, GBV/SEA/SH, temporary access disruption, cultural heritage and livelihood impacts. These risks are significant but manageable through strict implementation of the ESMMP, Contractor ESMMP, RP , GM, monitoring programme, contractual EOHS clauses and institutional supervision arrangements.

Subject to implementation of the ESMMP and RP , continued stakeholder engagement, effective GM operation, compliance with the Environmental Protection and Management Law, EPA ESIA Procedural Guidelines, AfDB ISS, World Bank ESF and GIIP, the project is considered environmentally and socially acceptable and suitable for consideration for environmental permitting by EPA and continued financing by AfDB, World Bank other partners.

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1.0 INTRODUCTION

1.1 Background and Context

The Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP) is a multi-phase, multinational initiative of the Mano River Union (MRU) and its Member States—Liberia, Sierra Leone, Guinea, and Côte d'Ivoire—supported by the African Development Bank (AfDB), the World Bank (WB) and other partners. The overall Programme seeks to improve road infrastructure and transport services along key regional corridors to reduce transport costs, facilitate the free movement of persons and goods, promote regional trade and integration, and improve the living conditions of communities in the programme area. (Source: MRU/RDTFP Phase V Project documentation and AfDB Project records.)

Within this framework, the Government of Liberia (GoL), through the Ministry of Public Works (MPW), is implementing the "Paving of the Buchanan–Cestos City Junction Corridor (60.9 km)"—Phase V, Lot 1 of the MRU/RDTFP. The project section runs from the port city of Buchanan in Grand Bassa County to Cestos City Junction in Rivercess County, forming part of the strategic Buchanan–Greenville Coastal Highway corridor, which links the south-eastern counties to the rest of Liberia and to regional MRU/ECOWAS transport networks.

At present, the corridor is a laterite road that has evolved over more than five decades of use without being fully engineered. It is in very poor condition and is frequently impassable during the rainy season due to deep ruts, mud, and water-filled potholes. This results in high vehicle operating costs, long travel times, and periodic isolation of communities, with knock-on effects on access to markets, schools, health services, and administrative centres. The project, therefore, targets a critical bottleneck in the national and regional road network and is a priority intervention under Liberia's infrastructure agenda.

The present ESIA has been prepared for Lot 1 (Buchanan–Cestos City Junction, 60.9 km, including the spur to Buchanan Port), financed by AfDB, WB and other co-financiers together with the GoL. The Proponent is the Ministry of Public Works.

1.2 Project Objectives and Rationale

The development objective of the MRU/RDTFP is to improve road infrastructure and cross-border transport connectivity within the MRU area to facilitate trade, movement of people, and regional integration, thereby supporting post-conflict economic recovery and poverty reduction. Specifically for Liberia, the paving of the Buchanan–Cestos City Junction section aims to:

- Provide an all-weather, safe, and efficient road link between Buchanan and Cestos City Junction as part of the coastal highway and MRU regional corridor;
- Reduce vehicle operating costs and travel times for passengers and freight;
- Improve access of rural communities to markets, health, education, administrative and other essential services; and
- Stimulate agricultural production, trade, and private sector investment along the corridor.

The project is fully aligned with national and regional policies and strategies, including:

- **Liberia's National Transport Policy and Strategy (NTPS) and Transport Master Plan**, which priorities rehabilitation and paving of primary corridors, including the coastal road, to connect all county capitals and improve rural access. (roadsai.org)

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- **The ARREST Agenda for Inclusive Development (AAID, 2025–2029)**, which continues GoL's focus on infrastructure, connectivity, and regional integration, and under which the current project is explicitly recognized as part of the national road program.
- **Regional initiatives**, including the New Partnership for Africa's Development (NEPAD) infrastructure agenda, the Sub-Saharan Africa Transport Policy Programme (SSATP), and the ECOWAS Priority Road Transport Programme (PRTP), all promote investments in regional transport networks to enhance trade and social development.

In this context, the Buchanan–Cestos City Junction project represents a critical step toward opening Liberia's southeastern region, strengthening national cohesion, and consolidating MRU and ECOWAS integration.

1.3 OBJECTIVES OF THE ESIA

The Environmental and Social Impact Assessment (ESIA) has been commissioned to ensure that the project is planned and implemented in an environmentally sustainable and socially responsible manner, in line with national legislation, AfDB's Integrated Safeguards System (ISS), Environmental and Social Framework (ESF) and Good International Industry Practice (GIIP). The specific objectives of the ESIA are to:

1. **Support environmental permitting:** Provide the EPA of Liberia with the necessary environmental and social information to facilitate the review of the project and the determination of applicable environmental permitting requirements.
2. **Ensure legal and safeguard compliance:** Identify the applicable national environmental and social legislation, regulations, and permit conditions, together with the relevant World Bank ESF requirements.
3. **Assess environmental and social risks and impacts**: Identify, predict, and evaluate the potential positive and negative impacts associated with project preparation, construction, operation, maintenance, and the reinstatement of temporary construction facilities, as relevant. The assessment will address direct, indirect, and cumulative impacts on communities, workers, biodiversity, natural resources, and cultural heritage.
4. **Evaluate alternatives and apply the mitigation hierarchy:** Examine feasible project alternatives, including relevant design and alignment options, and apply the mitigation hierarchy by prioritizing impact avoidance, followed by minimization, mitigation, and compensation or offsetting where appropriate under applicable requirements. Measures to enhance positive project outcomes and manage residual impacts will also be identified.
5. **Develop E&S management measures:** Prepare ESMMP where consistent with project terminology, specifying mitigation measures, monitoring requirements, performance indicators, responsibilities, implementation schedules, and associated costs. Relevant supporting instruments may include a BAP, traffic and road safety measures, occupational health and safety provisions, community health and safety measures, pollution prevention measures, and emergency preparedness arrangements.
6. **Establish requirements for complementary instruments:** Identify the need for and support the preparation and implementation of complementary environmental and social instruments, as applicable, including a RP under ESS5, Labour Management Procedures and contractor occupational health and safety plans under ESS2, a SEP and

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grievance mechanisms under ESS10, biodiversity management measures under ESS6, and cultural heritage management procedures under ESS8. Measures for preventing and addressing GBV, SEA, and SH will be incorporated into the relevant project instruments according to the identified risks.

7. **Facilitate informed decision-making:** Provide the EPA of Liberia, the Government of Liberia, and the World Bank with a systematic assessment of project impacts, proposed mitigation measures, residual risks, and monitoring arrangements to inform environmental permitting, project design, financing, and implementation decisions.
8. **Promote inclusive stakeholder engagement:** Ensure meaningful, timely, and accessible consultation with project-affected people and other interested stakeholders, including local communities, landowners, farmers, businesses, women, vulnerable or disadvantaged groups, and relevant government institutions. Stakeholder feedback and local knowledge will be considered in project planning, impact assessment, mitigation measures, and implementation.
9. **Establish monitoring and accountability arrangements**: Define measurable performance indicators, monitoring procedures, reporting requirements, and corrective-action mechanisms to assess the effectiveness of mitigation measures, verify compliance with project commitments, and support continuous improvement in E&S performance throughout project implementation.

1.4 Scope of the ESIA

The spatial scope of the Environmental and Social Impact Assessment (ESIA) is defined in terms of the Project Area of Influence (AoI), comprising the areas within which direct, indirect and cumulative environmental and social impacts may reasonably occur.

Direct Area of Influence (DAI): The Direct Area of Influence comprises the full physical footprint of the Project and the areas within which direct construction and operational impacts may occur. This includes the existing and proposed Right of Way (ROW), road works, bridges and drainage structures, temporary construction areas and diversions, safety zones, and immediately affected land uses and sensitive receptors.

It also includes project-related facilities and activities located outside the road corridor, including construction camps, quarries, borrow pits, crushing or batching plants, stockpile and spoil disposal areas, access roads and haul routes, where these form part of the Project.

For baseline characterization and initial impact screening, a corridor extending approximately 250 m on each side of the existing road centreline along the 60.9 km alignment may be used as a practical spatial assessment area for impacts such as dust, noise, vibration, access disruption, community health and safety, biodiversity disturbance and effects on adjacent land uses. The 250 m corridor does not constitute a fixed boundary of the Direct Area of Influence. Where Project activities, ancillary facilities or direct impact pathways extend beyond this corridor, the Direct Area of Influence extends accordingly.

The existing road corridor has been substantially modified through more than 50 years of use as a laterite road and through adjacent settlement, agriculture, small-scale trade, artisanal activities and other human uses. Field surveys did not record species of conservation concern within the surveyed road corridor. This finding should not be interpreted as applying to the entire

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Project Area of Influence or as confirming the absence of natural or critical habitat. Natural habitats, wetlands, riparian areas and other biodiversity-sensitive receptors within the wider landscape remain relevant to the assessment and to site-specific screening of ancillary facilities and off-corridor Project activities.

Indirect Area of Influence (IAI): The Indirect Area of Influence includes communities, environmental receptors and geogRP hic areas that may experience reasonably foreseeable secondary or induced effects associated with the Project. These include communities dependent on the road for access to markets, employment and services; downstream rivers, streams, wetlands and associated catchments; and areas potentially affected by changes in accessibility, economic activity, population movement, land use, settlement patterns and pressure on natural resources. The extent of the Indirect Area of Influence varies according to the impact pathway and is therefore not defined by a single fixed distance from the road..

- **Regional Context**: At a broader scale, the project forms part of the Buchanan–Greenville Coastal Highway and the MRU regional corridor. The ESIA therefore qualitatively considers transboundary and regional issues such as regional trade flows, connectivity to ports and borders, and cumulative impacts with other MRU/RDTFP phases and road projects in the south-eastern region.

Temporal Scope

The ESIA covers the full project life-cycle, including:

- **Pre-construction and construction**: planning, detailed design, site preparation, land acquisition and resettlement, vegetation clearing, earthworks, materials extraction and transport, construction of bridges and drainage works, pavement works, ancillary facilities, workers' camps, and demobilization.
- **Operation and maintenance**: routine and periodic maintenance, traffic operations, road safety, drainage maintenance, and induced development along the corridor.
- **Decommissioning or major rehabilitation**: although not expected in the near term, the ESIA outlines principles for managing environmental and social risks in the event of substantial upgrading, rehabilitation, or decommissioning in the future.

Thematic Scope

Consistent with national requirements, applicable E&S standards, the ESIA addresses an integrated set of biophysical and socio-economic themes, including but not limited to:

- **Physical environment**: climate and meteorology; air quality and noise/vibration; geology and soils; surface and groundwater resources and quality; erosion and sedimentation; and landscape/visual aspects.
- **Biological environment**: terrestrial and aquatic habitats; flora and fauna; critical habitats; ecosystem services; and invasive species risks.

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- **Socio-economic environment: land use and land tenure; population and settlement patterns; livelihoods (with emphasis on agriculture, fishing, forestry,** and petty trade); employment and income; vulnerable groups; cultural heritage; and community structures.

- **Human health and safety**: occupational health and safety; community health and safety; traffic and road safety; communicable diseases (including HIV/AIDS, STIs, and COVID-19); vector-borne and water-borne diseases; emergency preparedness and response.

- **Gender, GBV and SEAH**: gender roles and dynamics; differentiated project impacts on women, men, youth, and persons with disabilities; risks of gender-based violence (GBV), sexual exploitation, abuse, and harassment (SEAH), violence against children (VAC), and child labour; and mitigation and response measures.

- **Labour and working conditions**: terms and conditions of employment, workers' rights, occupational health and safety, workers' accommodation, and grievance mechanisms.

- **Climate change and disaster risk**: climate baseline and trends; greenhouse gas (GHG) emissions; climate resilience of the road (flooding, intense rainfall, temperature extremes); and contribution to Liberia's Nationally Determined Contribution (NDC) and National Adaptation Plan (NAP).

- **Cumulative and induced impacts**: in combination with other existing, planned or reasonably foreseeable projects and programmes, particularly other phases of the MRU/RDTFP and related infrastructure investments in the region.

1.5 ESIA Approach and Methodology

Alignment with EPA ESIA Process

The ESIA is carried out in accordance with the Revised ESIA/SEA Procedural Guidelines of Liberia (EPA/003/03-22, 2022), which defines the national ESIA process and its key stages: screening, scoping, Terms of Reference approval, impact assessment, public participation, review and decision-making, and monitoring and auditing.

Key steps followed are described below:

- **Application/notification and screening:** The Project was subject to the EPA screening process to determine the required level of assessment. Based on its type, scale and potential E&S risks, the road is classified as Category A (Major) under the EPA process and Category 1 under the AfDB ISS. Under the WB ESF, LECO (P513497), under which the Buchanan–Cestos City Junction Road is co-financed, is classified as High E&S Risk, comprising Substantial environmental risk and High social risk. The ESIA and associated instruments are therefore required to meet applicable national requirements, and WB ESSs.

- **Scoping and Terms of Reference**: Early engagement with national, county and local stakeholders was undertaken to identify key issues, sensitive receptors and information needs, and to define the spatial and thematic scope of the ESIA. The scoping process

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informed the preparation of detailed Terms of Reference, which were approved by the EPA.

- **Baseline data collection**: Integrated environmental, social and health baseline data were collected through a combination of literature review, field surveys, sampling and community consultations, as described below.

- **Impact identification and evaluation**: Potential impacts were identified for all project phases and receptors, and evaluated in terms of magnitude, extent, duration, reversibility and likelihood, taking account of existing conditions and cumulative effects.

- **Mitigation and enhancement measures** were developed following the mitigation hierarchy (avoid, minimize, restore, offset/compensate) and consolidated into an ESMMP with clear responsibilities, performance indicators, budget and monitoring arrangements.

- **Stakeholder engagement and disclosure**: Stakeholder engagement was undertaken throughout the ESIA process in line with EPA Guidelines and WB ESS10. with a Grievance Mechanism established to handle complaints and feedback.

- **Disclosure, review and permitting:** The ESIA is subject to EPA technical review, public disclosure and consultation or hearing requirements, as applicable, followed by EPA decision-making and environmental permitting.
- **Implementation and compliance monitoring:** monitoring of ESMMP implementation, permit conditions and project performance during construction and operation, including corrective action and environmental audits where required.

Application of GIIP and International Safeguard Frameworks

In addition to national requirements and WB's ESSs, the ESIA has been guided by Good International Industry Practice (GIIP), including:

- **World Bank Group Environmental, Health and Safety (EHS) Guidelines (2007)**, particularly the General EHS Guidelines and sector-specific guidance for construction and road projects, which provide quantitative and qualitative benchmarks for emissions, effluents, noise, occupational health and safety, and community safety.

These instruments have been used to benchmark the project's performance and to shape the ESMMP and associated management plans in areas where national standards are absent or less stringent.

Methods and Tools

The ESIA employed a combination of qualitative and quantitative methods to ensure a robust and evidence-based assessment:

- **Desk review and secondary data analysis**: Compilation and review of relevant laws, policies, strategies, and plans (national, MRU, and regional), previous studies, maps,

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satellite imagery, climate data, and published information on biophysical and socio-economic conditions in Grand Bassa and Rivercess Counties.

- **Field surveys – biophysical environment**:
  - Reconnaissance surveys along the 60.9 km corridor to characterize topogRP hy, drainage, landforms, and land use;
  - Ecological walk-over surveys within the 250 m to identify habitat types, flora and fauna (including any species of conservation concern), and sensitive receptors such as wetlands, watercourses, and community forests;
  - Noise and vibration measurements at representative locations near settlements and sensitive receptors; and
  - Collection of soil and water samples at strategic locations (e.g. river crossings, low-lying sections and representative farmland areas) for laboratory analysis.

Soil and surface water samples collected between 6 and 14 January 2025 were analyzed at the University of Liberia Civil Engineering Laboratory against relevant national and international standards, including Liberia Water Quality Standards (LWQS). Analytical results for water and soil quality are presented in Annex VI (UL Civil Engineering Laboratory Analytical Results Report).

- **Socio-economic baseline survey (SEBS): A structured household survey was undertaken across project-affected communities (PACs) along the corridor using tablet-based** questionnaires (Kobo Toolbox). A total of 100 households were randomly sampled across the four project-associated counties, complemented by key informant interviews, focus group discussions, and town-hall meetings to capture qualitative information on livelihoods, vulnerability, perceptions of the project, and expectations regarding benefits and risks.

- **Participatory methods and stakeholder engagement**: Open community meetings, targeted focus group discussions (e.g., women, youth, elders, persons with disabilities and the PAPS of the project), and interviews with institutional stakeholders (EPA, MPW, county authorities, sector ministries, CSOs) were conducted at national and local levels. Stakeholder identification, analysis, and engagement methods followed WBESS10 and EPA 2022 Guidelines, and a Grievance Mechanism (GM) was designed and discussed with communities.

- **Impact assessment tools**: Impacts were identified using checklists, interaction matrices, and expert judgment. Significance ratings considered the nature, magnitude, geogRP hic extent, duration, reversibility, probability, and sensitivity of receptors, as well as the effectiveness of proposed mitigation measures. Where appropriate, comparative and scenario analysis were used to examine alternatives.

- **Risk and cumulative impact analysis**: Specific attention was given to high-risk issues such as road safety, GBV/SEAH, child labour, influx of workers, and climate and disaster risks. Cumulative impacts were assessed qualitatively by considering other existing and

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planned projects in the corridor, including other MRU/RDTFP lots and related infrastructure investments.

ECONOMIC INFORMATION AND PROJECT BENEFITS

Economic Evaluation Overview

In accordance with applicable national and lender E&S requirements of World Bank, requirements of the Environmental Protection and Management Law (EPML, 2023), the EPA ESIA Procedural Guidelines (2022), and AfDB's Integrated Safeguards System (ISS), an economic appraisal of the Buchanan–Cestos Junction Road improvement has been undertaken as part of the overall feasibility study. This ESIA chapter summarizes the key parameters, assumptions, and categories of costs and benefits considered in the economic evaluation and highlights the principal development benefits for Liberia and the wider MRU region.

The economic analysis is based on a "with project" and "without project" comparison over the economic life of the road (typically 20–30 years), using a standard social discount rate (to be confirmed by Government and AfDB guidelines) and expressed in constant prices. The main elements of the appraisal are summarized in the table below.

Table 1 summarizes the main categories of costs and benefits used in the economic appraisal framework.

Table 1: Main Categories of Costs and Benefits in Economic Appraisal

Category	Sub-Category	Description/Examples
Economic Costs	Capital investment	Civil works, structures, road safety features, and ancillary facilities
	Maintenance	Routine and periodic maintenance over the project's life
	E&S management and resettlement	ESMMP implementation, monitoring, RP /ARP implementation, livelihood restoration
	Residual negative externalities	Non-mitigable environmental and social impacts (where quantifiable)
Economic Benefits	Vehicle operating cost savings	Lower fuel, oil, tyre wear, maintenance, depreciation due to better road surface and geometry
	Travel time savings	Reduced passenger and freight travel times, including reliability gains
	Accident cost reduction	Lower fatalities, injuries, and property damage due to improved road standards and safety measures
	Accessibility & connectivity	All-weather access to markets, health and education services, and administrative centres
	Trade facilitation & regional integration	Enhanced cross-country and MRU trade flows and logistics efficiency
	Wider economic impacts	Increased agricultural output, business development, land value changes, and induced investments

Key economic indicators—EIRR, NPV, and BCR—are detailed in the project's Economic Feasibility Report and are summarized and cross-referenced in this ESIA to support the assessment of the project's overall viability (Note: EIRR-Economic Internal Rate of Return: The discount rate at which the net present value of a project's economic benefits equals its costs; a higher EIRR indicates a more economically attractive project; NPV-Net Present Value: The total value of projected benefits minus costs, discounted to present terms; a positive NPV indicates the project is economically worthwhile.

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BCR-Benefit–Cost Ratio: The ratio of the present value of benefits to the present value of costs; a BCR greater than 1 show that benefits exceed costs.)

ECONOMIC AND SOCIAL BENEFITS

The paving and upgrading of the road are expected to generate significant economic and social benefits at local, national, and regional levels. Key benefit streams include:

1. **Travel Time Savings**
   - Improved road surface and geometry will increase average travel speeds and reduce congestion and delays, particularly in the rainy season when the existing laterite road becomes difficult to pass.
   - Time savings accrue to:
     - Passengers (commuters, traders, students, patients).
     - Freight transporters (agricultural produce, timber, consumer goods).
   - Reduced travel time enhances access to education, health, markets, and administrative services.

2. **Vehicle Operating Cost (VOC) Savings**
   - Paved surfaces reduce fuel consumption, tyre wear, and repairs, lowering operating costs for cars, minibuses, trucks, and motorcycles.
   - These savings can translate into lower transport tariffs, improved profitability for transport operators, and more affordable services for users.

3. **Trade Facilitation and Regional Integration**
   - The road forms part of the Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP), strengthening economic ties between Liberia and neighboring countries via improved connectivity to Buchanan Port and inland production areas.
   - Enhanced logistics efficiency supports growth in agricultural exports, forestry products, small and medium enterprise (SME) development, and cross-border trade.

4. **Employment and Skills Development**
   - Direct employment during construction of skilled and unskilled workers from local communities.
   - Indirect employment through supply chains (quarries, suppliers, services, catering, accommodation).
   - Capacity building and skills transfer in road construction, environmental management, health and safety, and community liaison.

5. **Poverty Reduction and Social Inclusion**
   - Better connectivity reduces isolation of rural communities, improves access to social services and economic opportunities, and supports smallholder farmers and petty traders.
   - Women, youth and vulnerable groups benefit through improved mobility, safer travel conditions, and increased access to labour markets and services.

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6. **Road Safety Improvements**
    - Provision of road safety features (signage, markings, speed calming measures, pedestrian crossings, guardrails) will reduce accident rates and associated human and economic losses.

Table 2 provides a qualitative summary of the main economic and social benefits.

Table 2: Summary of Key Economic and Social Benefits

Benefit Category	Description	Main Beneficiaries
Travel time savings	Faster journeys, less time lost in transit	Passengers, drivers, businesses
VOC savings	Reduction in fuel, tyres, repair, and maintenance costs	Public and private transport operators
Trade facilitation	Greater volumes of goods moved efficiently, resulting in lower logistics costs	Farmers, traders, exporters, importers
Employment and skills	Construction and maintenance jobs, on-the-job training	Local communities, women, youth, and skilled workers
Access to services	Improved access to schools, health facilities, markets, and administrative centres	Rural and peri-urban households
Road safety	Fewer crashes, reduced fatalities and injuries	All road users and nearby residents
Regional integration	Improved connection to the MRU corridor and port facilities	National and regional economies

DISTRIBUTIONAL IMPACTS

The project's benefits and costs will be distributed among various stakeholder groups along the corridor and beyond. While the economic analysis uses aggregate values, the ESIA considers distributional aspects to support equitable and inclusive development in line with AfDB OS7 (Vulnerable Groups) and OS5 (Resettlement).
Key distributional aspects include:

- **GeogRP hic Distribution**
    - Primary benefits accrue to communities directly along the 60.9 km corridor and those served by feeder roads connecting to the upgraded road.
    - Secondary benefits extend to regional traders and users accessing Buchanan Port and inland markets.

- **Social Groups**
    - **Rural households and smallholder farmers:** gain from improved market access, lower transport costs for inputs and outputs, better access to health and education.
    - **Transport operators and drivers:** benefit from VOC savings and increased traffic volumes but may incur higher regulatory and compliance requirements (road safety, vehicle inspections).
    - **Women and girls:** benefit from employment opportunities (women), safer and more reliable access to health facilities, markets and schools, but may face heightened GBV/SEAH risks if not properly managed during construction.
    - **Youth:** benefit from employment opportunities during construction and induced economic activities but also face traffic safety and social risks.
    - **Persons with disabilities and elderly people:** gain improved physical accessibility but may require specific safety and design measures (e.g., crossings, signage).

- **Potential Adverse Distributional Effects**

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- Land acquisition and resettlement may disproportionately affect poorer households, tenants, informal businesses, and vulnerable groups along the right of way.
- Increased land values and commercialization can benefit landowners but may disadvantage landless or marginalized groups if not mitigated.

Table 3 summarizes the main distributional impacts by groups:

Table 3: Distributional Impacts by Stakeholder Group (Qualitative)

Stakeholder Group	Main Positive Impacts	Potential Negative Impacts / Risks
Smallholder farmers	Better market access, higher farm-gate prices, and more buyers	Land acquisition, competition for land, and market volatility
Transport operators & drivers	Lower VOCs, higher demand, better working conditions	Enforcement of safety standards, potential route competition
Women and girls	Safer access to services, economic opportunities	GBV/SEAH risks, increased care burden if resettled
Youth (men and women)	Employment, skills development, and entrepreneurship opportunities	Risk-taking behaviour, exposure to social vices, and accidents
Vulnerable groups (elderly, persons with disabiity)	Easier travel to health and social services	Exclusion if designs ignore accessibility and safety needs
Businesses and traders	Lower transport costs, expanded markets	Higher rents, competition, and potential displacement

Mitigation and enhancement measures in the ESMMP and RP /ARP aim to maximize benefits for vulnerable groups and minimize adverse distributional effects.

Environmental and Social Externalities in the Economic Analysis

In line with Good International Industry Practice (GIIP), the project's economic evaluation considers major environmental and social externalities to the extent they can be reasonably quantified or valued. These include:

- **Negative Externalities (Costs)**
  - Residual impacts on land, water, air quality, noise, and biodiversity that remain after mitigation (e.g. loss of some trees, incremental traffic emissions).
  - Social costs are associated with physical and economic displacement, temporary disruption to livelihoods, and community cohesion during construction.
  - Risk-based valuation of residual accident and health impacts (e.g. traffic accidents, communicable diseases) if quantification data are available.
- **Positive Externalities (Benefits)**
  - Reductions in current high accident rates due to improved road design and safety interventions.
  - Health benefits associated with quicker access to emergency medical care and health services.
  - Climate-related benefits of more efficient road traffic (reduced congestion and idling), although these may be offset by induced traffic.

Where robust quantitative data are not available, these externalities are addressed qualitatively in the ESIA and reflected in the design of mitigation measures, monitoring programmes, and contingency provisions in the ESMMP and RP /ARP budgets.

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Report Structure

Consistent with the EPA requirements and ESS1, the ESIA should be structured to address the following core elements:

Proposed ESIA Section	Principal Content
1. Executive Summary	Significant E&S findings, material risks and impacts, key mitigation measures, implementation requirements and recommended actions.
2. Legal and Institutional Framework	Applicable national requirements, AfDB ISS, WB ESF, EHSGs and GIIP; institutional responsibilities; comparison of national requirements with the ESSs and identification of material gaps; requirements of co-financiers.
3. Project Description and Area of Influence	Project components and activities, design, construction and operation; ROW and physical footprint; ancillary and off-site facilities; primary suppliers where relevant; AoI and affected receptors; maps; identification of complementary E&S instruments required.
4. Analysis of Alternatives and Design Measures	No-project alternative; feasible alignment, design, technology, siting and construction alternatives; E&S comparison of alternatives; basis for the selected design and integration of mitigation into engineering design.
5. Environmental and Social Baseline	Relevant physical, biological and socioeconomic conditions; sensitive receptors; baseline data sources and dates; data quality, limitations and gaps; anticipated changes before Project implementation; other existing or planned developments relevant to cumulative impacts.
6. E&S Risk and Impact Assessment	Direct, indirect, induced and cumulative risks and impacts across the Project lifecycle; assessment of significance; relevant requirements under ESS1 to ESS10; impacts on disadvantaged and vulnerable groups; residual risks and impacts.
7. Mitigation and Management Measures	Application of the mitigation hierarchy; differentiated measures for vulnerable groups; management of significant residual impacts; feasibility, cost and institutional requirements of mitigation; linkages to the RP , LMP, SEP, GBV/SEA/SH measures, BAP and other management instruments.
8. ESMMP	Consolidated mitigation and monitoring requirements; responsibilities; implementation schedule; indicators and targets; institutional capacity; training; reporting; corrective action; Contractor requirements; costs and financing.
9. Stakeholder Engagement and GM	Summary of engagement undertaken during the ESIA, issues raised and how they influenced assessment/design; disclosure arrangements; interface with the SEP and project and worker GMs.
10. Key Measures and Actions for the ESCP	Material measures, actions, responsibilities and timing required to close outstanding gaps and meet applicable ESS requirements.
11. Appendices	ToR, preparers, references, consultation records, baseline data, maps, specialist studies and list/cross-references to associated E&S instruments.

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2.0 POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK

2.1 National Policy and Legal Framework

Constitutional and Overarching Environmental Framework

The 1986 Constitution of the Republic of Liberia establishes the State's responsibility to manage natural resources in the public interest and to protect the environment for present and future generations (e.g., Articles 7 and 9, promoting sustainable use and international cooperation).

Liberia's environmental assessment framework is principally established by the EPA Act and EPML, with the Revised ESIA/SEA Procedural Guidelines providing the detailed requirements for environmental assessment, review, permitting and compliance monitoring. The Project is also subject to sectoral legislation and policies relating to land, labour, public health, biodiversity, forestry, transport, road safety, gender, child protection and waste management. The principal instruments and their relevance to the Project are summarized in Table 4.

Table 4: Key National Legal and Policy Instruments Relevant to MRU/RDTFP

No.	Instrument	Key Provisions Relevant to the Project	Implications for MRU/RDTFP
1	**EPA Act (2002)**	Establishes the EPA as the lead environmental regulator; mandates environmental monitoring, permitting, and enforcement.	ESIA approval, environmental permitting, compliance monitoring, and enforcement for the road project are under the EPA's authority.
2	**Environmental Protection and Management Law (EPML, 2002/2003)**	Provides the legal basis for ESIA, environmental standards, pollution control, ecosystem protection, public participation, and offences.	The project must obtain an ESIA permit, adhere to pollution and waste norms, apply the mitigation hierarchy, and allow public participation.
3	**Revised ESIA / SEA Procedural Guidelines (2021/2022)**	Details the ESIA process and required contents; defines screening, scoping, impact assessment, review, decision, and follow-up steps.	ESIA content and process for this road project must align with these guidelines, including Notice of Intent, scoping, and public consultation.
4	**National Environmental Policy (2003)**	Sets national objectives for environmental protection, sustainable resource use, pollution control, environmental education, and EIA.	Guides the project towards minimizing degradation, conserving biodiversity, and contributing to sustainable development.
5	**Land Rights Act (2018)**	Defines land categories (public, government, customary, private), recognizes customary/community land, and requires free, prior, and informed consent (FPIC) for use of community land.	Land acquisition, access, and use of quarries/borrow areas must respect customary rights and FPIC, coordinated with the Liberia Land Authority and communities.
6	**National Forestry Reform Law (2006)** and **Community Rights Law with Respect to Forest Lands (2009)**	Provides for sustainable forest management, conservation areas, commercial logging, community forestry and public participation in forest decisions.	Any vegetation clearance, roadside wood harvesting, or use of forest land for camps/borrow sites must be consistent with FDA rules and community rights.
7	**Public Health Law (Title 33) & revised Public Health Law (2019)**	Regulates environmental sanitation, water supply, waste management, disease control and health protection.	Construction camps, borrow areas, waste handling, dust, noise and traffic safety must comply with public health and sanitation provisions.
8	**Decent Work Act (2015)**	The principal labour law sets minimum employment standards,	Contractor(s) must provide decent work conditions, ensure OHS, avoid

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No.	Instrument	Key Provisions Relevant to the Project	Implications for MRU/RDTFP
		prohibits forced and child labour, regulates working hours, OHS, and labour relations.	child/forced labour and respect workers' rights and grievance mechanisms.
9	**Children's Law (2011)**	Domesticates the CRC; provides a Bill of Rights for children, including protection from harmful work, abuse, exploitation and neglect.	The project must prevent child labour in construction supply chains and manage SEA/SH and child-protection risks in communities along the corridor.
10	**National Gender Policy (2009) and Revised National Gender Policy 2018–2022**	Provides a framework for gender equality, women's empowerment, gender mainstreaming and GBV prevention/response.	ESIA/ESMMP must integrate gender analysis, promote equitable access to benefits, and address GBV/SEA/SH risks related to the influx of workers and road operations.
11	**Domestic Violence Act (2019)** and **RP e Amendment Act (2005/2006)**	Criminalizes domestic violence, strengthens penalties for RP e and gang RP e, and supports GBV prevention and survivor protection.	The project's GBV/SEA/SH Action Plan, Codes of Conduct and grievance mechanisms must align with national GBV laws and referral pathways.
12	**National Transport Policy & Strategy (2008/2009)** and **National Transport Master Plan (2012; updated 2023)**	Prioritizes rehabilitation and maintenance of primary, secondary and feeder roads, promotes safe and efficient transport, regional connectivity and poverty reduction.	MRU/RDTFP directly supports national priorities to improve road access, lower transport costs and foster regional integration with Côte d'Ivoire, Guinea and Sierra Leone.
13	**Road Safety Action Plan (2018–2021) and subsequent road safety initiatives**	Addresses road safety management, safer roads and mobility, safer vehicles, safer users, and post-crash response.	Design and operation of the road must incorporate road safety engineering, traffic calming, signage, and institutional coordination.
14	**Solid Waste Management and related regulations (e.g. National Solid Waste Management Policy 2024)**	Establishes responsibilities for solid waste management and pollution control, coordinated by the EPA and local governments.	Construction and operational waste from the project must be collected, transported, treated, and disposed of in line with national standards and EPA requirements.

In addition, Liberia is party to a broad range of human rights instruments (e.g. ICCPR, ICESCR, CEDAW, CRC, African Charter on Human and Peoples' Rights, African Charter on the Rights and Welfare of the Child), which underpin national legislation on non-discrimination, labour, GBV and child protection and are relevant for the project's social safeguards.

2.2 LIBERIA EPA ESIA PROCEDURAL GUIDELINES (2022)

The **Revised ESIA/SEA Procedural Guidelines (Instrument No. EPA/003/03-- 22) provide** detailed administrative steps for preparing and reviewing ESIAs in Liberia. They build on earlier 2006 and 2017 guidelines and are issued pursuant to the EPML.

i. ESIA Process and Operating Stages

The guidelines set out the following main stages in the ESIA process:

a) **Application for ESIA Permit** – the proponent submits a formal request to EPA prior to project commencement.
b) **Submission of Project Brief** – a concise description of the project, its location and potential impacts, used by EPA and line ministries for initial appraisal.

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c) **Screening** – EPA, in consultation with line ministries, determines whether the project requires:
   - a full ESIA,
   - a limited ESIA or EMP, or
   - no further assessment (with or without conditions).

d) **Notice of Intent (NoI)** – if a full ESIA is required, the proponent publishes a Notice of Intent in national and local media, describing the project and inviting public participation.

e) **Scoping and Terms of Reference (ToR)** – identification of key environmental and social issues, definition of the area of influence (here a 250 m direct AoI plus broader project influence area), stakeholder mapping, and preparation of detailed ToR for the ESIA study.

f) **Impact Analysis** – systematic identification, prediction, and evaluation of potential biophysical, socio-economic, health, cultural, and cumulative impacts during construction, operation, and decommissioning.

g) **Evaluation of Significance** – assessment of the importance and acceptability of predicted impacts, taking into account magnitude, sensitivity, duration, reversibility, and stakeholder concerns.

h) **Mitigation and Impact Management** – development of mitigation measures, alternatives, environmental and social management plans (ESMMPs), and monitoring plans to avoid, minimize, restore, or offset significant adverse impacts, and to enhance positive impacts.

i) **Preparation of ESIA Report / Environmental Impact Statement (EIS)** – documentation of the ESIA process, baseline, alternatives, impact analysis, mitigation, ESMMP, public consultation and conclusion.

j) **Review of the ESIA** – EPA and a multi-sectoral review committee assess whether the ESIA meets the ToR, the guidelines, and legal requirements, and whether it provides adequate information for decision-making.

k) **Decision-Making** – EPA issues an environmental permit with conditions, or rejects the project, or requests additional information or redesign.

l) **Follow-up, Monitoring and Environmental Audit** – EPA oversees implementation of permit conditions, monitoring commitments, and periodic audits to verify compliance and effectiveness of mitigation.

2.3 INSTITUTIONAL FRAMEWORK

Implementation of the MRU/RDTFP Lot 1 in Liberia will involve several national institutions with distinct mandates and responsibilities.

i. Environmental Protection Agency (EPA)

The EPA is the lead environmental regulator, established by the EPA Act and mandated by the EPML to:

- Develop and enforce environmental policies, regulations, and standards;

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- Administer ESIA/SEA processes and issue environmental permits;
- Coordinate environmental management with line ministries and local authorities;
- Monitor compliance, inspect sites, and enforce corrective measures;
- Coordinate implementation of multilateral environmental agreements (MEAs).

For this project, EPA will: (i) oversee the ESIA and permit process; (ii) approve the ESMMP and related plans; (iii) monitor implementation; and (iv) liaise with development partners and other regulators.

ii. Ministry of Public Works (MPW) and Infrastructure Implementation Unit (IIU) / Project Implementation Unit (PIU)

The Ministry of Public Works (MPW) is responsible for planning, constructing, and maintaining national road infrastructure. Its **Infrastructure Implementation Unit (IIU)** is a specialized agency mandated to execute high-impact, donor-funded, large-scale infrastructure projects, including road projects.

For MRU/RDTFP Lot 1:

- MPW is the Executing/Implementing Agency for the Liberia section of the programme.
- The IIU/PIU is responsible for day-to-day project management, including procurement, supervision of contractors, safeguards implementation, monitoring, and reporting to EPA, AfDB, and the Government.
- The IIU Social and Environmental Safeguards Office coordinates ESIA implementation, stakeholder engagement, grievance redress, and monitoring along the corridor.

iii. Other National Ministries and Agencies

Other key institutions include:

a) **Liberia Land Authority (LLA)** – regulates land tenure, land administration, and land use planning; oversees implementation of the Land Rights Act and processes related to acquisition of customary and private land.

b) **Forestry Development Authority (FDA)** – manages forest resources, protected areas, and community forests; authorizes forest land use, timber harvesting, and ensures compliance with forestry laws.

c) **Ministry of Mines and Energy (MME)** – issues licenses for quarrying, borrow pits, and extraction of construction materials; regulates mining safety and environmental obligations in coordination with EPA.

d) **Ministry of Transport (MoT)** – responsible for transport policy, road safety regulation, vehicle inspection, and driver licensing; collaborates with MPW on implementation of the National Transport Master Plan.

e) **Ministry of Health (MoH)** – regulates public health, environmental sanitation, and disease control under the Public Health Law; supports health impact management, surveillance, and emergency preparedness along the corridor.

f) **Ministry of Labour (MoL)** – enforces the Decent Work Act and labour standards, including OHS, minimum wages, and prohibition of child labour.

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g) **Ministry of Gender, Children and Social Protection (MGCSP)** – leads on gender equality, GBV prevention and response, implementation of the National Gender Policy, GBV Action Plans, and the Domestic Violence Act, and child protection.

h) **Ministry of Internal Affairs (MIA)** and **local governments (county and district administrations)** – coordinate with traditional authorities and community structures on land access, grievance resolution, community development, and local infrastructure.

i) **County and District Administrations** along the road corridor play key roles in local development planning, issuance of local authorizations (e.g. siting of markets or truck parks), and coordination of community engagement.

j) **Traditional leaders and community governance structures** (clan chiefs, town chiefs, elders, women's and youth groups) are central for consultation, land and resource use negotiations, conflict resolution, and ensuring culturally appropriate communication in local languages.

k) **Ministry of Information, Cultural Affairs and Tourism (MICAT)** – responsible for cultural heritage, monuments and relics, and promotion of tourism; collaborates with EPA on chance-find procedures and cultural heritage management.

The ESIA process and ESMMP implementation are designed to ensure meaningful participation of these stakeholders, in line with **EPA guidelines and the WB ESSs**.

2.4 INTERNATIONAL AND LENDER E&S FRAMEWORK

The Project was originally prepared under the AfDB ISS and is now subject to WB ESF requirements through WB co-financing. This version of the ESIA has therefore been updated to ensure alignment with the applicable WB ESSs, while maintaining consistency with the AfDB ISS and national requirements.

There is substantial convergence between the two frameworks. Both require risk-based E&S assessment, application of the mitigation hierarchy, management of labour and community risks, pollution prevention, resettlement and livelihood restoration, biodiversity protection, cultural heritage management and stakeholder engagement.

The principal differences relate to the formulation, scope and level of specificity of individual requirements. The updated ESIA addresses these differences by incorporating the additional analysis, management measures and implementation requirements needed to ***align with the WB ESF while retaining compliance with the AfDB ISS.***

ESS1 also requires the legal and institutional assessment to consider co-financier requirements and identify gaps between the Borrower framework and the ESSs.

Table 3 below provides a ***comparison of AfDB ISS and WB ESSs*** and identifies the key differences, if any.

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Table 5: Alignment of AfDB OSs

WB ESS	Corresponding AfDB OS	Principal Convergence	Key Difference / WB Alignment Consideration
ESS1	**OS1**	Integrated E&S assessment, risk management, mitigation hierarchy, alternatives, ESMMP, monitoring and adaptive management.	WB ESS1 places explicit emphasis on direct, indirect and cumulative impacts, Associated Facilities, primary suppliers, data gaps, alternatives, institutional capacity and linkage of outstanding actions to the ESCP.
ESS2	**OS2**	Labour conditions, non-discrimination, OHS, worker protection and worker GM.	Review should confirm WB requirements for direct, contracted and primary supply workers, worker GM, OHS and contractor management are fully reflected.
ESS3	**OS3**	Resource efficiency, pollution prevention, waste, hazardous materials, emissions and efficient resource use.	WB alignment should explicitly reference applicable EHSGs and justify any deviation from their performance levels.
ESS4	**OS4**	Community health and safety, traffic safety, hazardous materials, emergencies and security risks.	WB ESS4 requires explicit assessment of traffic and road safety throughout the Project lifecycle, emergency preparedness, community exposure and universal access where applicable.
ESS5	**OS5**	Avoidance/minimization of displacement, replacement-cost compensation, livelihood restoration and consultation.	WB alignment should confirm ESS5 eligibility, informal/customary users, livelihood restoration, timing of compensation before displacement, transitional support and completion monitoring.
ESS6	**OS6**	Biodiversity conservation, habitat protection, ecosystem services and mitigation hierarchy.	WB ESS6 requires explicit differentiation of modified, natural and critical habitat and assessment of primary supply risks where natural-resource commodities are involved.
ESS7	**OS7, partly**	Both address groups requiring differentiated protection and meaningful consultation.	**Not equivalent.** AfDB OS7 addresses vulnerable groups broadly. WB ESS7 applies specifically to Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities. General vulnerability under WB is addressed principally through ESS1, ESS10 and relevant sector ESSs.
ESS8	**OS8**	Protection of tangible and intangible cultural heritage and chance finds.	Broadly convergent. WB alignment should verify identification, consultation, avoidance and management of legally protected and culturally significant heritage.
ESS9	**OS9**	E&S management by FIs.	Not applicable to the road unless financing is channeled through an FI.
ESS10	**OS10**	Stakeholder identification, meaningful engagement, disclosure and GM.	WB ESS10 places particular emphasis on proportionality, differentiated engagement of disadvantaged/vulnerable groups, ongoing engagement throughout the lifecycle and documented stakeholder feedback.

Table 1: Alignment of WB ESSs

1	**World Bank Environmental and Social Framework (ESF, 2018)**	Establishes the overarching framework for identifying, assessing, and managing environmental and social risks and impacts of World Bank-financed projects. Requires risk-based assessment, mitigation, monitoring,	The ESIA and ESMMP must address the applicable ESS requirements, define environmental and social commitments, establish monitoring and reporting arrangements, and identify responsibilities for implementation and corrective action.

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		stakeholder engagement, and adaptive management.	
2	**ESS1: Assessment and Management of Environmental and Social Risks and Impacts**	Requires assessment and management of environmental and social risks throughout the project lifecycle, consideration of alternatives, application of the mitigation hierarchy, and monitoring of mitigation effectiveness.	The ESIA must assess direct, indirect, and cumulative impacts within the relevant area of influence, identify associated facilities where applicable, and establish an ESMP/ESMMP with measurable actions, responsibilities, schedules, budgets, and monitoring indicators
3	**ESS2: Labor and Working Conditions**	Requires fair treatment, non-discrimination, safe and healthy working conditions, protection against child and forced labour, worker grievance mechanisms, and management of occupational health and safety risks.	The project must implement Labour Management Procedures, contractor OHS plans, worker grievance mechanisms, Codes of Conduct, and labour-monitoring arrangements covering relevant direct, contracted, and primary-supply-chain workers, as applicable.
4	**ESS3: Resource Efficiency and Pollution Prevention and Management**	Requires efficient use of energy, water, and raw materials and prevention or minimisation of pollution, waste, hazardous-material risks, and emissions.	The ESMMP must specify dust, air quality, noise, vibration, water quality, wastewater, erosion, sediment, hazardous materials, and waste controls, with monitoring against applicable national requirements and relevant World Bank Group Environmental, Health, and Safety (EHS) Guidelines.
5	**ESS4: Community Health and Safety**	Requires assessment and management of risks to communities arising from project activities, including traffic, hazardous materials, emergency events, worker interactions, and infrastructure safety.	The project must implement community health and safety measures, construction traffic management, road safety measures, emergency preparedness and response, worker-community conduct requirements, and appropriate controls for SEA/SH risks.
6	**ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement**	Addresses physical and economic displacement, restrictions on land use, compensation at replacement cost, livelihood restoration, consultation, and assistance to affected people.	A RP or other appropriate resettlement instrument must be prepared and implemented where required. Asset inventories, eligibility criteria, compensation, livelihood restoration, grievance redress, and completion monitoring must be documented before relevant displacement or land access, in accordance with applicable requirements.
7	**ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**	Requires protection and conservation of biodiversity, assessment of habitat and species impacts, application of the mitigation hierarchy, and additional measures where natural or critical habitat may be affected.	The project must assess habitats and biodiversity within the relevant area of influence, manage vegetation clearance and wildlife risks, protect watercourses and sensitive habitats, control invasive species, and prepare a BAP or other biodiversity instrument where warranted by the assessment.
8	**ESS8: Cultural Heritage**	Requires assessment and protection of tangible and intangible cultural heritage, consultation with relevant stakeholders, and procedures for chance finds.	The ESIA/ESMMP must identify cultural heritage receptors where practicable, establish avoidance and protection measures, consult relevant communities and authorities, and include a Chance Finds Procedure in construction contracts.

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9	**ESS10: Stakeholder Engagement and Information Disclosure**	Requires meaningful, inclusive, and ongoing engagement with project-affected parties and other interested stakeholders, timely disclosure of relevant information, and accessible grievance mechanisms.	The project must implement a SEP, document consultations and responses, provide accessible and culturally appropriate information, maintain grievance mechanisms, and monitor the resolution of concerns, including those raised by vulnerable or disadvantaged groups.
10	**World Bank Group Environmental, Health, and Safety (EHS) Guidelines**	Provide GIIP-based technical guidance on occupational and community health and safety, air emissions, wastewater, noise, waste, hazardous materials, and construction-related environmental management.	The Contractor and PIU must incorporate relevant General EHS Guidelines and applicable sector-specific guidance into the ESMMP, construction method statements, monitoring programme, and corrective-action procedures, alongside applicable Liberian requirements.

2.5 International Standards and Good International Industry Practice (GIIP)

The ESIA, ESMMP and associated instruments should also apply the relevant technical guidance and GIIP, including:

- **WBG General EHSGs**, covering air quality, wastewater, water conservation, hazardous materials, waste, noise, contaminated land, OHS and community health and safety. WB requires application of the relevant EHSG performance levels and measures, subject to the provisions in the ESF regarding justified alternatives.
- **WBG EHSGs for Construction Materials Extraction**, where quarries, borrow pits or other material extraction activities are used for the Project.
- **WB GPN on Road Safety**, relevant to road-safety assessment, design measures and management of risks to workers, communities and road users.
- **WB GPN on SEA/SH in IPF involving Major Civil Works**, relevant to SEA/SH risk assessment, Codes of Conduct, worker training, referral arrangements, survivor-centred response and confidential grievance pathways.
- **WB guidance on project-induced labour influx**, relevant to assessment and management of community impacts associated with non-local construction labour.
- **WB Guidance Notes for the applicable ESSs**, together with relevant SEP, GM and LMP tools and templates. These provide implementation guidance but do not replace the mandatory requirements of the ESSs.

i. Multilateral Environmental Agreements (MEAs)

Liberia is a Party to a number of MEAs that are relevant to this project, including:

- **Convention on Biological Diversity (CBD)** and the Nagoya Protocol on Access and Benefit Sharing; (Convention on Biological Diversity)
- **United Nations Framework Convention on Climate Change (UNFCCC)** and the **Paris Agreement**, under which Liberia has submitted NDCs; (UNFCCC)

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- **Ramsar Convention on Wetlands of International Importance** (ramsar.org)
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** (CITES)
- **Basel, Rotterdam and Stockholm Conventions** related to hazardous wastes, chemicals and POPs; and
- **Regional and subregional agreements** on biodiversity and natural resources (e.g. International Tropical Timber Agreement, African Union biodiversity commitments). *(Source: applicable ratified regional and international environmental agreements identified in the legal framework.)*

These MEAs influence national law (e.g. EPML, forestry legislation) and guide the project in conserving biodiversity, managing wetlands, controlling hazardous materials and addressing climate change.

ii. Human Rights and Gender Frameworks

Liberia's participation in international human rights instruments (ICCPR, ICESCR, CEDAW, CRC, CRPD, African Charter, Maputo Protocol) and its National Action Plans on GBV and UNSCR 1325 guide national laws such as the National Gender Policy, Domestic Violence Act, RP e Law and Children's Law. (landwise-production.s3.us-west-2.amazonaws.com)
The project will integrate these principles by promoting non-discrimination, gender equality, prevention of GBV/SEA/SH, and access to remedy.

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2.6 GAP ANALYSIS: LIBERIAN FRAMEWORK WB ESF AND AFDB ISS

Liberia has an established legal and regulatory framework for E&S assessment and management. However, the WB ESF introduces requirements that are more explicit or detailed than the national framework in several areas, including integrated E&S assessment, AoI, cumulative impacts, labor management, stakeholder engagement, vulnerability, resettlement and livelihood restoration, biodiversity, community health and safety, SEA/SH, climate risk and contractor management.

The Project was originally prepared under AfDB ISS. As part of WB co-financing, this version of the ESIA has been updated to address material differences between the national framework and the applicable WB ESSs, while maintaining alignment with AfDB ISS. Table 6 focuses on those differences that have practical implications for the ESIA, ESMMP or associated instruments.)

ESMMP ***Table 6: Gap Analysis – Material Gap Analysis: Liberian Framework, WB ESF and AfDB ISSESMMP***

Thematic Area	Liberian Framework	WB ESF Requirements and AfDB ISS Convergence	Material Gap / Difference	Updated ESIA/ESMMP Alignment
ESIA scope, AoI and assessment process	EPML and EPA Guidelines establish screening, scoping, ESIA, review, permitting and monitoring requirements.	**ESS1**, broadly consistent with **OS1**, requires integrated assessment proportionate to risk, covering direct, indirect and cumulative impacts, alternatives, relevant off-site activities, Associated Facilities where applicable, primary suppliers and the full AoI.	National requirements are less explicit on the breadth of AoI, cumulative impacts, Associated Facilities, primary suppliers and integration of these issues across the assessment.	The updated ESIA defines the AoI on the basis of Project activities and impact pathways, assesses direct, indirect and cumulative impacts, and addresses ancillary/off-site activities and other relevant facilities and supply risks.
Cumulative impacts	EPA Guidelines require consideration of cumulative effects but provide limited methodological detail.	**ESS1** explicitly requires consideration of cumulative impacts from relevant past, present and reasonably foreseeable developments and predictable activities enabled by the Project. AfDB **OS1** similarly requires cumulative risk and impact assessment.	Existing assessment may not systematically identify other developments, cumulative receptors and the Project's incremental contribution.	A distinct CIA is incorporated, identifying relevant developments, receptors, impact pathways and Project contributions, with management measures assigned where within Project influence.
Stakeholder engagement and disclosure	EPML and EPA Guidelines require consultation, public notice, disclosure and public hearing where applicable.	**ESS10** and **OS10** require ongoing, proportionate and inclusive engagement, stakeholder identification, differentiated engagement with disadvantaged or vulnerable groups, disclosure and an accessible GM.	National requirements are less prescriptive on lifecycle engagement, SEP content, differentiated engagement and documented feedback loops.	SEP and GM are maintained as Project instruments, with engagement continuing through implementation and targeted measures for affected and vulnerable groups.
Labour and OHS	Decent Work Act establishes core labour, worker protection and OHS requirements.	**ESS2** and **OS2** require LMP, OHS measures, worker GM, non-discrimination, protection of direct and	National law does not provide the same Project-specific management framework for worker categories, worker	LMP, worker GM, OHS requirements, Codes of Conduct and contractor labour requirements are incorporated

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Thematic Area	Liberian Framework	WB ESF Requirements and AfDB ISS Convergence	Material Gap / Difference	Updated ESIA/ESMMP Alignment
		contracted workers, and relevant primary supply worker requirements.	GM, contractor controls and primary supply risks.	into Project and contractual arrangements.
Land acquisition, displacement and livelihoods	National land legislation recognizes formal and customary land rights and provides the legal basis for land administration and compensation.	**ESS5** and **OS5** require avoidance/minimization of displacement, replacement-cost compensation, livelihood restoration, eligibility for persons without formal title, assistance to vulnerable PAPs, compensation before displacement and monitoring of outcomes.	National provisions do not fully prescribe the same eligibility, replacement-cost, livelihood restoration, transitional assistance and completion requirements.	RP implementation is aligned with ESS5 and OS5, including replacement cost, livelihood restoration, vulnerable-group measures, sequencing of compensation and monitoring of restoration outcomes.
Biodiversity and ecosystem services	EPML, forestry and wildlife legislation provide protection for forests, wildlife and environmentally sensitive areas.	**ESS6** and **OS6** require assessment of modified, natural and critical habitat, ecosystem services, direct/indirect/cumulative biodiversity impacts, mitigation hierarchy and, where applicable, no net loss or net gain requirements.	National law is less explicit on habitat classification, critical habitat criteria, ecosystem services and biodiversity outcomes.	The updated assessment distinguishes habitat types where relevant, considers ecosystem services and extends assessment beyond the road corridor where Project activities may affect sensitive habitats. Any critical habitat conclusion must be supported by appropriate assessment.
Community health, traffic and road safety	Public health, transport and road safety requirements provide the national regulatory basis for community safety and health protection.	**ESS4** and **OS4** require systematic assessment of community health and safety, traffic and road safety, hazardous materials, emergency preparedness, communicable disease and security-related risks.	National requirements are less explicit on integrated Project-level community health and safety assessment across the lifecycle.	The ESIA links community receptors to traffic, road safety, construction, emergency, communicable disease and other Project risks, with corresponding ESMMP and design measures.
SEA/SH and labour influx	National GBV, criminal and gender-related laws provide legal protection and response mechanisms.	**ESS2, ESS4 and ESS10**, together with applicable WB guidance, require proportionate assessment and management of SEA/SH and labour-influx risks. AfDB requirements are addressed through **OS2, OS4, OS7 and OS10**.	National legislation does not prescribe Project-specific SEA/SH risk management, confidential grievance pathways, Codes of Conduct or service-provider/referral arrangements.	The Project applies a dedicated GBV/SEA/SH Action Plan, Codes of Conduct, worker training, referral pathways and confidential survivor-centred grievance arrangements.
Disadvantaged and vulnerable groups	National laws and policies provide protections relating to gender, disability, children and other vulnerable populations.	**ESS1 and ESS10** require identification of disadvantaged or vulnerable groups and differentiated measures so impacts do not fall disproportionately on them.	National requirements are less explicit on linking vulnerability to specific Project impacts, mitigation, engagement and monitoring.	Vulnerability is linked to specific receptors and impact pathways, with differentiated mitigation, engagement and monitoring measures. **ESS7 is**

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Thematic Area	Liberian Framework	WB ESF Requirements and AfDB ISS Convergence	Material Gap / Difference	Updated ESIA/ESMMP Alignment
		AfDB **OS7** addresses vulnerable groups more broadly.		**not treated as equivalent to AfDB OS7 and is not considered applicable unless its specific eligibility criteria are met.**
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities (ESS7)	National laws and policies recognize customary land and community rights and provide protections for ethnic and traditional communities; project-specific screening is needed to establish whether communities meet the relevant ESS7 criteria.	**ESS7 applies where Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities, as defined by the Standard, are present in or have collective attachment to the Project area; AfDB OS7 addresses vulnerable groups and is not directly equivalent to WB ESS7.**	Under the Liberian national laws, Free Prior informed Consent (FPIC) applies to interference with customary land use, community forest rights, Community Forest Resources, and the establishment or expansion of protected areas (Land Rights Act 2018, Community Rights Law 2009, National Wildlife Conservation and Protected Area Management Act 2016).	The corridor does not involve these activities, FPIC is not triggered
Cultural heritage	National heritage responsibilities exist, together with EPA requirements to consider cultural resources.	**ESS8** and **OS8** require identification of tangible and intangible heritage, consultation, avoidance, mitigation and chance-find procedures.	National provisions provide less detail on Project-specific screening, consultation and chance-find management.	Cultural heritage screening covers the Project footprint and relevant off-site areas, with avoidance measures and a contractual Chance Find Procedure.
Climate change and resilience	National climate policy, NDCs and environmental legislation provide the broader policy framework.	**ESS1**, ESS3 where relevant, and AfDB **OS1** require climate-related risks to be considered in E&S assessment and Project design.	Climate risk and resilience requirements are not consistently embedded in national project-level ESIA practice.	The ESIA assesses material climate hazards, including rainfall, flooding, erosion and drainage risks, and links findings to design and resilience measures. GHG assessment is undertaken where required and proportionate to Project emissions.
Monitoring, contractor management and adaptive management	EPA requirements provide for compliance monitoring, reporting and audits.	**ESS1** requires monitoring proportionate to Project risk, contractor management, corrective action and adaptive management. AfDB **OS1** has comparable implementation and monitoring requirements.	National requirements provide less detail on contractor E&S management, measurable performance indicators, corrective action and linkage to financing commitments.	The ESMMP defines responsibilities, indicators, monitoring frequencies, contractor requirements, reporting, corrective action, budget and implementation schedule, with material

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Thematic Area	Liberian Framework	WB ESF Requirements and AfDB ISS Convergence	Material Gap / Difference	Updated ESIA/ESMMP Alignment
				outstanding actions reflected in the ESCP.
Data Privacy and Protection	The Constitution of Liberia (1986), Article 16, protects the right to privacy. The Personal Data Protection and Privacy Act of 2024, effective from 23 March 2026, provides a dedicated framework for the collection, processing, transmission, storage, protection and use of personal information. The Electronic Transactions Law (2002) also provides relevant provisions concerning electronic records	The WB ESF does not establish a standalone data privacy standard; relevant requirements are addressed through ESS1, ESS2, ESS4 and ESS10, as applicable, particularly in relation to risk assessment, worker information, community-related data, confidentiality and stakeholder grievance mechanisms. AfDB OS1, OS2 and OS10 provide corresponding safeguards concerning E&S risk management, worker protection and stakeholder engagement, including appropriate handling of sensitive information.	Although Liberia has enacted dedicated data protection legislation, implementation arrangements, regulatory guidance and institutional oversight require consideration. The WB ESF and AfDB ISS do not provide a single standalone data privacy standard, requiring privacy risks to be addressed across relevant Project instruments and management procedures.	The ESIA/ESMMP will incorporate data protection measures covering lawful collection and processing, informed consent where applicable, data minimisation, secure storage, restricted access, confidentiality, retention and controlled disclosure of personal information. Particular safeguards will apply to PAP records, worker information, GRM complaints and confidential SEA/SH cases. Contractors, PIU personnel and third-party service providers will be required to comply with applicable data protection requirements.

2.7 Statutory Permits, Licenses, and Project Approvals

Implementation of MRU/RDTFP Lot 1 will require several permits and approvals from national authorities. The main requirements and indicative timing are summarized in Table 7. Actual timelines will depend on EPA and other agencies' procedures and project readiness.

Table 7: Key Permits, Licenses and Approvals for MRU/RDTFP

No.	Permit / Approval	Competent Authority	Key Requirements / Scope	Indicative Timing
1	**ESIA Permit / Environmental Permit**	EPA	Submission of Project Brief, screening, Notice of Intent, scoping/ToR approval, full ESIA report, public consultations, ESIA and RP (if required). Payment of ESIA fees. (ekmsliberia.info)	Prior to commencement of any major civil works, typically obtained after ESIA review and approval.
2	**Approval of ESIA, RP and associated plans**	EPA (in consultation with relevant line ministries)	Submission of final ESIA, RP and thematic plans (e.g. Traffic Management Plan, GBV/SEA/SH Action Plan, OHS Plan) consistent with permit conditions.	Concurrent with or shortly after ESIA permit issuance, before contractor mobilization.

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No.	Permit / Approval	Competent Authority	Key Requirements / Scope	Indicative Timing
3	**Road Works / Construction Permit or Authorization**	MPW	Consistency with national road standards, design approval, safety provisions and allocation of Right-of-Way (RoW).	Before the start of road construction and any permanent encroachment on RoW.
4	**Land Acquisition and Resettlement Approvals**	Liberia Land Authority, MPW/IIU, local authorities	Land surveys, verification of ownership and use rights (including customary land), negotiation and payment of compensation, signing of agreements, and RP approval. (ekmsliberia.info)	Prior to the displacement of any person or economic activity, phased where needed, but before work in each segment.
5	**Quarry and Borrow Pit Licenses**	Ministry of Mines & Energy, with EPA oversight	Licensing of quarry and borrow sites, including site-specific ESMMPs, rehabilitation plans and community consultation; compliance with safety and environmental requirements. (Source: applicable Ministry of Mines and Energy and EPA permitting requirements.)	Before opening any quarry or borrow pit; renewal as required.
6	**Effluent Discharge / Waste Management Permits (where applicable)**	EPA; local government authorities	Authorization for wastewater discharge (e.g. from camps, batching plants), adherence to effluent standards, solid and hazardous waste management permits or authorizations. (FAOLEX)	Prior to the operation of camps, batching plants or any facilities generating effluents or hazardous waste.
7	**Tree Felling / Vegetation Clearance Authorization**	Forestry Development Authority (FDA); EPA	Clearance permits for vegetation removal outside standard RoW, especially near forests or wetlands, and any use of timber resources. (clientearth.org)	Prior to clearing of roadside vegetation or trees beyond routine maintenance.
8	**Use of Wetlands and Water Resources**	EPA; relevant basin authorities	Authorization for any work in wetlands, floodplains or water abstraction for construction, in line with Ramsar obligations and national wetland regulations. (reports.ramsar.org)	Before activities affecting wetlands or water bodies (e.g. culvert upgrades, bridge works, water abstraction).
9	**Water Abstraction Licence / Permit (Surface Water and Groundwater)**	Ministry of Mines and Energy (MME), through the relevant water resources/hydrological department; EPA for applicable environmental approvals and oversight. The National WASH Commission may also be consulted where water is supplied through a regulated water supply service.	Obtain the applicable authorization before abstracting water from rivers, streams, springs, or groundwater sources for construction purposes. The Contractor shall identify each proposed abstraction source and provide its coordinates, ownership/access arrangements, intended use, estimated daily and total abstraction volumes, abstraction rate, duration and proposed pumping arrangements. Applications should be supported by relevant hydrological or hydrogeological information, as applicable. Where groundwater is proposed, obtain the required borehole exploration, drilling and/or operation authorization from MME in accordance with applicable requirements. Implement water conservation measures, install suitable flow-measuring devices where required, maintain abstraction records, and comply with authorized limits and any restrictions imposed to protect community water supplies, downstream users and aquatic ecosystems.	Before establishing abstraction infrastructure, drilling or operating a borehole, or commencing direct abstraction from any surface-water or groundwater source. All applicable licences and authorizations shall remain valid throughout the abstraction period.

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No.	Permit / Approval	Competent Authority	Key Requirements / Scope	Indicative Timing
			Water quality testing shall be undertaken where water is intended for potable or other sensitive uses.	
10	**Camp Establishment and Occupancy Permits (local level)**	Local governments (County, District, City authorities); EPA (where ESIA/EMP required)	Land use permission for workers' camps, compliance with zoning, sanitation and public health regulations, and community agreements.	Before the construction camp establishment.
11	**Labor Registration / Workplace Inspections**	Ministry of Labor	Registration of employer(s), verification of contracts, OHS arrangements and compliance with the Decent Work Act. (Civil Service Agency)	Prior to or shortly after contractor mobilization, ongoing inspections during construction.
12	**Traffic Management and Road Safety Approvals**	MPW, MoT, Liberia National Police (LNP)	Approval of the Traffic Management Plan, detours, signage and enforcement measures, in line with national road safety plans. (ittransport.co.uk)	Before major traffic diversions or high-risk construction activities (e.g. works in towns, major intersections).
13	**Biodiversity Screening, Protection and Restoration Measures**	EPA or relevant wildlife/ environnemental authorities where a specific statutory autorisation is triggered; project implementing authority for ESMMP compliance	Assess the biodiversity implications of the road corridor and ancillary sites, including rivers, wetlands, riparian vegetation, forest patches and habitats potentially affected by clearance, borrow pits and construction. Determine whether protected species, protected areas or other legally regulated resources trigger specific permits.	Before vegetation clearance, site development or other works affecting sensitive habitat; implement measures throughout construction and rehabilitation. Apply the mitigation hierarchy; define no-go areas and clearance limits; protect aquatic and riparian habitats; manage invasive species; and establish ecological supervision, restoration and monitoring measures. Complete additional biodiversity assessment and planning where the ESIA identifies material gaps or ESS6 requires it.
14	**Cultural Heritage Assessment and Chance Finds Procedure**	EPA for ESIA review and relevant national cultural heritage authorities, as applicable	Identify known or potential tangible and intangible cultural heritage receptors and confirm whether any activity-specific approval is required. Establish a Chance Finds Procedure that specifies work stoppage, site protection, notification, competent-authority assessment, consultation and authorization before work resumes.	Before construction; apply the Chance Finds Procedure throughout excavation and ground-disturbing works.
15	**Stakeholder Engagement, Disclosure and GM**	Project implementing authority/PIU; EPA for consultation and disclosure requirements under the ESIA	Maintain meaningful stakeholder engagement and accessible grievance channels throughout the project cycle. Record consultations, disclose relevant E&S information in accessible formats and languages, and	Initiate during ESIA preparation; maintain before and throughout construction and operation, as applicable.

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No.	Permit / Approval	Competent Authority	Key Requirements / Scope	Indicative Timing
		process; relevant local authorities and community structures	provide confidential handling and referral arrangements for sensitive complaints, including SEA/SH.	
16	**Community Health, Safety and Emergency Preparedness**	Project implementing authority; EPA and relevant public health, fire, emergency-response or local authorities where legally required	Address construction traffic, open excavations, heavy equipment, dust, noise, vibration, water contamination, communicable disease risks, emergency access and other foreseeable community hazards. Confirm whether specific fire, public health or emergency-related permits are triggered by camps, workshops or other facilities.	Before the relevant works or facility begins operation; maintain throughout construction and operation as applicable.
17	**Applicability Screening: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities**	Consent (FPIC) under Liberian Law (where applicable) Liberia Land Authority (LLA), Forestry Development Authority (FDA) and relevant customary authorities, as applicable.	Under the Land Rights Act (2018), Community Rights Law (2009) and National Wildlife Conservation and Protected Area Management Act (2016), FPIC requirements may apply to activities interfering with customary land use, community forest rights and resources, or involving the establishment or expansion of protected areas. FPIC is not triggered by the current road corridor activities. The same determination applies to quarries, borrow pits, construction camps and access roads, subject to confirmation of their locations and land use arrangements. Separately, ESS7 is not currently relevant, as no communities meeting its applicability criteria have been identified in the project area.	Before activities requiring FPIC under applicable national legislation. Reassess if project locations, land use arrangements or activities change..
18	**Contractor E&S Management Plans and Pre-Construction Clearances**	Contractor prepares; Supervision Consultant reviews; PIU/IIU or other designated implementing authority approves or accepts according to the contract and project procedures	Prepare the C-ESMMP and relevant topic-specific plans, including OHS, labour, traffic, waste, erosion and sediment control, emergency response, biodiversity, chance finds, worker accommodation, community health and safety, and site reinstatement, as applicable. These are generally contract requirements rather than standalone statutory permits.	Before mobilization or the relevant activity, as required by the contract and project E&S procedures.
19	**Blasting and Explosives Permit / Authorization**	Ministry of Mines and Energy (MME); Ministry of Commerce and Industry (MOCI) for explosives import authorization; Ministry of Justice and National Security Agency for relevant security clearances; EPA for applicable environmental licensing and oversight.	Obtain the necessary authorization for the procurement, import, transportation, storage, handling and use of explosives in accordance with Liberian law. The Contractor shall submit a site-specific Blasting Management Plan covering blast design, qualified blasting personnel, explosives inventory and security, exclusion zones, community notification, emergency procedures, vibration and noise monitoring, fly-rock control, pre-blasting structural surveys and misfire management. Compliance with applicable safety and environmental requirements shall be ensured throughout blasting operations.	Obtain all applicable permits, clearances and approvals before importing, transporting, storing or using explosives and before commencing any blasting activity. Renew or update authorizations as required.

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Note:
Unidentified quarries and borrow pits: Since the locations of the estimated two quarries and up to 20 borrow pits are not yet confirmed, the ESIA establishes a clear commitment that each site will undergo screening, land-access verification, applicable permitting and site-specific E&S assessment before development or use. The PIU, in coordination with EPA and line ministries, will prepare a permitting plan and maintain a compliance register to track permit conditions and renewal dates. No construction activities will commence in any road segment until all applicable permits and approvals for that segment have been obtained and all pre-conditions fulfilled.

2.8 LAND ACQUISITION AND RESETTLEMENT FRAMEWORK (NATIONAL,AFDB OS5 AND WB ESS5)[920.1]

Detailed RP /ARP implementation arrangements, eligibility, entitlements, livelihood restoration, grievance management and monitoring are presented in Chapter 11.

The applicable framework includes the Constitution of Liberia, the Land Rights Act, relevant valuation and property requirements, the Environmental Protection and Management Law, the EPA ESIA Procedural Guidelines, and AfDB OS5 requirements on avoidance and minimization of displacement, compensation at full replacement cost, livelihood restoration, assistance to vulnerable groups, consultation, grievance redress, monitoring and completion auditing.

Resettlement planning and implementation for the project are governed by Liberian legislation and AfDB Operational Safeguard 5 and the WB ESS5. Where requirements differ, the more stringent provision applies.

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3.0 PROJECT DESCRIPTION

The proposed development involves the upgrading and paving of approximately 60.9 km of the existing Buchanan–Cestos Junction Road, forming Phase V, Lot 1 of the Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP). The road currently operates as a largely non-engineered laterite/gravel single carriageway with localized surface improvements in some settlements and has been in use for more than 50 years.

The project will upgrade the existing corridor into an all-weather, two-lane paved highway with improved horizontal and vertical alignment, engineered pavement layers, new or rehabilitated bridges and culverts, enhanced longitudinal and cross-drainage, and integrated road safety features. The works will be largely confined to the existing alignment and RoW, with only localized realignments where required for safety, drainage or structural reasons.

The road corridor is part of a broader coastal and south-eastern highway system and is a priority regional link under the MRU/RDTFP and national transport sector programmes. Once completed, the road will provide year-round, reliable access between Buchanan and Cestos Junction, improve connectivity to the southeastern counties, and facilitate regional trade within the Mano River Union.

3.1 PROJECT LOCATION AND SETTING

i. Regional and Administrative Context

The project road is located in central coastal Liberia, within Grand Bassa and Rivercess Counties. It extends from the port city of Buchanan (Grand Bassa County) eastward to Cestos Junction in Rivercess County, traversing predominantly rural landscapes and a number of small towns and villages.

The corridor lies within Liberia's humid tropical climatic zone, with two main seasons (wet from May to October and dry from November to April) and high annual rainfall, particularly in coastal areas. Freshwater systems along the route include the Timbo, Gbowee and New Cess Rivers and numerous smaller streams and wetlands that drain toward the Atlantic Ocean.

ii. Local Corridor and Settlements

The existing corridor passes through a mosaic of secondary vegetation, wetlands, agricultural land, settlements and roadside commercial areas, with forested and riverine habitats occurring within the wider landscape. Approximately 44 towns and villages lie along or near the 60.9 km Project road, including Buchanan, Yarpah Town, Big Joe Town, Gio's Town, Nyon Behn Town and Gbediah Town. These settlements constitute important social receptors for the assessment of access, livelihoods, community health and safety, traffic, land acquisition, labour influx and other Project-related impacts.

For this ESIA, the Direct AoI comprises the full Project footprint and all areas where direct Project impacts may reasonably occur. This includes the RoW, road works, bridges, culverts and drainage structures, localized realignments, temporary diversions, directly affected land uses and

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sensitive receptors, together with Project-related ancillary facilities such as construction camps, asphalt and batching plants, crushing facilities, quarries, borrow pits, stockpile areas, access roads and haul routes where these form part of the Project. The 250 m corridor on either side of the road centreline is retained as a practical baseline and receptor-screening area, but is not treated as the fixed boundary of the Direct AoI. The Direct AoI will extend beyond this corridor wherever Project activities or impact pathways require it.

The Indirect AoI includes communities, environmental receptors and geogRP hic areas that may experience reasonably foreseeable secondary or induced effects arising from the Project. This includes communities dependent on the road, downstream rivers, streams and wetlands, areas affected by changes in traffic and accessibility, and locations where improved access may influence settlement, land use, commercial activity or pressure on natural resources.

For cumulative impact assessment, the spatial and temporal boundaries extend beyond the Direct and Indirect AoI, as appropriate, to consider the Project in combination with relevant past, existing and reasonably foreseeable developments and other activities within the wider Buchanan–Cestos corridor and associated catchments..

Before the commencement of works at any ancillary facility not assessed at the ESIA stage, *the Contractor shall submit the proposed site location, footprint, access arrangements and relevant technical details for environmental and social screening. The screening shall identify sensitive receptors, land ownership and use, biodiversity and cultural heritage constraints, drainage and water resources, community health and safety risks, and potential effects on livelihoods. Where the screening identifies impacts not adequately covered by the ESIA, the Contractor shall undertake the necessary site-specific assessment and prepare or update the relevant management and rehabilitation measures for review by the Supervision Consultant and approval or acceptance by the designated Project authority, in accordance with the contract and applicable World Bank requirements. No such site shall be developed or used until the required land access, applicable authorizations and environmental and social clearances have been completed.*

Table 8: Illustrative key settlements along the Buchanan–Cestos Junction corridor

No.	Settlement / Node	County	Relative Position Along Corridor*	Dominant Surrounding Land Use	Identified Sensitive Receptors / Environmental and Social Features
1	Buchanan (Km 0)	Grand Bassa	Corridor starting point	Urban/port, services, industry	Residential areas; commercial establishments; markets; schools and educational institutions; healthcare facilities; religious facilities (churches and mosques); community gathering places; public water points and wells; roadside vendors; pedestrian crossings; road users and port-related traffic.
2	Intermediate villages (various)	Grand Bassa	Km 5–25 (approx.)	Mixed farms, secondary forest, wetlands	Scattered residential settlements; community wells, hand pumps and streams; agricultural land and livelihood areas; wetlands and seasonal watercourses; secondary forest patches; trees and natural vegetation; wildlife habitats and movement areas; places of worship; community access paths; children and pedestrians using the road; livestock crossing points.

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3	Yarpah Town	River-cess	Mid-cor-ridor node	Town centre, markets, schools and residences	Residential clusters; schools and children walking along or crossing the road; markets and roadside businesses; healthcare and community facilities; churches and other religious sites; community wells, hand pumps and streams; public gathering areas; agricultural access routes; roadside vendors and pedestrian movement areas.
4	Big Joe Town	River-cess	Middle section of the corri-dor	Rural town, farms and small busi-nesses	Residential properties; schools and schoolchildren; community wells and water collection points; churches and religious gathering places; agricultural land and farms; community meeting areas; roadside businesses; streams and drainage channels; natural vegetation and nearby forest patches; pedestrian and livestock crossing locations.
5	Gio's Town	River-cess	Eastern segment	Rural settle-ment, small-holder agri-culture	Scattered houses; community water sources, includ-ing wells and streams; smallholder farms and culti-vated plots; schools and children using roadside routes, where present; religious facilities; community gathering areas; natural vegetation and potential wildlife habitats; agricultural access paths and live-stock movement routes.
6	Nyon Behn Town	River-cess	Eastern segment	Rural settle-ment, shifting cultivation	Residential clusters; community wells, hand pumps and streams; shifting cultivation areas and agricul-tural plots; schools and children walking along the road, where present; churches and religious sites; community meeting places; forest and secondary vegetation patches; wildlife habitats; drainage chan-nels and pedestrian crossing points.
7	Gbediah Town	River-cess	Near Ces-tos Junc-tion	Rural town, farms and wetlands nearby	Residential properties; schools and schoolchildren; community water sources, wells and streams; wet-lands and associated aquatic habitats; agricultural land; religious facilities; community gathering places; natural vegetation and wildlife habitats; road-side businesses; pedestrian movement and livestock crossing points.
8	Cestos Junction (Km 60.9)	River-cess	Corridor terminus	Regional junction, ac-cess to Cestos City and hin-terland	Residential and commercial establishments; commu-nity facilities; schools and educational institutions; healthcare facilities; religious sites; community water points and nearby streams; road junction users; pe-destrian crossing points; roadside vendors; agricul-tural access routes; nearby wetlands, riparian vegeta-tion and associated biodiversity receptors.

* Chainage and positions will be confirmed and refined during detailed engineering design and construction planning. PIU is requested to provide the relevant information/chainages based on engineering designs.

Table 9: Communities along the project corridor

No	Name of Communities	Counties
1.	**Buchanan**	**Grand Bassa (36 communities)**
2.	**Rock Town**	
3.	**Sand Town**	
4.	**Garpue Town**	
5.	**Henry Logan Town**	
6.	**Debay Town**	
7.	**Brumskine Farm**	
8.	**Logan Town**	
9.	**Meneh Town**	

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No	Name of Communities	Counties
10.	Jacob Town	
11.	Glorgarkpah	
12.	Gbankon Behn	
13.	Kasuah Town	
14.	Charlie King Town	
15.	David Town	
16.	Gio Town	
17.	Kobeedun Town	
18.	Tarr Town	
19.	Gbeysayday	
20.	Walker Town	
21.	Menyongai	
22.	Broad Street	
23.	Saturday Town	
24.	Zahnto Town	
25.	Whalakpo Town	
26.	Gebior Town	
27.	Gbee Town	
28.	Borbor Town	
29.	Charles Town	
30.	Tan Town	
31.	Gorzhon	
32.	Nyonbehn Town	
33.	James Town	
34.	Koko Town	
35.	Wayzohn	
36.	Forster Town	
37.	Yarpleah Town	River Cell (8 communities)
38.	Bayon Town	
39.	Gongbo Town	
40.	Gbediah Town	
41.	Yarpah Town	
42.	Toe Town	
43.	Maniah Town	
44.	Stewart Town	

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Figure 3.1: Regional Road Alignment Map

iii. Existing Road Condition

The existing Buchanan–Cestos Junction Road is predominantly an unsealed gravel/laterite single carriageway, typically 7.2–8.0 m wide with intermittent surfaced sections in some villages. The surface condition is generally poor, particularly during the rainy season when erosion and saturation of the weak subgrade led to rutting, ponding and impassable sections. In many places, previous gravel layers and embankments have eroded to below the original ground level.

Traffic volumes vary along the corridor, with current Average Annual Daily Traffic (AADT) estimated at about 300 vehicles per day at the southern end near Buchanan, rising to around 8,400 vehicles per day closer to urban nodes, reflecting both existing demand and congestion caused by the poor road condition. Side drains are limited and, where they exist, are frequently eroded or blocked; many culverts are hidden by vegetation and partially or fully obstructed, resulting in upstream flooding and erosion of the carriageway.

The corridor currently includes five bridges of varying length (one approximately 190 m long and several between 5–30 m) in differing structural condition. Approach embankments have been repeatedly graded, and in many locations, the approaches are now lower than the bridge decks, creating safety and drainage issues.

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Surrounding Land Use and Ecological Condition of the Road Corridor

Within the 250 m baseline and receptor-screening corridor, land use is characterized mainly by:

- Linear roadside settlements, including houses, shops, schools, clinics, religious facilities and other community infrastructure;
- Smallholder agriculture, including cassava, rice, vegetables and tree crops, together with fallow land and mixed agroforestry;
- Secondary vegetation, woodlots, plantations and fragmented forest-edge habitats; and
- Rivers, perennial streams, seasonal wetlands, swamp rice areas and riparian vegetation.

The corridor has been subject to long-standing human use associated with the existing road, settlements, agriculture, logging and other resource-use activities. Much of the terrestrial landscape is therefore modified. However, ecological conditions are not uniform across the corridor. Localized natural and higher-sensitivity features occur within and adjacent to the road corridor, particularly at river and stream crossings, seasonal wetlands and forest-edge areas.

The BAP identifies the Timbo River crossing as a high-sensitivity ecological node, together with perennial stream crossings and seasonal wetland depressions of moderate sensitivity and a localized forest-edge segment. These features require location-specific consideration in Project design, construction planning and mitigation.

Field surveys did not confirm CR, EN, VU or NT species within the surveyed corridor, and the habitat assessment indicates that much of the immediate terrestrial corridor is modified. This finding should not, however, be interpreted as demonstrating an absence of sensitive biodiversity solely on the basis of species non-detection. Habitat classification and any critical habitat determination should consider habitat characteristics, ecological function, landscape context and the applicable ESS6 criteria. The wider landscape includes KBAs and records of species of conservation concern, reinforcing the need for precautionary management at sensitive ecological interfaces.

3.2 PROJECT JUSTIFICATION

The upgrading of the Buchanan–Cestos Junction Road is justified on economic, social, safety and environmental grounds and is aligned with national and regional objectives under the MRU/RDTFP, ECOWAS transport integration agendas and Liberia's transport and poverty reduction strategies. Key reasons include:

a) **Strategic connectivity and regional integration**: The road is a key east–west link between the national capital area and the south-eastern counties and forms part of a priority regional highway corridor serving the Mano River Union region. Its current poor condition constitutes a major bottleneck to national and regional trade.

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b) **Economic development and poverty reduction**: Improved Road conditions will reduce vehicle operating costs, travel times, and transport losses for agricultural produce and goods. This is expected to stimulate agricultural productivity, market access, and investment, supporting rural livelihoods and local enterprise development.

c) **Access to social services and social inclusion**: The road provides access to schools, health centres, administrative services, and markets for numerous rural communities. A reliable all-weather road will reduce isolation, particularly during the rainy season, and improve inclusion for vulnerable groups such as women, children, persons with disabilities, and elderly people.

d) **Road safety improvement**: The current un-engineered alignment, poor surface condition, lack of dedicated pedestrian facilities, and ad-hoc drainage structures create unsafe conditions for all road users, including pedestrians, motorcyclists, and public transport passengers. Upgrading will include improved geometry, pavement, signage, speed management, and pedestrian facilities, leading to overall safety gains.

e) **Environmental benefits compared to the "no-project" scenario**: While construction will generate temporary impacts, maintaining the existing deteriorated road would perpetuate high dust levels, degraded drainage and recurrent washouts, with associated impacts on air quality, water quality and community health. Upgrading the road to an engineered paved standard is expected to reduce dust emissions and polluted runoff from the carriageway, and to enable better control and management of drainage and erosion compared with the current situation.

f) **E&S Sustainability in Project Design:** In accordance with the World Bank ESF, the justification for the Project also considers the need to integrate E&S risk management into design, construction and operation. The preferred option should be assessed against feasible alternatives, including the "no-project" scenario, taking account of land acquisition and livelihood impacts, biodiversity and habitat disturbance, impacts on rivers and wetlands, climate-related hazards, community health and safety, labour and working conditions, and cultural heritage. The Project shall apply the mitigation hierarchy by prioritizing avoidance, followed by minimization, restoration and, where required, appropriate offset measures. Inclusive stakeholder engagement, accessible grievance mechanisms and proportionate monitoring shall support implementation of the environmental and social management measures throughout the Project lifecycle, consistent with ESS1 and other applicable ESSs.

3.3 PROJECT COMPONENTS AND ACTIVITIES

i. Main Road Works

The core civil works for the 60.9 km corridor include:

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a) Upgrading of the existing single carriageway to a standard 2-lane paved highway, with each lane 3.65 m wide and paved shoulders 1.8 m wide.

b) Localized realignment and geometric improvements (flattening of sharp curves, smoothing of vertical profiles) to improve safety, visibility and riding comfort, while remaining largely within the existing RoW.

c) Construction of a new pavement structure with a design life of approximately 20 years, comprising asphalt concrete wearing course, crushed rock base, stabilized gravel sub-base and natural gravel subgrade.

d) Installation and improvement of longitudinal side drains, catch-pits, culverts, and cross-drainage structures, with particular attention to low-lying and flood-prone locations.

e) Construction and rehabilitation of bridges and river crossings along the corridor.

f) Provision of junction improvements, bus laybys, access management measures, and driveways to community facilities, farms, and businesses, where feasible.

g) Provision of road safety features, including guardrails, speed calming measures in settlements, thermoplastic road markings, traffic signs and hazard delineators.

ii. Bridges, Culverts, and Drainage Structures

The project will rehabilitate existing bridges and provide new structures where required to achieve the design hydraulic and safety standards:

- The existing road currently has five bridges of varying span (approximately 5–190 m).

- Under the upgraded design, a total of about seven bridges are anticipated along the 60.9 km corridor. New and rehabilitated bridges will be constructed in reinforced concrete, generally providing a 7.3 m wide carriageway and 1.5 m sidewalks on both sides, with guardrails separating pedestrian and vehicle spaces.
- Bridge design will consider hydraulic conditions (flood levels, flow velocities, scour), structural loading, wind and seismic effects; river training works and appropriately designed abutment protection (e.g. grouted rip-RP over gravel bedding) will be included as needed.

Drainage works will include:

- Concrete side drains of varying cross-sections, particularly in urban and steep sections, to control surface runoff and protect the pavement.
- Pipe culverts, box culverts, and, where suitable, drifts or causeways designed for hydraulic capacity, fish passage, and safety.
- Cross-drainage facilities at streams and depressions, with erosion and sedimentation control measures (energy dissipation structures, scour protection).

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iii. Pedestrian and Road Safety Facilities

In urban and peri-urban sections along the corridor, the upgraded road will include paved sidewalks approximately 2.0 m wide on both sides, using paving blocks or double bituminous surface treatments, with covered side drains where necessary. These facilities are intended to improve pedestrian safety, especially near schools, markets, health centres and other community nodes. Pedestrian facilities will incorporate universal accessibility features, including ramps at pedestrian crossings and changes in level, tactile paving at appropriate locations, and safe, unobstructed pedestrian routes to accommodate children, older persons, persons with disabilities and other vulnerable road users.

Additional safety features will include:

- Speed calming measures, including speed humps, rumble strips and reduced speed limits in densely populated areas and near schools and markets.
- Clearly marked pedestrian crossings, warning signs, guardrails and protective barriers at locations presenting elevated risks to pedestrians and other road users.
  Safe pedestrian access to schools, markets, health facilities and other community facilities, with particular consideration for vulnerable road users.

An **Operational Road Safety Plan** will be prepared before the road opens to traffic, building on the road safety assessment presented in Appendix 2 and the safety measures incorporated into the detailed engineering design. The Plan will address increased traffic speeds and volumes, particularly at markets, settlements, schools and other high-risk locations. It will establish measures for speed management, pedestrian protection, road safety awareness, accident monitoring, maintenance of safety facilities and coordination with traffic enforcement authorities. The Ministry of Public Works, in coordination with relevant road and traffic authorities, will define responsibilities for implementation, monitoring and maintenance during the operational phase.

iv. Ancillary Facilities

The construction of the road will require several temporary and semi-permanent ancillary facilities, including:

a) **Contractor's camps and offices** – accommodation, offices, workshops, equipment yards and storage areas. Locations will be selected in consultation with communities and authorities, avoiding sensitive sites.

b) **Asphalt mixing plants** – at least one, and preferably two, asphalt plants located near the corridor mid-section to minimize haul distances (target <25 km). Indicative minimum production capacity is around 250 t/h.

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c) **Rock crushing and screening plants** – for aggregates production, with typical capacity around 200 t/h.

d) **Concrete batching plants** – for structural concrete with an indicative capacity of about 50 m^3/h.

e) **Borrow pits and quarries** – an estimated two quarries and up to 20 borrow pits may be required to provide gravel, laterite, and aggregates, with preference for using or expanding existing sites where feasible.

f) **Temporary access and haul roads** – connecting camps, plants, quarries, and borrow pits to the main road.

g) **Material laydown and stockpile areas** – for aggregate, laterite, culverts, pipes, and other materials.

h) **Temporary traffic diversions** – to maintain traffic flow during construction, preferably within the existing RoW and, where necessary, via short detours outside the RoW, in which case additional mitigation and compensation measures will be applied.

Guidance / Requirements for Setting Ancillary Facilities

a) ***E&S Screening and Site Selection*** – Each ancillary facility shall be screened for E&S risks before its location is finalized and development begins. Screening should consider nearby settlements, schools, health facilities, rivers, streams, wetlands, sensitive habitats, cultural heritage sites and other receptors. The 250 m corridor shall be used as baseline reference only and should not limit the assessment of impacts from off-corridor facilities.

b) ***Land Access and Resettlement*** – Land requirements for camps, plants, quarries, borrow pits, stockpiles, access roads and temporary diversions shall be established before site occupation or use. Land access shall be legally documented, and any physical or economic displacement, land acquisition or restrictions on land use shall be addressed through the applicable resettlement instruments in accordance with World Bank ESS5 before the affected activities commence.

c) ***Pollution Control and Resource Management*** – Ancillary facilities shall implement appropriate measures for dust suppression, noise and vibration control, wastewater management, stormwater drainage, erosion and sediment control, spill prevention, and safe storage of fuels and chemicals. Solid and hazardous waste shall be managed through approved procedures and authorized disposal arrangements, where required. Water and energy consumption shall be controlled, and applicable environmental standards and permit conditions shall be observed.

d) ***Biodiversity and Watercourse Protection*** – Site selection and access planning shall avoid sensitive habitats, wetlands, riparian vegetation and watercourses wherever feasible. Site-specific controls shall address vegetation clearance, wildlife disturbance, invasive species, water abstraction, sedimentation and habitat restoration. Activities affecting rivers, streams or wetlands shall be assessed and undertaken in accordance with applicable legal requirements and approved environmental and social management measures.

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e) ***Labour Conditions, Worker Welfare and Occupational Safety*** – Contractors shall provide safe working conditions, adequate sanitation, potable water, fire protection, emergency response arrangements and appropriate accommodation where worker camps are established. Labour management procedures, occupational health and safety measures, worker grievance mechanisms and Codes of Conduct shall be implemented in accordance with applicable national legislation and World Bank ESS2, including measures to prevent harassment, exploitation and abuse.

f) ***Community Health, Safety and Security*** – The operation of ancillary facilities and associated haul routes shall be managed to reduce risks arising from construction traffic, dust, noise, vibration, blasting where applicable, hazardous materials, open excavations and unauthorized access. Appropriate fencing, warning signs, traffic controls, emergency procedures and community notification shall be provided. Security arrangements shall be proportionate to identified risks and consistent with applicable World Bank requirements.

g) ***Stakeholder Consultation and Grievance Management*** – Affected communities and relevant authorities shall be consulted regarding proposed facility locations, access routes, operating hours, traffic movements and anticipated environmental and social impacts. Information on potential disturbances and mitigation measures shall be disclosed in accessible formats. The Project Grievance Mechanism shall remain accessible to affected people, including confidential and survivor-centred reporting and referral arrangements for sensitive complaints, including SEA/SH.

h) ***Rehabilitation, Closure and Environmental Monitoring*** – Each ancillary facility shall have a site-specific management and rehabilitation plan addressing progressive restoration, removal of temporary infrastructure, safe closure of quarries and borrow pits, land regrading, erosion control, revegetation and reinstatement of disturbed areas, as appropriate. Contractors shall monitor compliance, document incidents and corrective actions and complete closure and rehabilitation in accordance with applicable permits, approved management plans and contractual requirements, subject to verification by the Supervision Consultant and designated Project authority.

i) ***All above ancillary facilities required for the Project shall be identified***, screened, and finalized before contractor mobilization. Their selection shall consider E&S sensitivity, land ownership and acquisition requirements, proximity to communities and sensitive receptors, biodiversity, cultural heritage, water resources, pollution risks, occupational and community health and safety, and applicable legal requirements. The finalized locations, site-specific E&S assessments, maps, mitigation measures, monitoring arrangements, consultation records, required permits and rehabilitation measures shall be incorporated in the C-ESMPs for review and approval by the MPW/IIU before establishment or use of the facilities. Any subsequent change in location or the addition of an ancillary facility shall be subject to prior E&S screening, assessment and approval before implementation.

Table 10: Summary of main physical components and associated facilities

Component category	Key elements
Main carriageway	60.9 km two-lane paved road, 3.65 m lanes, 1.8 m shoulders, localized geometry improvements

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Component category	Key elements
Pavement structure	Asphalt wearing course, crushed stone base, stabilized gravel sub-base, natural gravel subgrade/fill
Drainage	Concrete side drains, culverts, drifts, and erosion control structures
Bridges and crossings	Approx. 7 bridges, including rehabilitation and new structures, plus numerous culverts
Road safety features	Markings, signs, guardrails, speed-calming, pedestrian crossings
Pedestrian facilities	Sidewalks/footpaths, especially in towns and villages
Ancillary facilities	Camps, workshops, asphalt & concrete plants, crushing plants, laydown areas
Material sources	Quarries and borrow pits for aggregates, laterite and fill
Access & diversions	Temporary access roads, traffic diversions, construction detours

3.4 PROJECT PHASES AND ACTIVITIES

The project will be implemented through several overlapping phases, each with specific activities and associated environmental and social interactions.

i. Planning and Design Phase

Key activities:

- Detailed topogRP hic surveys of the existing corridor and adjacent drainage and stream crossings.
- Geotechnical and soils investigations for pavement and structure design (boreholes, test
- pits, laboratory testing).
- Traffic counts and forecasts to inform geometric and pavement design.
- Detailed design of the carriageway, pavement layers, bridges, culverts, and drainage systems.
- Preparation and approval of bidding documents and construction contracts.
- Finalization of the ESIA, ESMMP, and RP , including integration of E&S requirements into design and contract documents.

ii. Pre-Construction Phase

Key activities:

- Mobilization of the contractor and supervising engineer.
- Detailed site selection and layout for camps, plants, quarries and borrow pits, including required site-specific ESMMPs (e.g. quarry management plans, waste management plans).
- Permitting and approvals (EPA ESIA Permit, quarry and borrow pit approvals, local government clearances).

- Land acquisition and resettlement as per approved RP , including compensation payments, livelihood restoration and relocation of utilities (electricity poles, water lines, telecommunications).
- Establishment of GM, community liaison and initial information disclosure in project communities.

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iii. Construction Phase

Typical activities during construction include:

- Site preparation and clearing of vegetation within the RoW and at ancillary facility sites.
- Earthworks, including stripping of topsoil, cut-and-fill operations, embankment construction and compaction.
- Installation and operation of quarries, borrow pits, crushing plants, asphalt plants and batching plants.
- Construction of culverts and drainage structures; desilting and improvement of existing drains.
- Construction and rehabilitation of bridges and related river training works.
- Pavement construction (sub-base, base, asphalt wearing course) and shoulders.
- Construction of sidewalks, pedestrian crossings and traffic safety measures in settlements.
- Traffic management and maintenance of safe diversions and access for road users and adjacent communities.

iv. Quality Control, Testing and Environmental Monitoring

Throughout construction, quality control and environmental monitoring activities will include:

- Testing of construction materials (CBR, Proctor, sieve analysis, asphalt Marshall tests, concrete strength tests, etc.).
- Field density and compaction testing for f-sub-base,b-base and base layers.
- Structural inspections of bridges, culverts and drains.
- Monitoring key environmental parameters (dust, noise, water quality, waste management performance) in accordance with the ESMMP.

v. Operation and Maintenance Phase

Following completion of construction and commissioning, the road will enter an operation and maintenance phase, including a defects liability period of about 12 months within an overall project duration of approximately four years. Typical activities will include:

- Routine inspections of pavement and structures and minor maintenance (pothole repairs, crack sealing, drainage clearing).
- Periodic maintenance works as required over the pavement design life (resealing, localized rehabilitation).
- Ongoing road safety measures, signage management and vegetation control within the RoW.

vi. Decommissioning / Reinstatement of Temporary Facilities

While the road is expected to remain in use for the long term, certain temporary facilities (construction camps, plants, borrow pits, temporary access roads, and diversions) will be

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decommissioned, closed, and rehabilitated at the end of construction. Decommissioning will include:

- Removal of temporary structures, equipment and stockpiles.
- Grading and stabilization of disturbed areas, reinstatement of original drainage patterns, and spreading of stored topsoil.
- Re-vegetation of disturbed areas (including borrow pits and quarries) with appropriate species to restore productive or natural land uses.

Table 11: Summary of project phases and typical activities

Phase	Typical activities
Planning & Design	Surveys, investigations, detailed design, ESIA/ESMMP/RP preparation, tendering
Pre-construction	Mobilization, permits, land acquisition, utility relocation, camp/plant siting, GM set–up
Construction	Clearing, earthworks, drainage, bridges, pavement works, safety features, and ancillary facility operation
Quality control/testing	Material testing, compaction tests, structural inspections, and environmental monitoring
Operation & maintenance	Routine & periodic maintenance, safety management, monitoring
Decommissioning	Demobilization, rehabilitation of camps, quarries, borrow pits, temporary access roads and diversions

3.5 Design Standards and Criteria

The road design follows national road standards and good international engineering practice, taking into account AfDB requirements, AASHTO and related guidance, and the need for climate-resilient infrastructure. Key design parameters include[5]:

i. **Road classification:** primary inter-urban trunk road serving regional and national traffic.

ii. **Carriageway configuration[6]:** single carriageway with two lanes (3.65 m each) and paved shoulders (1.8 m each).

iii. **Right-of-Way (RoW)[7]:** generally aligned with the existing RoW defined by the Ministry of Public Works – approximately 15.2 m from centerline in urban areas and 22.8 m in rural areas, encompassing the carriageway, shoulders, drains and roadside structures.

[5] Typical cross-sections/drawings (roads, drainage, road safety signs etc.) are provided at Appendix 7.11

[6] As per detailed design, the cross-section varies from rural to urban locations. Urban areas (Lane width = 3.65m, Parking = 2.10m, Footway =2.0m Embarkment topsoil =0.9m) both ways; and for Rural areas (Lane width = 3.65m, Shoulder = 1.8m, berm = 0.6m) both ways. Areas with high fill have a berm up to 1.5m

[7] This is according to the Right-of-Way standard established by the MPW

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iv. **Pavement design life:** approximately 20 years based on projected traffic loading and environmental conditions.

v. **Pavement structure:** indicative typical section: asphalt concrete wearing course (≈50 mm); crushed stone base (≈200 mm); stabilized gravel sub-base (≈200 mm); natural gravel subgrade (≈300 mm) and natural gravel fill (≈300 mm), subject to refinement in detailed design.

vi. **Bridges:** reinforced concrete superstructure and substructure designed in accordance with relevant load and safety codes, including provision for sidewalks and adequate hydraulic clearance (freeboard) above design flood levels.

vii. **Drainage design:** longitudinal and cross-drainage sized using hydrological analysis of catchments, rainfall and runoff characteristics, considering climate-change-induced variability in rainfall intensity.

Climate-resilient design considerations include:

- Raising embankment levels above flood-prone sections where feasible.
- Enlarged culverts and improved inlet/outlet protection to reduce blockage and scour and to accommodate higher peak flows under climate change scenarios.
- Slope stabilization and erosion control measures in cut and fill sections (e.g., stone pitching, retaining structures, revegetation).

Table 12: Key geometric and structural design parameters (indicative)

Parameter	Typical value/criterion (subject to detailed design)
Road classification	Primary inter-urban trunk road
Carriageway width	7.3 m (2 × 3.65 m lanes)
Shoulder width	1.8 m paved shoulders on each side
Design speed	~80 km/h in rural sections; ~50 km/h in towns and villages (indicative)
Sidewalk width (urban areas)	2.0 m each side
RoW (rural)	≈22.8 m from centerline
RoW (urban)	≈15.2 m from centerline
Pavement design life	≈20 years
Typical pavement structure	Asphalt wearing course, crushed stone base, stabilized sub-base, natural gravel subgrade/fill
Bridge carriageway width	~7.3 m plus 1.5 m sidewalks on each side
Equivalent Standard Axle) ESA 80KN	= 1,067,268
Structural Number (SN)	= 2.62
CBR (Subgrade)	= 15 to 30%
Subbase	25% mechanical stabilization with granular material
Design Speed	
Rolling Terrain	= 80 to 100 km/hr
Urban Arterial	= 50 to 100 km/hr
At Design Speed:	100 km/hr
Min. Radii and e/max	8% : 395 m

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Parameter	Typical value/criterion (subject to detailed design)
Crest Vertical Curves:	5200 m
Sag Vertical Curves:	4500 m
Max grade:	4%
At Design Speed:	80 km/hr
Min. Radii and e/max	8% : 229 m
Crest Vertical Curves:	2600 m
Sag Vertical Curves:	3000 m
Max grade:	5%
At Design Speed	60 km/hr
Min. Radii and e/max	6% : 123 m
Crest Vertical Curves:	1100 m
Sag Vertical Curves:	1800 m
Max grade:	6%

3.6 Project Inputs and Outputs

i. Construction Materials and Natural Resources

The project will require significant quantities of construction materials, largely sourced from local quarries and borrow pits, complemented by imported inputs where necessary.

Table 13: Indicative material inputs during construction

Material/resource	Main use	Likely source
Lateritic gravel	Embankment, subgrade, select fill	Borrow pits along or near the corridor
Crushed rock aggregates	Base course, concrete, asphalt	On-site or nearby quarries
Sand	Concrete, mortar, bedding layers	River sand and/or borrow pits (licensed sources)
Cement	Structural and non-structural concrete	Imported / national supply
Asphalt / bitumen	Wearing course and seals	Imported via national terminals
Water	Concrete, compaction, dust suppression	Surface water and/or groundwater (licensed abstraction points)
Diesel and lubricants	Fuel for equipment and generators	Licensed petroleum suppliers
Wood (formwork, temporary)	Formwork, scaffolding, temporary site works	Local timber suppliers (from legal sources)

Exact quantities will be determined and documented in the contractor's construction method statements and materials management plans, but are expected to be significant given the full length of pavement and multiple structures. These should be included in the C-ESMMP also.

ii. Workforce

Construction will create substantial short-term employment for both local and non-local workers. Based on current planning, the project is expected to employ:

- Approximately 75 expatriate or non-resident specialist staff (management, engineering, technical experts).

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- More than 500 national workers, including roughly 150 skilled workers, 100 semi-skilled workers and 350 unskilled workers. The Project will prioritize the inclusion of women, youth and vulnerable groups in employment opportunities, consistent with applicable labour and inclusion commitments.

iii. Labour Influx Risks

Construction employment opportunities may also attract additional job seekers, informal traders and service providers to settlements near construction camps and work sites. The scale of this secondary influx has not yet been quantified and will depend on contractor recruitment practices, camp locations and construction sequencing.

Labour influx may increase demand for housing, water, sanitation, healthcare and other community services, particularly in smaller settlements with limited existing capacity. Interactions between incoming workers and local communities may also increase risks of SEA/SH, communicable diseases, social tensions and competition for employment and accommodation. These risks will be managed through local recruitment measures, worker accommodation and camp management arrangements, codes of conduct, SEA/SH prevention and response measures, communicable disease awareness and prevention, and community engagement, as detailed in the ESMP and associated management plans.

Employment will span the design, construction and early operation phases and will be managed in accordance with Liberia's labour laws, WB ESS2, AfDB OS2 and the Project LMP. Requirements will cover fair and transparent recruitment, non-discrimination and equal opportunity, prohibition of child and forced labour, worker accommodation, worker GM, and OHS.

iv. Equipment, Emissions, Effluents and Waste

The construction phase will utilize a range of heavy machinery and support equipment, such as asphalt pavers, rollers, graders, excavators, bulldozers, dump trucks, tipper trucks and cranes, as well as laboratory and testing equipment.

The main **emissions and effluents** will include:

- Exhaust emissions (NOx, SO_2, CO, particulate matter) from construction machinery and vehicles.
- Fugitive dust from earthworks, unpaved haul roads, stockpiles and material handling.
- Noise and vibration from equipment, blasting (where used for quarrying) and traffic.
- Wastewater from concrete batching, equipment washing, workshops and camps (to be managed through appropriate containment and treatment systems).

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- Domestic wastewater and sewage from worker camps and offices, requiring septic tanks or equivalent treatment.

In addition to the emissions and effluents identified above, construction activities may generate hazardous and non-hazardous solid waste, including used oils and lubricants, oily rags, filters, batteries, scRP metal, packaging materials, surplus excavated material and damaged construction materials. Fuel and chemical spills, leaks from machinery, and improper storage or disposal of waste may contaminate soil, groundwater, surface water and nearby wetlands.

Appropriate waste segregation, secure storage, spill prevention, collection and disposal arrangements shall be established in accordance with applicable national requirements and the approved C-ESMMP.

- The Contractor shall implement an equipment maintenance and pollution prevention programme to minimize exhaust emissions, fuel consumption, excessive noise and avoidable leaks. Machinery shall be maintained in good operating condition, unnecessary engine idling shall be avoided, and dust suppression shall be undertaken on exposed surfaces, stockpiles and haul roads as required. Where construction activities occur near settlements, schools, health facilities, rivers or other sensitive receptors, additional controls and monitoring shall be implemented based on the assessed risks.
- Concrete batching plants, asphalt plants, crushing facilities, workshops and equipment washing areas shall be located and operated to minimize impacts on nearby communities, watercourses and sensitive habitats. Wastewater and process water shall be collected and appropriately treated or reused where feasible. Untreated effluent, cement slurry, fuel, oils and chemicals shall not be discharged into rivers, streams, wetlands or drainage channels. Fuel and chemical storage areas shall have suitable containment, and spill response equipment shall be available at relevant work sites.
- Noise and vibration shall be managed through appropriate equipment selection, maintenance, work scheduling and advance notification to affected communities. Where blasting is required for quarrying or excavation, a site-specific blasting procedure shall address vibration, air overpressure, flyrock, exclusion zones, community notification and emergency response. Vibration and noise monitoring shall be undertaken where warranted by proximity to settlements, structures, cultural heritage sites or other sensitive receptors. Worker exposure to dust, fumes, noise, vibration and hazardous substances shall be controlled through safe work procedures, appropriate personal protective equipment, training and occupational health surveillance where required. Camps and offices shall have adequate sanitation, potable water and wastewater management facilities, with treatment systems designed, operated and maintained to prevent public health risks and environmental contamination.

Expected solid and liquid waste includes:

- Spoil and overburden/topsoil (much of which will be reused for landscaping and rehabilitation).
- Off-spec or surplus bituminous materials and empty containers.

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- Municipal solid waste from work camps (estimated at approximately 300 kg/day, of which around 175 kg/day is biodegradable, and 125 kg/day is non-biodegradable).
- Hazardous waste such as used oils, oily rags, spent filters and small quantities of chemical containers.
- Sewage sludge from on-site sanitation systems (estimated around 35 kg/day).

This waste will be managed in accordance with an integrated Waste Management Plan to be prepared by the contractor, EPA's waste management requirements and the project ESMMP. The selected contractor shall be required to submit, prior to commencement of construction, a (C-ESMMP, which shall detail, among others, specific estimates of volumes of waste anticipated, and the plans for safely managing these wastes.

v. Traffic and Transport Outputs

During construction, there will be increased traffic associated with haulage of materials, movement of heavy equipment, and worker transport. This will result in:

- Increased heavy vehicle movements along the corridor and connecting roads.
- Temporary traffic diversions and controlled one-way working sections at construction fronts.

In operation, the improved road will facilitate higher and more reliable traffic volumes than present, with smoother flow and reduced travel times. While this provides economic and social benefits, it also requires effective road safety management and enforcement, addressed in later chapters of the ESIA.

3.7 Implementation Schedule

The overall implementation period for the project is anticipated to be approximately four years, comprising a design and mobilization period, a main construction period of up to three years, and a defects liability/initial operation period of 12 months. An indicative schedule is presented in Table 14. Specific start and completion dates will be confirmed by the project proponent and contractor once financing and procurement are finalized.

Table 14: Indicative implementation schedule

Phase / Activity	Approximate duration	Indicative timing*
Detailed design & procurement	6–9 months	Months 1–9
Mobilization & pre-construction	3–6 months	Months 6–12
Main construction works	Up to 36 months	Months 9–45
Commissioning and hand-over	3 months	Months 42–45
Defects liability / initial operation	12 months	Months 45–57
**The PIU/Contractor shall consider potential seasonal changes during earthworks and stream works in the rainy season.*		

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Actual timing subject to contract award date, financing effectiveness and seasonal constraints (e.g. rainy season). Implementation will be sequenced to allow staged completion of sections while maintaining traffic flow. Critical path activities include bridges and major culverts, establishment of quarries and plants, and completion of RP implementation prior to works in affected sections.

3.8 Consideration of Best Available Technologies and Practices

In line with the Liberian EPA ESIA Procedural Guidelines and the Environmental Protection and Management Law, the project has considered the use of best available technologies and practices (BAT/BEP) and GIIP to minimize environmental and social impacts while ensuring technical and economic feasibility. Key aspects include:

a) **Optimized use of existing alignment and RoW**: Retaining the general alignment and minimizing major realignments reduces land acquisition, resettlement and disturbance of undisturbed areas, while still allowing targeted improvements to meet safety and design standards.

b) **Engineered asphalt pavement solution**: Adoption of a laterite embankment topped with engineered granular layers and a bitumen-based asphalt wearing course is a standard and proven approach for humid tropical conditions, offering a durable, all-weather surface with lower life-cycle maintenance than gravel alternatives.

c) **Efficient material sourcing and site rehabilitation**: Concentrating aggregate production in a limited number of well-managed quarries and borrow pits (with environmental controls, progressive rehabilitation and final closure) is preferred, and subject to approval by engineer in-charge, over many small informal sites.

d) **Modern construction equipment and quality control**: Use of calibrated asphalt plants, batching plants and crushers, coupled with comprehensive laboratory testing (materials, asphalt mixes, concrete) and field quality control, is planned to ensure compliance with design specifications and to minimize wasted materials and rework.

e) **Integrated drainage and erosion control solutions**: Design of surface and sub-surface drainage systems, plus erosion and slope stabilization measures, follows GIIP to minimize scour, sedimentation and slope failures, including appropriate sizing of culverts for anticipated climate-related changes in runoff.

f) **Environmental and social management integration**: The project ESMMP and subsequent C-ESMMP will embed GIIPs reflected in the applicable lenders' standards and World Bank Group EHS Guidelines, including measures on biodiversity conservation, invasive species management, occupational and community health and safety, GBV/SEAH prevention, stakeholder engagement and grievance management.

g) **Health, safety and community protection**: Application of structured traffic management, worker safety programmes, community liaison and emergency preparedness plans will aim to maintain safe conditions for workers and road users during construction and operation, in line with international road safety and occupational health and safety standards.

The selection and implementation of technologies and methods will continue to be refined during detailed design and construction, with explicit consideration of environmental and social

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performance, cost-effectiveness and long-term sustainability, as required by national and lenders applicable E&S standards.

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4.0 PROJECT ALTERNATIVES

This chapter presents the analysis of feasible alternatives to the proposed paving of the 60.9 km Buchanan–Cestos Junction Road. The analysis follows the mitigation hierarchy (avoid–minimize–mitigate–offset), and the applicable national and ***lenders' E&S requirements*** to demonstrate that the selected option represents the most environmentally and socially acceptable, technically feasible and economically viable solution.

4.1 Methodology and Evaluation Criteria for Alternatives

The alternatives analysis was undertaken in close coordination between the engineering design team and the E&S team. It comprised the following steps:

a) **Identification of alternative types**
   - Strategic alternatives: with/without project ("no project" alternative).
   - **Location and alignment alternatives:** use of existing corridor versus possible new or bypass alignments.
   - **Design/technology alternatives:** pavement type, cross-section width, drainage concepts, and climate-resilient design options.
   - **Construction method alternatives:** sources of materials (borrow pits vs. existing quarries), plant locations, construction sequencing and traffic management options.

b) **Screening of clearly infeasible options**: Alternatives that were technically infeasible, inconsistent with national and regional transport strategies, or obviously unacceptable from an environmental or social perspective were screened out at an early stage (e.g. long greenfield links crossing extensive primary forest).

c) **Multi-criteria evaluation**: Remaining alternatives were assessed using a multi-criteria analysis combining quantitative and qualitative information. The assessment criteria reflect applicable WB ESS requirements, particularly ESS1, ESS3, ESS4, ESS5 and ESS6, while remaining consistent with the corresponding AfDB OS requirements and national priorities.

Table 15: Evaluation criteria for alternatives

Criterion for E&S Integration	Description
Land acquisition and physical/economic displacement	Extent of permanent and temporary land take, loss of residential or commercial structures, displacement of households, loss of crops and other assets, and disruption of livelihoods. Consider opportunities to avoid or minimize resettlement in accordance **with WB ESS5**.
Biodiversity and critical habitat	Potential impacts on natural and modified habitats, threatened species, ecological corridors, forest areas, wetlands, and aquatic ecosystems. Assess opportunities to avoid sensitive habitats and achieve biodiversity conservation outcomes consistent with **WB ESS6.**

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Water resources and drainage	Impacts on rivers, streams, wetlands, groundwater, surface-water quality, natural drainage patterns, erosion, sedimentation, and flood conveyance, including at the Timbo, Gbowee, and New Cess River crossings.
Construction footprint and ancillary facilities	Land and environmental impacts associated with quarries, borrow pits, construction camps, asphalt and concrete plants, crushing facilities, stockpiles, access roads, and haul routes. Consider site availability, proximity to settlements and sensitive receptors, and rehabilitation requirements.
Pollution prevention and waste management	Potential for dust, emissions, noise, vibration, wastewater discharge, hazardous-material spills, and solid-waste generation during construction and operation; feasibility of effective pollution prevention and disposal arrangements **(WB ESS3).**
Labour and working conditions	Ability to manage occupational health and safety, worker accommodation, sanitation, fair working conditions, labour influx, worker grievances, and risks of child or forced labour in accordance with **WB ESS2** and applicable national requirements.
Community health, safety and security	Risks arising from construction traffic, heavy equipment, open excavations, blasting, hazardous materials, communicable diseases, labour influx, and security arrangements; effectiveness of measures to protect road users and nearby communities.
Stakeholder engagement and grievance management	Extent to which the option supports meaningful consultation with affected communities, women, vulnerable groups, local authorities, and other stakeholders; accessibility and effectiveness of grievance mechanisms in accordance with **WB ESS10**.
Cumulative and induced impacts	Potential for combined impacts with other existing or planned developments, increased settlement and commercial activity, additional land conversion, natural-resource pressures, and changes in access or land-use patterns **(WB ESS1)**
Disaster risk and emergency response	Exposure to flooding, erosion, slope instability, landslides, bridge or culvert failure, and other hazards; adequacy of emergency access, response arrangements, and infrastructure redundancy.
Resource efficiency and material availability	Demand for construction materials, water, fuel and energy; availability of sustainable and legally sourced materials; opportunities to reduce waste, reuse suitable materials, and improve resource efficiency **(WB ESS3).**
Implementation capacity and institutional responsibilities	Availability of qualified contractors, supervision personnel, equipment, monitoring resources, and institutional capacity to implement and enforce environmental and social mitigation measures.
Operation and maintenance sustainability	Long-term requirements for drainage maintenance, pavement repairs, bridge and culvert inspection, vegetation management, road safety measures, and environmental monitoring; feasibility of sustained funding and institutional support.
Gender equality and universal accessibility	Ability of the option to improve safe and equitable access for women, children, older persons, and persons with disabilities, including safe pedestrian crossings, roadside access, public transport connections, and access to essential services **(WB ESSs).**
Cultural and community resource access	Potential to disrupt access to cemeteries, sacred groves, community facilities, customary-use areas, and other culturally significant resources, including impacts on intangible cultural heritage and community practices **(WB ESS1, ESS8)**
Mitigation feasibility and residual impacts	Practicality, effectiveness, cost, and enforceability of mitigation measures; extent of residual environmental and social impacts after mitigation and whether these impacts are acceptable under applicable requirements (**WB ESSs)**
Regulatory compliance	Alignment with EPML, EPA ESIA Procedural Guidelines, **WB ESSs**, road design standards, and expectations of affected communities and local authorities.
No-project scenario and comparative sustainability	Consequences of not implementing the project, including continued road safety risks, travel delays, restricted access to services and markets, and existing environmental and social conditions. Compare these with the likely impacts and benefits of each feasible alternative **(ESS1).**

d) **Stakeholder input**: Community consultations and key informant interviews provided information on how local people perceive different options (e.g. desire to stay on existing

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alignment vs. bypass settlements, preference for reduced journey times, concerns about dust, noise and access during construction). This feedback was incorporated qualitatively into the ratings of social, safety and public health criteria.

e) **Comparative ranking and selection**: For each group of alternatives, options were qualitatively ranked (High Positive, Moderate Positive, Neutral, Moderate Negative, High Negative) and an overall judgement made on the preferred alternative.

4.2 "No Project" Alternative

Under the "no project" alternative, the existing Buchanan–Cestos Junction corridor would remain an unpaved laterite/dirt road, in operation for over 50 years and currently in poor condition, with extensive rutting, ponding, and erosion during the rainy season.

i. Environmental implications

- Continued high levels of dust and particulates affect roadside communities during the dry season.
- Ongoing erosion of the carriageway and side drains, leading to siltation of nearby streams and wetlands, and deterioration of water quality.
- Persistent degradation of roadside vegetation and soils due to uncontrolled runoff and vehicle tracking.

ii. Social and economic implications

- Travel times and transport costs would remain high, particularly in the rainy season when sections of the road become difficult or impossible to pass.
- Poor road accessibility would continue to limit access to markets, schools, health facilities and administrative services, constraining poverty reduction and regional integration.
- Road safety conditions would remain poor, with frequent occurrence of accidents due to slippery surfaces, deep ruts and lack of road safety features.
-

Table 16: Comparison of "No Project" vs. proposed project

Aspect	"No Project"	Proposed Project (paved road)
Road condition	Unpaved laterite; severe deterioration in the rainy season	Engineered, all-weather bituminous pavement with a 20-year design life
Accessibility	Seasonal and unreliable; travel times are long	Year-round access; significantly reduced travel times
Vehicle operating costs	High fuel consumption and maintenance	Reduced VOCs and improved comfort
Environmental quality	Persistent dust, erosion and sedimentation	Short-term construction impacts; long-term reduction in dust and uncontrolled runoff
Social impacts	Limited access to services; constrained livelihoods	Improved market access, employment, and access to health and education, balanced by temporary construction impacts and some resettlement to be managed through RP

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Aspect	"No Project"	Proposed Project (paved road)
Consistency with national/regional strategies	Does not support the MRU corridor or the national transport policy objectives	Fully consistent with national and regional integration and poverty-reduction objectives

While the "no project" alternative would avoid construction-phase investment costs, impacts, and resettlement, it would perpetuate existing environmental and social problems and hinder development. It is therefore not considered acceptable in light of national policy and WB's development objectives.

4.3 Alignment and Route Alternatives

The Buchanan–Cestos Junction Road is an existing strategic corridor connecting Buchanan City to Cestos Junction and numerous intermediate towns and villages. The road was developed as an earth track following the "naturally best" alignment relative to terrain and stream crossings.

At the feasibility and preliminary design stages, the following high-level route alternatives were considered:

Table 17: Project Alternative Options

Evaluation Criteria	Alternative A – Upgrading Existing Alignment (Preferred)	Alternative B – New Greenfield Alignment	Alternative C – Upgrading Alternative Regional Corridor
Description	Upgrade and pave the existing 60.9 km corridor, retaining the current centerline with minor realignments at sharp bends, steep gradients, and river crossings.	Construct a new, straighter highway parallel to the existing corridor, bypassing selected settlements and improving design speeds.	Upgrade a different regional route connecting Buchanan to the south-eastern region through alternative settlements.
Construction Cost	Generally lower due to the use of the existing road and available infrastructure.	High due to new road construction, land acquisition, earthworks, and drainage structures.	Potentially high, depending on route length, existing road conditions, and required improvements.
Land Acquisition and Resettlement	Generally limited, although widening and local realignments may require additional land.	Potentially substantial, with increased risks of physical and economic displacement.	Depends on the existing right-of-way, road condition, and settlements along the alternative route.
Biodiversity and Habitat Impacts	Generally lower where works remain within the existing disturbed corridor; localized impacts may occur at realignment sections.	Potentially greater due to habitat loss, fragmentation, and disturbance of previously undisturbed areas.	Depends on the ecological sensitivity and degree of disturbance along the alternative corridor.
Impacts on Communities	Construction disturbance to existing roadside communities; maintains established access and connectivity.	May reduce through-traffic in bypassed settlements but could disrupt local access and livelihoods near new junctions.	Impacts would shift to communities along the alternative corridor, requiring separate assessment.
Cultural Heritage	Generally lower if the existing road footprint is retained; sensitive sites near widening areas require screening.	Potential risk of affecting previously undisturbed archaeological or cultural heritage sites.	Depends on the presence of cultural heritage sites along the alternative route.

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Road Safety	Improves safety through pavement rehabilitation, drainage, signage, and selective geometric improvements.	Potentially better design speeds and geometry, but new access points and higher speeds require safety controls.	Depends on the existing road standard and the extent of engineering improvements.
Climate and Disaster Resilience	Can improve drainage and river-crossing resilience, although existing terrain constraints may remain.	Allows design for improved drainage and resilience but may involve substantial earthworks and new exposure to hazards.	Depends on topogRP hy, flood exposure, drainage, and geotechnical conditions.
Construction Impacts	Generally moderate and localized, with temporary traffic disruption and dust during works.	Potentially substantial due to extensive earthworks, vegetation clearance, material extraction, and construction traffic.	Depends on construction requirements and the condition of the existing route.
Implementation Feasibility	Generally high because it builds on an established corridor and may require less land acquisition.	Moderate to low due to land acquisition, environmental approvals, and more extensive construction.	Uncertain until route surveys, engineering studies, and environmental and social assessments are completed.
Overall Assessment	Preferred, subject to confirmation through engineering, environmental, and social assessments.	May offer operational benefits but could result in higher costs and greater land and biodiversity impacts.	May provide regional connectivity benefits but requires a comparative assessment of travel demand, costs, and impacts.

Key findings

- **Alternative A** makes optimal use of the established right-of-way (15.2 m in urban and 22.8 m in rural sections), thereby limiting additional land acquisition and resettlement, and avoiding new fragmentation of forest and agricultural land. Alternative A is expected to have a ***comparatively smaller environmental and social footprint*** because it follows the existing road corridor and limits the need for new access roads and extensive vegetation clearance.

- **Alternative B** would ***require substantial new land take***, clearing of forest, creation of new stream crossings and additional bridges/culverts, with higher impacts on biodiversity, water resources and cultural heritage. Construction costs and maintenance requirements would also be significantly higher.

- **Alternative C** is ***inconsistent with the MRU coastal highway concept*** and would not directly benefit the 44 communities currently depending on the existing road.

The Buchanan–Cestos Junction Road is an existing strategic corridor linking Buchanan City to Cestos Junction and a number of intermediate towns and villages. At the feasibility and preliminary design stages, three broad route options were considered: (i) upgrading the existing alignment; (ii) developing a new greenfield alignment broadly parallel to the existing road; and (iii) investing in a different corridor. A qualitative comparison matrix was used, as illustrated above, to assess the alternatives against key technical, environmental, social, economic, and strategic criteria.

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For beneficial criteria such as technical feasibility, social benefits to current users, and consistency with national and MRU strategies, **High** indicates the most favorable outcome, **Medium** an intermediate outcome, and **Low** the least favorable outcome. For adverse-effect criteria such as land acquisition and resettlement, biodiversity and habitat disturbance, and CAPEX/OPEX implications, **Low** indicates the least adverse implication, **Moderate** an intermediate adverse implication, and **High** the most adverse implication. The ratings are therefore comparative rather than numerical and are intended to show the relative merits and disadvantages of each option.

Table 17A: Qualitative Comparison of Route Alternatives

Table 17B: Qualitative and Resettlement Screening Comparison of Alignment Alternatives

Criterion	Alt. A – Upgrade Existing Alignment	Alt. B – New Greenfield Alignment	Alt. C – Different Corridor
Technical feasibility	High (uses existing corridor; minor realignments)	Medium (requires new earthworks, bridges)	Medium (requires new corridor planning)
Land acquisition/resettlement	Moderate; 1,093 PAPs are verified in the cleared RP for the existing-alignment option.	High; expected to exceed 1,093 PAPs because a new ROW would affect previously unaffected settlements and farmland. A defensible numerical estimate requires a defined alignment, census and asset inventory.	High; expected to exceed 1,093 PAPs because a different corridor would affect new settlements and require a new RP . A defensible numerical estimate requires route selection, census and asset inventory.
Biodiversity & habitats	Moderate (disturbance within already modified strip; limited new clearing)	High (new forest clearance and habitat fragmentation)	High (unknown sensitive areas along new corridor)
Social benefits to current users	High	Medium (some communities bypassed)	Low–Medium (benefits a different population)
CAPEX / OPEX	Moderate	High	High
Consistency with national / MRU strategies	High	Medium	Low

Resettlement estimates for Alternatives B and C are screening-level only. Because no detailed alignments, cadastral surveys, census or asset inventories were prepared for those rejected alternatives, the verified 1,093 PAPs for Alternative A are used only as a lower-bound comparison; exact PAP numbers cannot be established without additional design and RP studies.

On this basis, Alternative A – upgrading the existing alignment with limited local realignments – is retained as the preferred route option, as it makes use of the established corridor, limits additional land acquisition and resettlement, avoids major new fragmentation of forest and agricultural land, and remains most consistent with the strategic objective of improving the

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existing Buchanan–Cestos Junction corridor for current users and the broader MRU coastal highway network.

4.4 DESIGN ALTERNATIVES

Within the preferred alignment, various design options were evaluated to optimize technical performance, climate resilience and E&S outcomes.

A qualitative comparison matrix was used to assess the pavement alternatives against key technical, environmental, economic, and operational criteria relevant to the Buchanan–Cestos Junction corridor. The matrix is comparative rather than numerical. For beneficial criteria such as road safety and overall performance, ratings of High, Medium, and Low indicate the relative degree of advantage offered by each option, with High representing the most favorable outcome.

For adverse-effect criteria such as initial construction cost, maintenance burden, dust generation, and lifecycle greenhouse gas implications, Low indicates the least adverse implication, Medium an intermediate implication, and High the most adverse implication. Descriptive ratings such as Very good, Fair, and Poor are used where narrative engineering judgement better reflects expected field performance, particularly under local climatic and traffic conditions. The matrix, therefore, provides a structured professional judgement of the relative strengths and weaknesses of each pavement option in light of the corridor's strategic function, high rainfall regime, and need for reliable year-round access

I. **Pavement alternatives**

The following pavement options were considered:

a) **Option P1 – Asphaltic concrete pavement (Preferred)**
   - 50 mm asphalt wearing course over a crushed stone base, stabilized gravel sub-base, and engineered subgrade, designed for 20 years life.
   - Provides a smooth, durable surface suitable for projected traffic volumes and heavy vehicles.

b) **Option P2 – Double bituminous surface treatment (DBST) on gravel base**
   - Lower initial cost but shorter design life, higher maintenance needs and vulnerability to stripping under heavy rainfall.

c) **Option P3 – Improved gravel road**
   - Upgrading existing gravel standard without sealing (e.g. thicker gravel layers, better compaction).

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Table 18: Comparison of pavement alternatives

Criterion	P1 – Asphaltic concrete	P2 – DBST on gravel	P3 – Improved gravel
Initial construction cost	**High**	**Medium**	**Low**
Maintenance cost & frequency	**Low**	**Medium–High**	**High**
Performance in heavy rainfall	**Very good; sealed surface and robust drainage**	**Fair; prone to stripping and potholes**	**Poor, frequent washouts and rutting**
Dust generation	**Very low**	**Low–Medium**	**High**
Road safety	**High (skid resistance, line-marking)**	**Medium–High**	**Low–Medium**
GHG emissions (lifecycle)	**Moderate**	**Lower upfront, but higher due to frequent maintenance**	**Potentially higher from repeated re-graveling and haulage**
Overall assessment	**Preferred**	Acceptable but sub-optimal	Not acceptable for the strategic corridor

Note: Color coding reflects relative favorability. For beneficial criteria, green indicates the most favorable outcome and red the least favorable. For adverse criteria, green indicates the least adverse implication and red the most adverse implication.

Given the corridor's strategic role, high rainfall and the need for reliable, year-round access, asphaltic concrete pavement (Option P1) was selected as the most suitable technology.

II. Cross-section with Alternatives

The improved roadway is planned as a single carriageway comprising two 3.65 m lanes with 1.8 m paved shoulders, and 2.0 m pedestrian walkways in urban areas.
Options analyzed include:

- **C1 – Standard cross-section (Preferred):** 2 × 3.65 m lanes + 1.8 m shoulders, with pedestrian walkways and covered side drains in urban areas.
- **C2 – Narrower carriageway and shoulders:** Reduced Lane width (e.g. 3.0 m) and/or unpaved shoulders to reduce land-take and construction cost.
- **C3 – Enhanced cross-section with climbing/slow lanes on steep gradients:** Standard cross-section plus additional lanes at selected locations.

Key considerations

- C1 provides adequate capacity and safety for design speeds while keeping within the existing RoW for most of the corridor.
- C2 would reduce safety margins, particularly for heavy vehicles and overtaking maneuvers, and would be inconsistent with national design standards and AfDB requirements on road safety (OS4).

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- C3 would improve safety on steep gradients but would substantially increase cut-and-fill volumes and may increase resettlement at constrained locations; the approach is therefore limited to locations where geotechnical and safety analyses clearly justify it.

The project will adopt C1, with targeted use of C3 where required by detailed design.

III. Drainage and climate-resilient design alternatives

Two conceptual approaches to drainage and climate resilience were considered:

- **D1 – Conventional drainage sized to historic rainfall records only:** Standard side drains, culvert sizes and bridge freeboard based on historical hydrological data.
- **D2 – Enhanced, climate-resilient drainage (Preferred)**: Drainage system sized using updated rainfall intensity-duration-frequency (IDF) curves and climate projections; includes lined concrete side drains in sensitive sections, energy dissipation structures, scour protection, improved bridge freeboard and bank protection, and erosion control measures.

D2 was adopted as it provides improved resilience to extreme rainfall and flooding, reducing long-term maintenance costs and disruption to communities.

4.5 Construction Method Alternatives

i. Material sourcing alternatives

Given the large quantities of laterite, aggregates, and sand required, the following options were evaluated:

- **M1 – Predominant use of existing licensed quarries and borrow pits (Preferred where feasible)**: Utilize existing sites in the region where material quality is adequate and haulage distances are reasonable.
- **M2 – Development of new borrow pits and quarries along the corridor**: Establish new sites within reasonable haul distances, with full ESIA/ESMMP coverage and rehabilitation plans.
- **M3 – Import of materials from distant commercial quarries only**: Avoid local borrow pits but rely on distant sources.

A qualitative comparison matrix was used to assess the materials sourcing alternatives against key environmental, social, operational, and regulatory criteria relevant to the project. The matrix is comparative rather than numerical.

For beneficial criteria, such as shorter haulage distance and reliance on already disturbed or licensed sites, ratings such as Low or Low–Medium indicate a more favorable outcome because they reflect lower fuel use, lower incremental disturbance, and reduced project-related burden.

For adverse criteria, such as land disturbance, permitting burden, and community impacts, Low indicates the least adverse implication, Medium indicates an intermediate implication, and High or Medium–High indicates the most adverse implication. Narrative descriptors such as “preferred,”

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"used where insufficient," and "supplementary only" are then applied to translate the comparative findings into a practical sourcing strategy.

The matrix therefore provides a structured professional judgement of the relative advantages and disadvantages of each option, taking into account material availability, haulage efficiency, environmental footprint, permitting complexity, and community effects.

Table 19: Summary of materials sourcing alternatives

Criterion	M1 – Existing sites	M2 – New local sites	M3 – Distant commercial sources
Haulage distance/fuel use	**Low–Medium**	**Low**	**High**
Land disturbance	**Low (already disturbed)**	**Medium–High (new disturbance)**	**Low at project area; high at the source**
Permitting requirements	Existing licensed sites preferred, subject to verification of permit validity, approved extraction limits, available capacity and site-specific E&S acceptability.	New permits required from the EPA and other agencies	Existing permits at source, but transport permits are needed
Community impacts	Potentially lower incremental impacts where existing sites are already operating, subject to verification of surrounding receptors, haul routes and cumulative impacts.	New impacts on nearby communities; requires strong consultation	Traffic and safety impacts along haul routes
Overall approach	**Preferred as the first option where technically suitable and environmentally and socially acceptable.**	Used where M1 is insufficient; full mitigation and rehabilitation	Supplementary only where required material quality is not available locally

Note: *Color coding reflects relative favorability. For adverse criteria, green indicates the least adverse implication, amber an intermediate implication, and red the most adverse implication. For the overall approach, green indicates the preferred option, amber a conditional or secondary option, and red the least preferred option.*

The project will prioritize the use of existing licensed quarries and borrow pits where technically feasible, complemented by carefully sited, rehabilitated new borrow areas as necessary.

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ii. Construction sequencing and traffic management alternatives

- **T1 – Full closure with long diversions**: Close long sections of the road and divert traffic via alternative routes.
- **T2 – Half-width construction with traffic maintained on one lane (Preferred)**: Undertake works on one half of the carriageway at a time, controlling traffic with flagmen and temporary signals, combined with short local diversions were essential.
- **T3 – Full closure in very short sections with temporary by-passes within RoW**

T2 was chosen as the primary approach because it ensures continuous access for communities, minimizes travel disruptions, and supports business continuity, while keeping works largely within the RoW. T3 will be applied at bridges and culverts where half-width construction is impossible. Long off-corridor diversions (T1) will be avoided except where necessary.

iii. Work camp and plant location alternatives

- **Centralized large camp and plant cluster** near the middle of the corridor.
- **Two medium-sized camps and associated plants** (e.g., around km 20 and km 40–45) to reduce haul distances and spread impacts.
- **Multiple small satellite camps** are dispersed throughout the corridor.

A configuration of one to two main camps with associated asphalt, crushing and batching plants, supplemented by smaller satellite yards where needed, was selected. This approach balances operational efficiency, environmental management, worker welfare and social risk management (including GBV/SEAH).

4.6 Environmental and Social Comparison of Alternatives

A consolidated comparison of key alternatives is provided below, focusing on strategic and design options that materially influence environmental and social outcomes.

A qualitative comparison matrix was used to assess the principal alternatives against key environmental, social, technical, and development criteria relevant to the project. The matrix is comparative rather than numerical. For beneficial criteria such as economic development and poverty reduction, climate resilience, and overall environmental and social performance, High indicates the most favorable outcome, Medium an intermediate outcome, and Low the least favorable outcome.

For adverse-effect criteria such as land take and resettlement, biodiversity and habitat disturbance, and water and soil impacts, Low indicates the least adverse implication, Moderate an intermediate implication, and High the most adverse implication.

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For mixed criteria such as community health, safety, and access, the rating reflects the overall balance between adverse effects and expected access or safety gains. Descriptive conclusions such as preferred, not preferred, sub-optimal, and unacceptable are then used to summarize the overall comparative judgment. The matrix, therefore, provides a structured professional assessment of the relative strengths, trade-offs, and constraints of each principal alternative in light of the project's development objectives and safeguard requirements.

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Table 20: Environmental and social comparison of principal alternatives

Alternative	Land acquisition / resettlement	Biodiversity and habitats	Water and soils	Community H&S	Access and development benefits	Climate resilience	Overall E&S comparison
No Project	No new Project-related land acquisition or displacement	No new construction-related habitat loss or fragmentation; existing pressures on roadside and natural resources continue	No construction impacts, but existing drainage, erosion and sedimentation problems continue	Existing road safety risks, poor road conditions and seasonal access constraints continue	**Low.** Existing connectivity, transport and service-access constraints remain	**Low.** Existing road remains vulnerable to heavy rainfall, flooding and deterioration	Avoids new construction impacts but does not address existing environmental, safety, access and resilience constraints or achieve the Project objectives
New greenfield alignment	**High potential impact.** New RoW would affect previously unaffected land, farms and settlements. Comparative assessment is screening-level because no detailed alignment, census or asset inventory was undertaken	**High potential impact.** New vegetation clearance, habitat fragmentation and disturbance of previously unaffected areas. Rating is screening-level pending route-specific biodiversity surveys	**High potential impact.** Extensive new earthworks, drainage works and watercourse crossings could increase erosion and sedimentation risks	Significant construction and road-safety risks; potential bypass effects for some existing corridor communities	**Medium.** Could generate new connectivity benefits, but some existing corridor communities may receive reduced direct benefit	Potentially high if designed to current resilience standards, but with a substantially larger new footprint	**Not preferred.** Greater new land disturbance, likely displacement and habitat fragmentation, with significant uncertainty because a detailed alternative alignment was not developed
Upgrade existing alignment using lower pavement standard, including DBST	Alignment-related impacts would remain. Any reduction in land take compared with the preferred design would depend on the final cross-section and has not been quantified	Generally lower than a greenfield corridor because the existing alignment is retained, although disturbance at sensitive locations would remain	Some improvement over existing conditions, but greater maintenance requirements and potentially lower long-term performance under high rainfall conditions	Some safety improvements, but more frequent maintenance and deterioration may create recurring community and traffic risks	**Medium–High.** Improved accessibility, but lower long-term reliability than the preferred pavement solution	**Medium.** More vulnerable to deterioration and climate-related damage than the preferred design	**Less preferred.** Lower initial construction requirements may offer some advantages, but lifecycle performance, reliability and resilience are lower

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Alternative	Land acquisition / resettlement	Biodiversity and habitats	Water and soils	Community H&S	Access and development benefits	Climate resilience	Overall E&S comparison
Upgrade existing alignment with asphalt pavement and climate-resilient design (Preferred)	**Significant impact.** Approximately 1,093 PAPs identified through the RP . Impacts are nevertheless more defined and expected to be lower than opening a new corridor	**Moderate overall, with localized higher-sensitivity receptors.** Much of the corridor is modified, but sensitive river, stream, wetland and forest-edge nodes require specific mitigation. Additional risks from ancillary facilities remain subject to site selection	**Moderate construction-phase risk** from earthworks, crossings, erosion and sedimentation, with significant long-term benefits from improved drainage, erosion and scour control	Material construction and operational road-safety risks requiring mitigation, together with significant long-term safety and access improvements from improved road design	**High.** Improved year-round access, connectivity, trade and access to markets and services	**High.** Enhanced drainage, erosion and scour protection improve resilience to rainfall and flooding	**Preferred on balance.** Avoids opening a new corridor and provides the strongest combination of connectivity, safety and resilience benefits while retaining material but comparatively more defined E&S impacts requiring mitigation

***Ratings for alternatives that were not developed to detailed design, particularly the greenfield alignment, are screening-level and should not be interpreted as equivalent to the site-specific assessment undertaken for the preferred alignment.
***Selection of the preferred alternative does not imply that its E&S impacts are minor. The preferred option has material land acquisition, biodiversity, community H&S and construction-related impacts, but these are more defined and are expected to be lower than those associated with opening a new corridor.

On the basis of the comparative assessment, upgrading the existing alignment with asphalt pavement and climate-resilient design is retained as the preferred alternative. It avoids the substantially greater new land disturbance, habitat fragmentation and likely displacement associated with a greenfield corridor while providing improved year-round access, road safety, drainage performance and climate resilience.

The preferred alternative nevertheless entails material adverse impacts, including land acquisition and displacement, construction-related community and worker risks, impacts at sensitive ecological and watercourse locations, and potential impacts associated with ancillary facilities. These impacts require implementation of the RP , ESMMP, BAP and associated management measures, together with site-specific assessment of ancillary facilities where locations remain to be confirmed.

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4.7 SELECTED ALTERNATIVE AND JUSTIFICATION

- **Selected alternative**

The project will:

- Upgrade and pave the existing 60.9 km Buchanan–Cestos Junction Road along its current alignment, with limited local realignments for safety and geometric improvements.
- Adopt an asphaltic concrete pavement structure designed for a 20-year life, with a single carriageway of two 3.65 m lanes, 1.8 m paved shoulders and 2.0 m pedestrian walkways and covered side drains in urban sections.
- Implement enhanced, climate-resilient drainage, erosion and scour protection measures and rehabilitate or replace bridges and culverts as needed.
- Use existing licensed material sources where technically suitable and E&S acceptable, supplemented by new sources where required, subject to site-specific E&S screening/assessment, applicable approvals and progressive rehabilitation.
- Maintain traffic primarily through half-width construction and short local diversions, complemented by a comprehensive traffic and road safety management plan.

- **Justification**

This alternative:

- **Maximizes socio-economic benefits** by providing reliable, all-weather access to 44 towns and two cities along the corridor, reducing travel times and vehicle operating costs, and improving access to markets, health, education and other services.
- **Minimizes environmental footprint** by staying largely within an existing disturbed corridor, avoiding extensive new habitat loss, and substantially reducing dust emissions and uncontrolled runoff compared to the current situation.
- **Improves safety and public health** through engineered pavement, drainage, signage, traffic calming and pedestrian facilities, consistent with WB ESS4, AfDB OS4 and national road safety requirements.
- **Supports climate resilience** by incorporating enhanced drainage and erosion control designed for projected climate conditions, thereby reducing future disruption and maintenance costs.
- **Is technically feasible and economically sound**, using proven construction technologies suitable for local soils and climate, and consistent with national standards and AfDB requirements.

Adverse impacts associated with the preferred alternative **include** temporary construction-related disturbances, as well as permanent or longer-term impacts associated with land acquisition and displacement, vegetation and habitat disturbance, and community H&S risks. These impacts will

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be addressed through the RP , ESIA, BAP and associated management plans, consistent with applicable national, AfDB and WB E&S requirements.

The selection of the upgrade of the existing alignment with asphalt pavement as the preferred alternative is justified not only by its technical, economic, and climate-resilience advantages, but also by its comparatively **lower resettlement impact**. Although this option affects approximately 1,093 Project Affected Persons (PAPs), it remains preferable to the other alternatives, particularly the new greenfield alignment, which would require a new right-of-way through additional farms and settlements and would likely result in a significantly higher number of PAPs and greater livelihood disruption.

The selection of ***Alternative A is consistent with the mitigation hierarchy*** because it avoids opening a new corridor and minimizes the extent of new land acquisition and habitat disturbance. As explained above, the RP identifies lower PAPs within the currently defined road footprint. Any additional land requirements associated with ancillary facilities or subsequent design changes will require screening and, where necessary, supplementary resettlement planning before the affected land is accessed.

The preferred alternative nevertheless entails significant resettlement impacts. The PAPs identified in the RP are predominantly associated with the existing corridor, making the impacts more defined than those associated with a new greenfield alignment. By contrast, Alternatives B and C would require new RoWs through previously unaffected land and settlements and are expected to result in greater displacement and livelihood impacts, although these conclusions remain screening-level because detailed alternative alignments, censuses and asset inventories were not undertaken.

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5.0 DESCRIPTION OF THE ENVIRONMENT (BASELINE CONDITIONS)

The baseline focuses on receptors and conditions within the Project's AoI, using spatial boundaries appropriate to the relevant impact pathways and E&S receptors.

Detailed physical-environmental baseline data are provided in Appendix 1, traffic counts and the road-safety baseline in Appendix 2, and biological survey results and species lists in Appendix 5.

5.1 Baseline Assessment Boundaries

The ***Project's AoI is defined in Section 3.1 Project Location and Setting*** and is not repeated here. Baseline studies were undertaken at spatial scales appropriate to the receptors and impact pathways being assessed rather than applying a single fixed distance to all environmental and social topics.

For the baseline assessment key considerations were:

- corridor-based physical, social and ecological surveys focused on the Project footprint and surrounding receptor-screening area;
- water-resource assessment considered road crossings, drainage pathways and downstream receptors potentially affected by runoff, sedimentation, water abstraction or accidental releases;
- biodiversity assessment considered both habitats within and adjacent to the corridor and the wider ecological context relevant to habitat connectivity, sensitive species and designated biodiversity areas;
- socio-economic assessment considered affected corridor communities, roadside land users and other communities or groups functionally linked to the road; and
- where ancillary facilities or off-corridor Project components have not yet been located, site-specific baseline verification and E&S screening will be undertaken before those sites are approved or used.

Baseline conditions represent pre-construction conditions based on the available field surveys, sampling and secondary data, including surveys undertaken in 2025 and 2026 where applicable. Historical information has been used where necessary to understand trends and seasonal variability.

As guided by WB ESF/ESSs, the baseline covers the physical, biological, socio-economic, community health and safety, labor, gender and SEA/SH, cultural heritage, ecosystem services and climate-related conditions relevant to the applicable E&S assessment requirements.

Rivercess

5.2 Baseline Study Methodology

Baseline data were collected through desk review, field surveys, laboratory analysis and stakeholder engagement, consistent with applicable national requirements and as noted in the WB

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ESS1. Data sources were reviewed for relevance, date, spatial coverage and reliability, and limitations or gaps are identified where they affect the assessment of E&S risks and impacts.

Desk Review

A comprehensive desk review was undertaken to establish existing baseline conditions. This included:

- Review of national and county-level statistics, sector reports, maps, and satellite imagery relevant to the project area.
- Review of available Project technical studies and engineering investigations, including the Buchanan–Greenville feasibility and design studies, hydrological and hydraulic assessments, geotechnical investigations and road-material studies relevant to the Buchanan–Cestos Junction section.
- Compilation and analysis of available biological and socio-economic datasets, including IBAT screening results to identify Key Biodiversity Areas (KBAs) and IUCN Red List species within a 1 km project buffer.

Field Surveys – Biophysical Environment

Field investigations were conducted along the 60.9 km corridor to validate and supplement secondary data:

- Reconnaissance and detailed surveys were carried out to characterize topogRP hy, landforms, land use, drainage systems, and habitat types.
- Flora and habitat assessments were undertaken using RP id appraisal techniques and sample plots (10 m × 10 m and 50 m × 10 m), representing key habitat types such as lowland secondary forest, degraded agricultural land, inland wetlands, and young bush. All sampling locations were geo-referenced using GPS.
- Faunal assessments combined direct observations, opportunistic sightings, and community-based approaches (including key informant interviews and use of species identification flashcards) to document species presence, habitat use and available indications of occurrence, supplemented by community information for less readily observable species.
- Soil and water samples were collected at representative locations along the corridor during the dry season (early 2025), with laboratory analyses conducted at the Civil Engineering Laboratory of the University of Liberia under established quality assurance and quality control (QA/QC) protocols.

Sampling Design

A total of 52 sampling and monitoring locations were established along the project corridor for water, soil, air, and noise assessments:

These sampling and monitoring locations were selected along the Buchanan–Cestos City Junction Road Project corridor to characterize existing environmental conditions and capture spatial variations in air quality, noise levels, soil characteristics, and surface-water quality.

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Site selection considered physical sensitivity, including river and stream crossings, drainage channels, erosion-prone areas, and variations in land use and terrain; ecological sensitivity, including wetlands, riparian vegetation, forest edges, agricultural habitats, and other areas potentially supporting sensitive species, and social sensitivity, including settlements, schools, health facilities, agricultural areas, and communities potentially exposed to construction-related disturbances.

Locations were also selected based on their proximity to the proposed alignment, anticipated construction activities, sensitive receptors, accessibility, and suitability for representative measurements. The monitoring network provides baseline information for assessing potential impacts from dust, noise, runoff, sedimentation, and accidental pollution, and for comparison with subsequent monitoring results.

Water Resources: Water quality assessment included ***both surface and groundwater*** sources used by communities along the corridor.

- A total of 12 water samples were collected from rivers, streams, creeks, wetlands, hand pump/well at 5km space intervals along the project corridor.
- Parameters analyzed included pH, temperature, turbidity, total dissolved solids (TDS), total suspended solids (TSS), sulfate, chloride, nitrate, iron, cadmium, and hexavalent chromium.
- Analytical results were compared against Liberia Water Quality Standards (LWQS) Class III thresholds to determine compliance and baseline conditions.

Soils: Soil sampling was conducted at 22 locations at the depths of 0–15 cm, spaced approximately at 2.5 km intervals. Sampling focused on topsoil in areas representative of construction zones, agricultural land, and potential contamination hotspots (e.g., settlements, quarry, camp sites, and road junctions). Samples were analyzed for key parameters including pH, organic matter, nitrates, sulfate, and selected heavy metals (Pb, Zn, Fe, and Cr), using standard laboratory methods with QA/QC measures such as calibration, blanks, and duplicates.

- **Ambient air:** Ambient air quality monitoring was ***conducted at Ten (10) strategic*** locations, targeting major towns, proposed camp sites, and quarry locations, with emphasis on dust and vehicular emissions. These locations include Buchanan, Brumskine Farm, Jacob Town, Kasua Town, David Town, Gio Town, Zahnto Town (Proposed Quarry Site), Bayon Town, Gbediah Town, and Cestos Junction (Proposed Camp Site).

- **Ambient Noise measurement:** Ambient Noise measurement was assessed at ***eight (8) strategic locations*** (Buchanan, Brumskine Farm, Kasuah Town, David Town, Gio Town, Zahnto Town (Proposed Quarry Site), Yarpleah Town, Cestos Junction (Proposed Camp Site)) along the project corridor during day/night times.

Consistent with the WB ESS1, the adequacy of baseline information was considered in relation to the decisions and impact pathways assessed. Where data limitations, seasonal constraints or unresolved Project locations create uncertainty, these are identified in the relevant baseline and impact-

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assessment sections. For ancillary facilities whose locations are not yet confirmed, site-specific baseline verification and E&S screening will be completed before site approval or use.

5.3 Environmental Baseline Monitoring

This included 22 soil samples (taken at 0–15 cm depth every 2.5 km) and 12 water samples (every 5 km). Additionally, ambient air quality and noise levels were monitored at strategic locations, including proposed camp sites, quarries, and local settlements, to establish a comprehensive environmental baseline.

TopogRP hy, Geology, and Soils

TopogRP hy

The road traverses gently undulating to hilly terrain, with elevations typically between 200 m and 300 m above sea level, forming part of a broader peneplain landscape shaped by long-term weathering and erosion. Slopes are generally rounded, with short, steep sections at river and stream crossings and in dissected areas.

Geology and Regional Context

Liberia is broadly characterized by a rolling coastal strip (flatlands, lagoons, tidal creeks, marshes) rising to inland hills and escarpments towards the northern border. The underlying geology along much of the country comprises Precambrian granitic gneisses, sandstones and schists with Archean and Proterozoic rocks, overlain by deeply weathered lateritic profiles in many areas.

Soil Types and Characteristics

- The project area is dominated by **lateritic soils (Latosols)** that are iron-rich, porous, and moderately well-drained. These soils, which cover much of Liberia, are typically low in humus but generally suitable for agriculture and for use in road construction when properly engineered.
[8]
- Hydromorphic soils occur in low-lying swamp and wetland areas along river floodplains and are used locally for swamp rice cultivation.
- Regosols (sandy coastal soils) are present closer to Buchanan and in some low-lying coastal stretches.

These soils are susceptible to surface erosion when vegetation is removed and when exposed to slopes, particularly given the high rainfall intensity. Cut slopes, borrow pits, and unprotected embankments are therefore potentially vulnerable to rill and gully erosion if not stabilized.

[8] https://documents.worldbank.org/curated/en/764771542191282628/pdf/ESIA-Report-IIU-SECRAMP-P149279.pdf

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5.4 ENVIRONMENTAL BASELINE

Sampling Program

- **Soil Quality**

A. Soil Sampling Methodology

Soil sampling along the Buchanan–Cestos Junction corridor was conducted to establish baseline soil quality conditions prior to project implementation. A total of 22 soil sampling points (SSPt-1 to SSPt-22) were selected at approximately 2.5 km intervals along the project alignment.

Sampling targeted the topsoil layer (0–15 cm depth), which is the most biologically active and environmentally sensitive zone, particularly relevant for agriculture, erosion processes, and contamination exposure.

Sampling locations were selected to represent:

- Proposed construction zones
- Agricultural lands
- Settlement areas
- Road junctions
- Potential contamination hotspots (e.g., borrow pits, camp sites, and quarry areas, laydown areas)

Collected samples were preserved and transported under control conditions to an accredited laboratory for analysis.

Laboratory Analysis and QA/QC

Samples were analyzed for the ***following parameters***:

- Soil pH
- Organic matter content (%)
- Nitrate (mg/kg)
- Sulfate (mg/kg)
- Heavy metals: Lead (Pb), Zinc (Zn), Iron (Fe), and Chromium (Cr)

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Standard analytical procedures were applied, supported by rigorous Quality Assurance/Quality Control (QA/QC) protocols, including:

- Calibration of analytical instruments
- Use of blanks and control samples
- Duplicate sample analysis
- Adherence to internationally accepted laboratory standards

A total of 22 soil sampling locations were established along the corridor as presented below:

Table 22: Soil Sampling Locations and Coordinates

No.	Sample Code	Location/Feature	Longitude (W)	Latitude (N)
1	SSPt-1	Buchanan_On Your Own Road	10°1'22.72"W	5°52'42.40"N
2	SSPt-2	Buchanan	10°0'25.99"W	5°53'40.66"N
3	SSPt-3	Buchanan–Big Joe Town	9°59'5.65"W	5°53'43.46"N
4	SSPt-4	Garpue Town	9°58'23.49"W	5°52'47.65"N
5	SSPt-5	Henry Logan Town	9°57'24.24"W	5°52'5.31"N
6	SSPt-6	Brumskine Farm	9°56'29.02"W	5°51'9.67"N
7	SSPt-7	Logan Town	9°55'27.01"W	5°50'18.33"N
8	SSPt-8	Charlie King Town	9°54'31.93"W	5°49'23.46"N
9	SSPt-9	Kobeedun Town	9°53'17.46"W	5°49'17.94"N
10	SSPt-10	Gbeysayday Town	9°52'21.41"W	5°48'34.44"N
11	SSPt-11	Gio Town	9°51'19.12"W	5°47'43.94"N
12	SSPt-12	Zahnto Town	9°49'58.26"W	5°47'45.17"N
13	SSPt-13	Gbee Town	9°48'40.29"W	5°47'49.23"N
14	SSPt-14	Tan Town	9°47'23.75"W	5°47'36.93"N
15	SSPt-15	Nyonbehn Town	9°46'11.88"W	5°47'13.49"N
16	SSPt-16	Koko Town	9°45'2.15"W	5°46'41.83"N
17	SSPt-17	Forster Town	9°43'53.81"W	5°46'0.70"N
18	SSPt-18	Bayon Town	9°42'38.00"W	5°45'32.69"N

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No.	Sample Code	Location/Feature	Longitude (W)	Latitude (N)
19	SSPt-19	Gbediah Town	9°41'19.98"W	5°45'38.36"N
20	SSPt-20	Toe Town	9°40'9.79"W	5°45'7.60"N
21	SSPt-21	Stewart Town	9°38'56.54"W	5°44'43.13"N
22	SSPt-22	Cestos Junction	9°37'23.68"W	5°43'22.43"N

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Legend

☆	Soil Sampling Point Coordinates
	Existing Roads
	Proposed Project Corridor
	Water Bodies (River, Stream, Creek, Pond, tributaries…)

Signed: *Alex B. Momo*
Chemical Analyst

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Table 23: Summary of Soil Quality Along the Corridor (SSPt-1 to SSPt-22)

Parameter	Observed Range*	Typical Interpretation
pH	~4.5 – 6.6	Slightly to moderately acidic; typical of lateritic tropical soils
Organic Matter (%)	~2.3 – 67	Moderate to very high; indicates fertile topsoil in undisturbed areas
Nitrate (mg/kg)	<0.001 – ~0.79	Low concentrations; no widespread contamination
Sulfate (mg/kg)	Mostly <0.001	Very low; no sulfate pollution detected
Lead (Pb, mg/kg)	<0.001 – ~0.14	Low; below international screening thresholds
Zinc (Zn, mg/kg)	~0.03 – 0.76	Within natural background levels
Iron (Fe, mg/kg)	<0.001 – ~0.48	Reflects lateritic soil composition

*Ranges derived from laboratory results (SS 001–SS 020).

B. Detailed Soil Analytical Results

Detailed laboratory results indicate:

- pH levels confirm acidic soil conditions typical of tropical lateritic environments.
- Organic matter is highly variable, with elevated levels in low-lying and vegetated areas.
- Nitrate and sulfate concentrations remain consistently low across all sampling points.
- Heavy metals (Pb, Zn, Fe, Cr) occur at low concentrations consistent with natural geochemical background levels.

No abnormal spikes or localized contamination hotspots were identified across the sampled corridor.

C. Interpretation of Baseline Conditions

There are currently no established national soil quality standards in Liberia. However, comparison with international benchmarks (e.g., WHO/FAO guidelines) indicates that:

- Soil quality is generally suitable for agriculture
- No evidence of significant anthropogenic contamination
- Heavy metal concentrations are within natural background levels
- Soil fertility is moderate to high, particularly where topsoil is intact

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Overall, baseline soil conditions along the corridor can be classified as environmentally stable and non-contaminated.

D. Key Environmental Sensitivities

Despite good baseline quality, the following sensitivities were identified:

1. Erosion Risk
    - High susceptibility on exposed surfaces, especially:
        - Cut and fill slopes
        - Borrow pits
        - Road embankments
        - Drainage channels
2. Topsoil Loss
    - Removal of nutrient-rich topsoil during construction activities
3. Soil Compaction
    - Heavy machinery may reduce soil permeability and fertility
4. Localized Contamination Risk
    - Potential at:
        - Construction camps
        - Fuel storage areas
        - Equipment maintenance zones

E. Impact and Mitigation Measures

- **Potential Impacts**

- Soil erosion and sedimentation
- Loss of productive topsoil
- Soil compaction
- Accidental contamination from fuels and lubricants

- **Mitigation Measures**

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Erosion Control

- Stabilization of exposed surfaces (mulching, vegetation, installation of gabion wall)
- Installation of drainage structures and silt tRP s
- Progressive rehabilitation of disturbed areas

Topsoil Management

- Stripping and stockpiling of topsoil
- Reuse for site restoration and landscaping

Pollution Prevention

- Designated fueling and maintenance areas
- Spill prevention and response plans
- Proper storage of hazardous materials

Construction Management

- Controlled movement of heavy equipment
- Limiting unnecessary land clearing

Ultimately, it is worth noting the soil quality baseline assessment along the Buchanan–Cestos Junction corridor indicates that:

- Soils are predominantly lateritic, slightly to moderately acidic, and agriculturally viable
- No significant contamination is present across the sampled locations
- Heavy metal concentrations are within natural background levels
- The principal environmental concern is erosion risk during construction

With the implementation of appropriate mitigation measures, potential impacts on soil resources can be effectively managed, ensuring minimal long-term environmental degradation.

5.5 HYDROLOGY AND HYDROGEOLOGY

The 60.9 km corridor crosses a number of important freshwater systems, including the **Timbo, Gbowee, and New Cess rivers, as well as numerous small streams and wetlands that provide water for domestic use, bathing, fishing, and small-scale** sand or gravel extraction. Drainage patterns are predominantly **dendritic**, reflecting the underlying geology and erosional history.
Key characteristics include:

- Short, relatively steep catchments drain directly to the Atlantic Ocean.

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- Seasonal flooding of low-lying areas and floodplains during the wet season.
- Extensive shallow groundwater and perched aquifers feed hand pumps and shallow wells in villages along the road.
- Small wetlands and swamp rice fields in valley bottoms.

Groundwater is used primarily through community hand pumps and dug wells. No major industrial abstractions are present in the corridor. The risk of saline intrusion is limited inland but may affect coastal aquifers near Buchanan under long-term sea-level rise.



Figure 9: Downstream pictorial of the Timbo River

- **Surface Water Quality**

This section presents the baseline conditions of surface water quality along the proposed corridor for the Integrated Mano River Union Road Development and Transport Facilitation Programme (IMRURDTFP) Phase-V: Buchanan (including the link to the Port of Buchanan) to Cestos Junction (60.9 km).

Surface water bodies along the project corridor are critical for domestic use, small-scale agriculture, fishing, and ecosystem support. Establishing baseline water quality conditions is essential for impact assessment and future monitoring.

The assessment is aligned with:

- Liberia Environmental Protection Agency (EPA) ESIA Procedural Guidelines
- The WB ESF, particularly ESS3 on water use, water quality and pollution prevention, together with ESS4 and ESS6 where changes in water resources may affect communities, livelihoods or ecosystem services. ESS3 specifically requires potential water-use and water-quality impacts on communities, other users and the environment to be assessed and managed.

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Water Sampling Methodology

- A systematic water quality sampling program was undertaken along the project corridor. A total of 12 water sampling points (WSPt-1 to WSPt-12) were established with 5km intervals along the corridor, covering:
- Surface water: rivers, streams, creeks
- Groundwater: hand pump and well

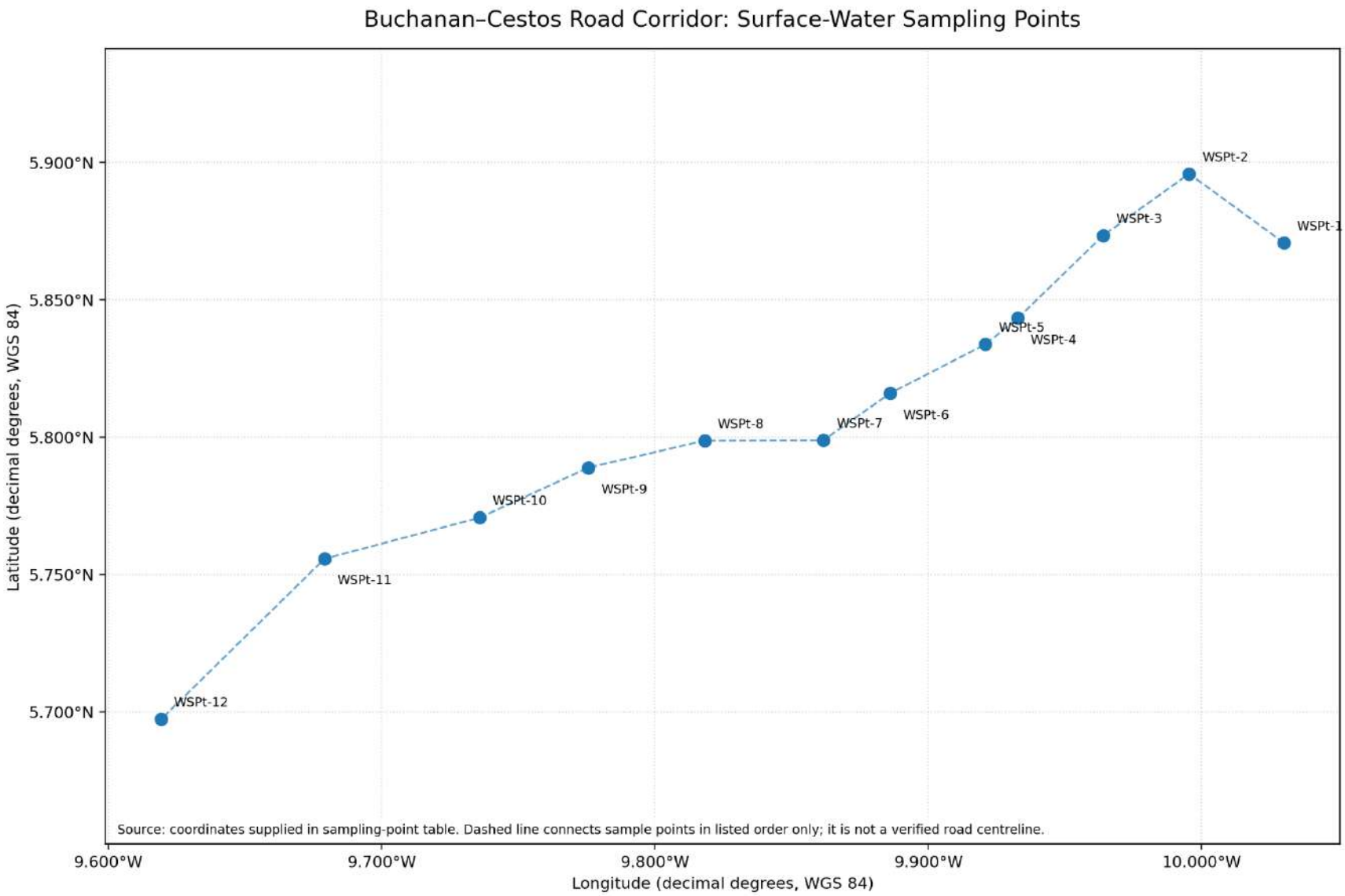
Sampling was conducted in January 2025, and analysis was undertaken by the University of Liberia Civil Engineering Laboratory using standard QA/QC procedures.

Table 24: Water Sampling Points/Locations and Coordinates

No	Sample Type/Perimeter (Surface Water)	Sample Code	Location	Coordinates (2.5km Intervals)	
				Longitude (X-axis)	Latitude (Y-axis)
1.	Water	WSPt-1	Buchanan – On Your Own Road (Start Point) (km0+000)	10°01’48.28”W	5°52’14.83”N
2.	Water	WSPt-2	Benson River / Big Joe Town (KM 5.0)	9°59’43.53”W	5°53’45.38”N
3.	Water	WSPt-3	Brumskine Farm (KM 10.0)	9°57’50.24”W	5°52’24.36”N
4.	Water	WSPt-4	GRP ue Town (KM 15.0)	9°55’57.84”W	5°50’36.02”N
5.	Water	WSPt-5	Gbankohn River (KM 16.8)	9°55’15.36”W	5°50’01.89”N
6.	Water	WSPt-6	Kasuah Town (KM 21.8)	9°53’09.58”W	5°48’57.55”N
7.	Water	WSPt-7	Timbo River (KM 25.35, near Foster Town)	9°51’42.14”W	5°47’56.18”N
8.	Water	WSPt-8	Menyongai (KM 30.35)	9°49’05.54”W	5°47’55.68”N
9.	Water	WSPt-9	Zahnto Town (KM 35.35 – Proposed Quarry)	9°46’32.12”W	5°47’20.13”N
10.	Water	WSPt-10	Nyonbehn Town (KM 40.35)	9°44’09.26”W	5°46’14.63”N
11.	Water	WSPt-11	Timbo River / Foster Town (KM 47.25)	9°40’44.92”W	5°45’20.80”N
12.	Water	WSPt-12	Cestos Junction (KM 58.05, near Yarpah Town)	9°37’09.86”W	5°41’50.64”N
WSPt=Water Sample Point					

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Map of the Project Area showing 12 Water Sampling Points at 5km Intervals of the project road

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- **Applicable Standards**

Results were assessed against **Liberia Water Quality Standards (LWQS) Class III**, summarized below:

Table 25: Liberia Water Quality Standards (LWQS) Class III

Parameter	Unit	LWQS Class III Limit
pH	–	5.5 – 9.0
Turbidity	NTU	≤ 10
TDS	mg/l	≤ 1,200
TSS	mg/l	≤ 50
Nitrate	mg/l	≤ 80
Sulfate	mg/l	≤ 250
Chloride	mg/l	≤ 450
Iron	mg/l	≤ 2.0
Cadmium	mg/l	≤ 0.01
Cr(VI)	mg/l	≤ 0.10

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- **Baseline Water Quality Results and Compliance Assessment**

Samples collected in January 2025 and analyzed at the University of Liberia Civil Engineering Laboratory, compared against Liberia Water Quality Standards (LWQS) Class III.

Table 26: Surface and Groundwater Quality Results and Compliance Status

Sampling location	Sample Code	KM	Source type	pH	Turbidity (NTU)	TDS (mg/l)	TSS (mg/l)	NO_3^- (mg/l)	SO_4^{2-} (mg/l)	Cl^- (mg/l)	Fe (mg/l)	Cd (mg/l)	Cr(VI) (mg/l)	Compliance status
LWQS Class III Limit	—	—	—	5.5–9.0	≤10	≤1,200	≤50	≤80	≤250	≤450	≤2.0	≤0.01	≤0.10	—
Buchanan – Start Point	WSPt-1	0+000	River	6.8†	9.5†	<30	<12	<1.0	<15	<50	0.90†	BDL	0.08†	Compliant
Benson River / Big Joe Town	WSPt-2	5.0	River	6.7	8.4	<30	<12	<1.0	<15	<50	0.85	BDL	0.07	Compliant
Brumskine Farm	WSPt-3	10.0	Stream	6.5	7.8†	<30	<10	<1.0	<15	<50	0.70	BDL	0.18	Cr(VI) Exceedance
GRP ue Town	WSPt-4	15	Stream	6.8	12.6	<30	<12	<1.0	<15	<50	1.10	BDL	0.09†	Turbidity Exceedance
Gbankohn River	WSPt-5	16.8	River	7.0	12.0	<30	<14	<1.0	<15	<50	0.95	BDL	2.50	Turbidity + Cr(VI)
Kasuah Town	WSPt-6	21.8	Well	6.9	11.8	<30	<13	<1.0	<15	<50	1.00	BDL	0.31	Turbidity + Cr(VI)
Timbo River (Foster Town)	WSPt-7	25.35	River	7.3	30.2	<30	<15	<1.0	<15	<50	1.15	BDL	0.08†	Turbidity Exceedance
Menyongai	WSPt-8	30.35	Stream	6.9†	14.0†	<30	<12	<1.0	<15	<50	0.85†	BDL	0.12†	Turbidity + Cr(VI)

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Sampling location	Sample Code	KM	Source type	pH	Turbidity (NTU)	TDS (mg/l)	TSS (mg/l)	NO_3^- (mg/l)	SO_4^{2-} (mg/l)	Cl^- (mg/l)	Fe (mg/l)	Cd (mg/l)	Cr(VI) (mg/l)	Compliance status
Zahnto Town (Quarry)	WSPt-9	35.35	Stream	6.8	4.2	<30	<8	<1.0	<15	<50	0.60	BDL	<0.03	Compliant
Nyonbehn Town	WSPt-10	40.35	Handpump	6.6	5.1	<30	<8	<1.0	<15	<50	0.55	BDL	<0.03	Compliant
Timbo River / Foster Town	WSPt-11	47.25	River	7.1†	11.5†	<30	<12	<1.0	<15	<50	0.90†	BDL	0.11†	Turbidity + Cr(VI)
Cestos Junction (Yarpah Town)	WSPt-12	58.05	Stream	6.7†	9.0†	<30	<10	<1.0	<15	<50	0.80†	BDL	0.07†	Compliant

Explanation of laboratory test results:

The baseline water quality assessment for the Buchanan–Cestos City Junction Road Corridor (60.9 km) was undertaken at 12 sampling locations along the proposed alignment, covering rivers, streams, wells, and handpumps. The results were compared with the applicable Liberia Water Quality Standards (LWQS) Class III limits, as presented in the table.

The measured pH values ranged from 6.5 to 7.3, indicating near-neutral water conditions within the specified permissible range of 5.5–9.0. Total dissolved solids (TDS), total suspended solids (TSS), nitrate, sulphate, chloride, iron, and cadmium were reported within the respective limits at all sampling locations.

However, turbidity exceeded the specified limit of 10 NTU at several locations, including GRP ue Town (12.6 NTU), Gbankohn River (12.0 NTU), Kasuah Town (11.8 NTU), Timbo River at Foster Town (30.2 NTU), Menyongai (14.0 NTU), and Timbo River/Foster Town (11.5 NTU). These elevated values may reflect natural suspended sediment, surface runoff, erosion, or local human activities; further investigation would be required to establish the causes.

The table ***also reports exceedances of the stated chromium (VI) limit of 0.10 mg/L*** at Brumskine Farm (0.18 mg/L), Gbankohn River (2.50 mg/L), Kasuah Town (0.31 mg/L), Menyongai (0.12 mg/L), and Timbo River/Foster Town (0.11 mg/L). These results warrant particular attention, especially at Gbankohn River, where the reported concentration is substantially above the stated limit. Potential

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sources should not be assumed without further investigation. Confirmatory sampling and laboratory analysis are recommended to verify these results and determine whether additional investigation of local geological conditions or potential anthropogenic sources is necessary. The remaining locations were reported as compliant with the listed parameters.

In conclusion, the results indicate localized concerns relating to turbidity and reported chromium (VI) concentrations rather than uniform deterioration across the sampled water sources.

These findings provide an important baseline for assessing potential project-related impacts during construction, particularly from earthworks, exposed soil, river and stream crossings, construction runoff, fuel and chemical handling, and wastewater discharge. Appropriate mitigation measures should include erosion and sediment control, prevention of untreated discharges, proper storage of fuels and chemicals, and protection of watercourses. Monitoring should be undertaken at the identified locations, particularly those showing exceedances, before and during construction and, where warranted, during operation. Water quality should be assessed against the applicable standards for the intended use of each water source, and any exceedances should trigger investigation and corrective action.

Legend:

	Fully compliant
	One or more exceedances
BDL	Below Detection Limit
†	Indicative value
WSPt	Water Sample Point
	Water Sampling Point Coordinate
	Existing Roads
	Proposed Project Corridor
	Water Bodies (River, Stream, Creek, Pond, tributaries…)

Signed: *Alex B. Momo*
Chemical Analyst

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- **Interpretation of Results:**

➢ **General Water Quality Status**

- Overall, baseline water quality is good, with most parameters compliant with LWQS Class III.
- Waters are low in dissolved solids, nutrients, and most heavy metals, indicating minimal anthropogenic pollution.

➢ **Key Issues Identified**

1. **Turbidity (Localized Exceedances)**
    - Observed at WSPt-4, 5, 6, 7, 8, and 11 (up to 30 NTU).
    - Likely due to natural sediment transport, mining activities, erosion, and existing land disturbance.
2. **Hexavalent Chromium (Cr-VI)**
    - Exceedances at WSPt-3, 5, 6, 8, and 11.
    - Highest value recorded: 2.50 mg/l (WSPt-5).
    - Likely geogenic origin but requires confirmation.
3. **Groundwater Quality**
    - Baseline testing shows that handpump water (WSPt-10) is fully compliant and safe for community use. In contrast, well water at WSPt-6 exceeded safety standards with turbidity levels of 11.8 NTU and Hexavalent Chromium levels of 0.31 mg/L, likely due to a combination of geogenic factors and anthropogenic activities.

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- **Impact Assessment (Construction & Operation Phases)**

Table 27: Potential Impacts (AfDB OS4 & EPA Framework)

Impact	Receptor	Significance
Increased turbidity from earthworks	Rivers/streams	Moderate–High
Sediment runoff into water bodies	Aquatic habitats	Moderate
Contamination from fuels, oils, bitumen	Surface & groundwater	Moderate
Mobilization of naturally occurring metals (Cr(VI))	Surface water	Moderate
Quarry runoff (Zahnto)	Downstream users	Moderate
Community water contamination	Public health	Moderate–High

- **Mitigation Measures**

A. Design Phase

- Avoid alignment through sensitive water bodies where feasible.
- Incorporate adequate drainage structures (culverts, side drains).
- Design sediment tRP s and retention ponds at critical crossings.

B. Construction Phase

Erosion and Sediment Control

- Install silt fences, sediment basins, and check dams near water crossings.
- Restrict vegetation clearing to the minimum required areas.
- Stabilize exposed surfaces immediately (re-vegetation, compaction).

Water Quality Protection

- Prohibit direct discharge of construction wastewater into water bodies.
- Establish buffer zones (≥ 30 m) around rivers and streams.
- Implement spill prevention and response plans.

Hazardous Materials Management

- Store fuels and chemicals in bunded areas (110% capacity).
- Maintain equipment to prevent leaks.

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- Train workers in spill response.

Specific Measures for Cr(VI) Risk Areas

- Avoid using affected surface water sources for:
  - Drinking
  - Concrete mixing
- Conduct confirmatory sampling at WSPt-3, 5, 6, 8, and 11 (where necessary).
- Provide alternative safe water supply where needed.

Quarry Management (Zahnto Area)

- Install runoff control systems (sediment ponds, gabion wall for erosion control).
- Prevent direct discharge into streams.

C. Operation Phase

- Maintain drainage systems to prevent sediment buildup.
- Monitor water quality at key crossings.
- Control roadside erosion through vegetation.

Table 28: Monitoring Plan for Water Quality

Parameter	Frequency	Locations	Responsibility
Turbidity	Monthly (construction)	All major crossings	Contractor/Supervising Engineer
Cr(VI)	Quarterly	WSPt-3, 5, 6, 8, and 11.	EPA/PIU
pH, TDS, TSS	Quarterly	Representative sites	PIU
Site Inspection	Weekly	Entire corridor	PIU/Engineer/Contractor

➢ Residual Impacts

With appropriate mitigation measures in place/implemented, the residual impacts are assessed as:

- Turbidity impacts → Reduced to low–moderate
- Pollution risks → Reduced to low
- Cr(VI) risks → Managed through monitoring and avoidance

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The baseline confirms that:

- The project corridor has generally good water quality conditions.
- Localized turbidity and Cr(VI) exceedances are pre-existing and manageable.
- With the implementation of EPA-compliant and WB/AfDB-aligned mitigation measures, the project is unlikely to cause significant adverse impacts on water resources.

- **Environmental Baseline: Air Quality**

This section presents the baseline ambient air quality conditions along the Buchanan–Cestos Junction Road corridor (60.9 km) for the Integrated Mano River Union Road Development and Transport Facilitation Programme (IMRURDTFP) Phase-V. The baseline has been developed in accordance with the requirements of the Environmental Protection Agency of Liberia and the WB ESF/ESSs requirements.

A total of ten (10) ambient air quality monitoring points (AAQMPt-1 to AAQMPt-10) were established at specific locations along the project corridor to characterize existing conditions and provide a reference for impact assessment and future monitoring.

- **Ambient Air Quality Monitoring Locations**

The table below presents the established ambient air quality monitoring points along the corridor.

Table 29: Ambient Air Quality Monitoring Locations and Coordinates

No.	Sample Type	Sample Code	Location / Feature	Longitude (X)	Latitude (Y)
1	Air	AAQMPt-1	Buchanan	10°00'32.42"W	5°53'37.36"N
2	Air	AAQMPt-2	Brumskine Farm	9°56'27.86"W	5°51'8.64"N
3	Air	AAQMPt-3	Jacob Town	9°53'16.03"W	5°49'13.25"N
4	Air	AAQMPt-4	Kasuah Town	9°50'58.01"W	5°47'43.13"N
5	Air	AAQMPt-5	David Town	9°46'22.62"W	5°47'20.97"N
6	Air	AAQMPt-6	Gio Town	9°43'19.91"W	5°45'46.93"N
7	Air	AAQMPt-7	Zahnto Town (Proposed Quarry Site)	9°41'41.24"W	5°45'47.67"N
8	Air	AAQMPt-8	Bayon Town	9°40'22.03"W	5°45'10.08"N
9	Air	AAQMPt-9	Gbediah Town	9°38'19.64"W	5°44'21.52"N
10	Air	AAQMPt-10	Cestos Junction (Proposed Camp Site)	9°37'6.33"W	5°43'13.27"N
AAQMPt = Ambient Air Quality Monitoring Point					

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No.	Sample Type	Sample Code	Location / Feature	Longitude (X)	Latitude (Y)

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Figure 11: Map of the Project Area showing 10 Ambient Air Quality Monitoring Points at specific locations of the project road

- **Parameters Measured:**

- Particulate Matter: PM_{10}, $PM_{2.5}$ (µg/m³)
- Gaseous Pollutants: CO (mg/m³), NO_2 (µg/m³), SO_2 (µg/m³)

Averaging Period: 24-hour (PM and gases except CO = 1-hour equivalent adjusted)

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Table 30: Ambient Air Quality Results (AAQMPt-1 to AAQMPt-5)

Sample Code	Location	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	CO (mg/m³)	NO_2 (µg/m³)	SO_2 (µg/m³)
AAQMPt-1	Buchanan	148	62	2.8	34	12
AAQMPt-2	Brumskine Farm	132	55	2.1	28	10
AAQMPt-3	Jacob Town	140	58	2.4	31	11
AAQMPt-4	Kasuah Town	126	52	2.0	26	9
AAQMPt-5	David Town	118	49	1.9	24	8

Table 31: Ambient Air Quality Results (AAQMPt-6 to AAQMPt-10)

Sample Code	Location	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	CO (mg/m³)	NO_2 (µg/m³)	SO_2 (µg/m³)
AAQMPt-6	Gio Town	110	46	1.7	22	7
AAQMPt-7	Zahnto Town (Quarry Site)	156	64	3.1	36	13
AAQMPt-8	Bayon Town	122	50	1.8	25	8
AAQMPt-9	Gbediah Town	115	47	1.6	23	7
AAQMPt-10	Cestos Junction	108	44	1.5	21	6

Table 32: Applicable Guideline Values (Reference Standards)

Parameter	Averaging Period	Guideline Value
$PM_{2.5}$	24-hour	15 µg/m³ (WHO, 2021)
PM_{10}	24-hour	45 µg/m³ (WHO, 2021)
NO_2	24-hour	25 µg/m³ (WHO, 2021)
SO_2	24-hour	40 µg/m³ (WHO, 2021)
CO	24-hour	4 mg/m³ (WHO equivalent)

- **Interpretation of Results**

- Particulate Matter (PM_{10} & $PM_{2.5}$)

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All monitoring points show elevated particulate concentrations exceeding WHO guideline limits, confirming that dust emissions from the unpaved road are the dominant air quality issue. The highest levels are recorded at:

- AAQMPt-7 (Zahnto Town-proposed quarry influence area)
- AAQMPt-1 (Buchanan – urban traffic influence)

- **Monitoring and Observations**

Ambient air quality monitoring conducted at selected locations along the corridor focused on particulate matter (PM_{10} and $PM_{2.5}$) and key gaseous pollutants. ***The findings indicate that***:

- Elevated dust concentrations occur near unpaved road sections and traffic convergence points (e.g., junctions and settlements).
- Particulate levels decrease significantly beyond approximately 100 m from the road due to natural dispersion and vegetative barriers.
- Seasonal variation is significant, with higher dust levels recorded during the dry season.
- Local communities have been chronically exposed to elevated dust levels due to over 50 years of road use in its current unpaved condition.
- **Carbon Monoxide (CO):**
  Concentrations remain within acceptable limits, indicating moderate vehicular emission impact.
- **Nitrogen Dioxide (NO_2):**
  Values are moderate, with slight elevations near settlements and high-traffic areas but generally close to guideline thresholds.
- **Sulfur Dioxide (SO_2):**
  Concentrations are low across all sites, reflecting the absence of industrial combustion sources.

- **Existing Air Quality Conditions**

The Buchanan–Cestos Junction corridor is predominantly rural, with dispersed settlements and no major industrial developments. ***There are no significant point sources of air emissions*** such as factories, processing plants, or large-scale combustion facilities along the alignment.

Current ambient air quality is influenced primarily by the following sources:

- **Fugitive Dust (Particulate Matter):**
  The unpaved laterite road is the dominant source of airborne particulates (PM_{10} and

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$PM_{2.5}$), especially during the dry season. Vehicular movement generates significant dust plumes, particularly by motorcyclists and in high-traffic areas and at junctions.

- **Vehicular Emissions:**
  Emissions from motorcycles, taxis, and heavy goods vehicles contribute to localized concentrations of gaseous pollutants such as carbon monoxide (CO), nitrogen oxides (NO_x), and hydrocarbons.
- **Domestic Fuel Combustion:**
  The widespread use of firewood and charcoal for cooking in roadside communities contributes to background levels of smoke and fine particulates.

- **Baseline Air Quality Characterization**

Based on field observations, the baseline air quality along the corridor can be summarized as follows:

- **Particulate Matter (PM_{10} and $PM_{2.5}$):**
  Elevated near the road, particularly during dry conditions; levels are primarily driven by road dust rather than industrial emissions.
- **Gaseous Pollutants:**
  Generally low and within typical rural background levels, with localized increases near traffic nodes and settlements.
- **Spatial Variation:**
  Air quality improves RP idly with distance from the road due to vegetation and low background emission sources.
- **Sensitivity of Receptors:**
  Roadside communities, schools, markets, and informal settlements represent the most sensitive receptors, especially those located within 50 m of the road.

- **Implications for the Project**

The baseline conditions indicate that:

- The project corridor is currently dust-dominated rather than emission-dominated.
- Paving of the road is expected to significantly improve long-term air quality, particularly by reducing fugitive dust.
- However, short-term construction activities (earthworks, hauling, quarrying) may temporarily increase dust and emissions if not properly managed.

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Therefore, strict implementation of dust suppression measures, vehicle emission controls, and environmental management plans will be essential during the construction phase to minimize adverse impacts.

Overall Baseline

- The corridor's air quality is particulate-driven, with PM_{10} and $PM_{2.5}$ as the primary pollutants of concern.
- Gaseous pollutants (CO, NO_2, SO_2) remain within acceptable rural background levels.
- The data confirms that road paving will likely result in substantial long-term air quality improvements, particularly through dust suppression.

- **Environmental Baseline: Ambient Noise Levels**

This section presents the baseline ambient noise conditions along the proposed corridor for the Integrated Mano River Union Road Development and Transport Facilitation Programme (IMRURDTFP) Phase V Lot 1: Buchanan (including the link to the Port of Buchanan) to Cestos Junction (60.9 km), traversing Grand Bassa and Rivercess Counties.

The assessment was conducted in line with the requirements of the Environmental Protection Agency (EPA) of Liberia, AFDB ESS and the World Bank ESF requirements; which require characterization of existing environmental noise levels to inform impact assessment and mitigation planning.

A total of eight (8) Ambient Noise Measurement Points (ANMPt-1 to ANMPt-8) were established at representative locations, including urban areas, rural settlements, and sensitive project-related sites such as the proposed quarry and proposed construction camp.

- **Ambient Noise Measurement Methodology**

☐ **Measurement Approach:**

- Ambient noise levels were measured using a calibrated digital sound level meter (Type 1 precision).
- Measurements were taken using the A-weighting scale (dB(A)), which reflects human hearing sensitivity.
- At each location, readings were taken over 15–30 minutes intervals to capture representative conditions.
- Measurements were conducted during both:

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- Daytime: 06:00 a.m.-10:00 p.m.
- Nighttime: 10:00 p.m.-06:00 a.m.

- **Measurement Conditions:**

- Microphone positioned at ~1.5 m above ground level.
- Measurements taken away from reflective surfaces where possible.
- Weather conditions (wind, rain) were controlled to avoid interference.

Parameters Recorded:

- Leq (Equivalent Continuous Sound Level)-primary indicator
- Lmax (Maximum Noise Level)
- Lmin (Minimum Noise Level)

Reference Standards:

- EPA Liberia Environmental Noise Guidelines
- AFDB Environmental & social Assessment Guidance
- WHO Environmental Noise Guidelines

Table 33: Typical guideline limits used for assessment:

Land Use	Daytime Limit dB(A)	Nighttime Limit dB(A)
Residential / Rural	55	45
Mixed / Commercial	65	55

Table 34: Ambient Noise Measurement Locations and Coordinates

No.	Sample Code	Location/Feature	Longitude (X)	Latitude (Y)
1	ANMPt-1	Buchanan	10°02'41.21"W	5°52'36.79"N
2	ANMPt-2	Brumskine Farm	9°56'27.86"W	5°51'08.64"N
3	ANMPt-3	Kasuah Town	9°50'58.20"W	5°47'46.59"N
4	ANMPt-4	David Town	9°46'22.97"W	5°47'18.97"N
5	ANMPt-5	Gio Town	9°43'18.82"W	5°45'46.69"N
6	ANMPt-6	Zahnto Town (Proposed Quarry Site)	9°41'41.93"W	5°45'45.44"N
7	ANMPt-7	Yarpleah Town	9°36'57.58"W	5°43'14.44"N
8	ANMPt-8	Cestos Junction (Proposed Camp Site)	9°37'03.59"W	5°41'49.43"N

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Figure 12: Map of the Project Area showing 8 Ambient Noise Measurement levels at specific locations of the project road

- **Baseline Ambient Noise Levels**

Baseline noise levels along the corridor are generally low to moderate, reflecting predominantly rural conditions with localized increases in urbanized or active community areas.

Table 35: Summary of Measured Noise Levels

Sample Code	Location	Daytime Leq dB(A)	Nighttime Leq dB(A)	Observation
ANMPt-1	Buchanan	62 – 68	52 – 58	Urban influence, traffic, port activities
ANMPt-2	Brumskine Farm	48 – 54	38 – 44	Quiet rural/agricultural setting
ANMPt-3	Kasuah Town	50 – 57	40 – 46	Community activities, moderate noise
ANMPt-4	David Town	47 – 53	37 – 42	Low noise, rural settlement
ANMPt-5	Gio Town	49 – 55	39 – 45	Typical village environment

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Sample Code	Location	Daytime Leq dB(A)	Nighttime Leq dB(A)	Observation
ANMPt-6	Zahnto Town (Quarry Site)	46 – 52	36 – 41	Currently quiet, sensitive to change
ANMPt-7	Yarpleah Town	48 – 54	38 – 43	Low to moderate rural noise
ANMPt-8	Cestos Junction (Camp Site)	52 – 60	42 – 50	Moderate activity, transport node

- **Key Findings and Spatial Trends**

Daytime Conditions (06:00 a.m.-10:00 p.m.):

- Noise levels are highest in Buchanan (ANMPt-1) due to traffic and commercial activities.
- Most rural locations fall within acceptable limits (45–55 dB(A)).
- Slight exceedances occur in busy nodes (e.g., Cestos Junction).

- **Nighttime Conditions (10:00 p.m.-6:00 a.m.):**

- Significant reduction in noise levels across all locations.
- Most sites comply with nighttime limits (≤45 dB(A)), except:
  - Buchanan (due to continuous activity)
  - Cestos Junction (transport-related movement)

- **Sensitive Receptors Identified:**

- Residential communities (Kasuah, Gio, Yarpleah)
- Proposed quarry site (Zahnto Town)
- Proposed construction camp (Cestos Junction)

- **Impact Assessment (Construction & Operation Phases)**

➢ **Potential Construction Phase Impacts**

✓ **Daytime Impacts:**

- Increased noise from:
  - Heavy machinery (graders, excavators, compactors)
  - Haulage trucks

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- Quarry operations (blasting, crushing)

- Likely exceedance of EPA/WHO limits (up to 75–90 dB(A) near sources)

✓ **Nighttime Impacts:**

- Disturbance to communities if nighttime works occur
- Increased sensitivity due to low background noise
- Sleep disruption and associated health effects

➢ **High-Risk Locations:**

- ANMPt-6 (Zahnto Town – Quarry Site)
- ANMPt-8 (Cestos Junction – Camp Site)
- Settlements along the corridor

➢ **Potential Operation Phase Impacts**

- Increased traffic noise due to improved road conditions
- Higher vehicle speeds leading to elevated noise levels
- Long-term noise increase in:
  - Buchanan outskirts
  - Cestos Junction
  - Growing roadside settlements

▪ **Mitigation Measures**

➢ **<u>Construction Phase Mitigation</u>**

✓ **General Measures:**

- Restrict noisy activities to daytime hours (06:00.a.m-6:00p.m.) where feasible
- Maintain equipment to minimize excessive noise
- Use low-noise machinery and silencers

✓ **At Sensitive Locations:**

- Install temporary noise barriers near settlements
- Maintain buffer distances between equipment and receptors

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- Provide advance notice to communities for high-noise activities (e.g., blasting)

➢ **Quarry Site (ANMPt-6):**

- Schedule blasting during midday hours
- Use controlled blasting techniques
- Establish exclusion zones

➢ **Construction Camp (ANMPt-8):**

- Enforce noise control rules within the camp
- Limit generator and vehicle idling at night

➢ **<u>Operational Phase Mitigation</u>**

- Introduce speed control measures in settlements
- Install traffic calming features (rumble strips, signage)
- Promote vehicle maintenance to reduce engine noise
- Consider vegetative buffers along sensitive sections

Monitoring Recommendations

- Conduct quarterly noise monitoring during construction
- Monitor both daytime and nighttime noise levels
- Focus on:
  - Quarry site (ANMPt-6)
  - Camp site (ANMPt-8)
  - Selected communities

Parameter: Ambient Noise (Leq, dB(A))
Monitoring Period: 24-Hour Cycle (Representative Baseline Day)

Table 36: ANMPt-1: Buchanan (Urban/Port Influence)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	55	12:00	67
01:00	54	13:00	68
02:00	53	14:00	67
03:00	52	15:00	66
04:00	52	16:00	65

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Time	Leq dB(A)	Time	Leq dB(A)
05:00	53	17:00	66
06:00	58	18:00	64
07:00	62	19:00	63
08:00	65	20:00	61
09:00	66	21:00	60
10:00	67	22:00	58
11:00	68	23:00	56

Table 37: ANMPt-2: Brumskine Farm (Rural/Agricultural)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	40	12:00	53
01:00	39	13:00	54
02:00	38	14:00	53
03:00	38	15:00	52
04:00	39	16:00	51
05:00	41	17:00	52
06:00	45	18:00	50
07:00	48	19:00	49
08:00	50	20:00	47
09:00	52	21:00	46
10:00	53	22:00	44
11:00	54	23:00	42

Table 38: ANMPt-3: Kasuah Town (Rural Settlement)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	42	12:00	56
01:00	41	13:00	57
02:00	40	14:00	56
03:00	39	15:00	55
04:00	40	16:00	54
05:00	42	17:00	55
06:00	46	18:00	53
07:00	49	19:00	52
08:00	52	20:00	50
09:00	54	21:00	48
10:00	55	22:00	46
11:00	56	23:00	44

Table 39: ANMPt-4: David Town (Quiet Rural Area)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	39	12:00	52
01:00	38	13:00	53
02:00	37	14:00	52
03:00	37	15:00	51
04:00	38	16:00	50
05:00	40	17:00	51
06:00	44	18:00	49
07:00	47	19:00	48

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Time	Leq dB(A)	Time	Leq dB(A)
08:00	49	20:00	46
09:00	51	21:00	45
10:00	52	22:00	43
11:00	53	23:00	41

Table 40: ANMPt-5: Gio Town (Village Setting)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	41	12:00	55
01:00	40	13:00	55
02:00	39	14:00	54
03:00	39	15:00	53
04:00	40	16:00	52
05:00	42	17:00	53
06:00	46	18:00	51
07:00	49	19:00	50
08:00	51	20:00	48
09:00	53	21:00	47
10:00	54	22:00	45
11:00	55	23:00	43

Table 41: ANMPt-6: Zahnto Town (Proposed Quarry Site – Baseline Quiet)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	38	12:00	51
01:00	37	13:00	52
02:00	36	14:00	51
03:00	36	15:00	50
04:00	37	16:00	49
05:00	39	17:00	50
06:00	43	18:00	48
07:00	46	19:00	47
08:00	48	20:00	45
09:00	50	21:00	44
10:00	51	22:00	42
11:00	52	23:00	40

Table 42: ANMPt-7: Yarpleah Town (Rural Community)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	40	12:00	54
01:00	39	13:00	54
02:00	38	14:00	53
03:00	38	15:00	52
04:00	39	16:00	51
05:00	41	17:00	52
06:00	45	18:00	50
07:00	48	19:00	49
08:00	50	20:00	47
09:00	52	21:00	46
10:00	53	22:00	44
11:00	54	23:00	42

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Table 43: Cestos Junction (Proposed Camp Site / Transport Node)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	48	12:00	59
01:00	47	13:00	60
02:00	46	14:00	59
03:00	45	15:00	58
04:00	46	16:00	57
05:00	48	17:00	58
06:00	52	18:00	56
07:00	55	19:00	55
08:00	57	20:00	53
09:00	58	21:00	52
10:00	59	22:00	50
11:00	60	23:00	49

- **Summary Observations for Annex**
  - Peak Noise Period: 08:00 a.m.-2:00 p.m.m across all locations
  - Lowest Noise Period: 02:00 a.m.-04:00a.m
  - Highest Recorded Levels: Buchanan (ANMPt-1) up to ~68 dB(A)
  - Quietest Location: Zahnto Town (ANMPt-6) baseline ~36–52 dB(A)
  - Nighttime Compliance: rural locations comply with ≤45 dB(A) guideline
  - Urban Exceptions: Buchanan and Cestos Junction show elevated nighttime levels

Baseline ambient noise levels along the project corridor are generally within acceptable limits, reflecting predominantly rural conditions with localized urban influence.

However, the project is expected to introduce significant temporary noise increases during construction, particularly near sensitive receptors such as settlements, the quarry site, and the construction camp. With proper mitigation and monitoring, these impacts can be effectively managed to comply with EPA Liberia and AfDB ISS requirements.

- Natural Hazards and Climate Change Context

The corridor is exposed to several climate- and weather-related hazards:

- **Flooding and Erosion:**
  - Intense rainfall events and high annual precipitation contribute to flash flooding, particularly at river crossings and in low-lying sections where drainage is inadequate or blocked.

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- Steep approaches to bridges and culverts are vulnerable to gully erosion if runoff is not properly controlled.

- **Storms and Extreme Rainfall:** Climate projections for Liberia indicate an increase in the frequency and intensity of heavy rainfall events, which may exacerbate flooding, slope instability, and erosion along road embankments. (Climate Knowledge Portal)

- **Coastal and Riverine Erosion:** Grand Bassa and Rivercess counties are identified as highly vulnerable to coastal erosion, sea-level rise, and riverine flooding, affecting low-lying areas near Buchanan and downstream reaches of rivers crossed by the road.

- **Heat Stress and Drought:** While overall rainfall is expected to remain high, intra-seasonal variability may create short dry spells affecting water availability for communities and construction during the dry season.

These baseline hazards underscore the need for robust, climate-resilient road, culvert, and drainage design, and for careful siting of ancillary facilities away from flood-prone areas.

5.6 Biological Environment

i. Ecosystems, Habitats and Land Cover

The project traverses a mosaic of modified and semi-natural habitats typical of Liberia's coastal and lowland forest belt:

- Secondary moist evergreen and semi-deciduous forest in varying stages of regeneration, following long histories of shifting cultivation and selective logging.
- Agricultural and fallow land (upland farms, small rubber holdings, mixed tree crops, cassava, rice and plantain).
- Riverine forest and riparian vegetation along streams, creeks and rivers, typically support higher biodiversity than adjacent dry-land forests.
- Wetlands and swamp rice fields in valley bottoms and low-lying depressions.
- Built-up areas and roadside settlements, with home gardens, fruit trees and ornamental plants.

Much of the existing road corridor is assessed as modified as a result of long-standing road use, settlement, agriculture, logging and other human activities. Ecological condition is not uniform, however. Localized natural or higher-sensitivity features remain, particularly along river and stream crossings, wetlands, riparian vegetation and forest-edge areas. These features require specific consideration in the biodiversity impact assessment and application of the mitigation hierarchy.

IBAT screening using a 1 km screening buffer identified the Cestos–Senkwen and Weeni Creek KBAs in the wider landscape, together with records or potential occurrence of numerous IUCN-

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listed species. These screening results provide landscape-level context and indicate the need for precautionary assessment of habitat connectivity and species of conservation concern. They should not be interpreted as confirmation that all recorded species occur within the Project footprint or that the Project corridor itself constitutes critical habitat.

These KBAs constitute critical ecological assets in the broader landscape; although outside the 250 m direct AoI, they fall within the indirect biodiversity AoI and require careful consideration under ESS6 of World Bank.

Vegetation and Flora

Vegetation surveys along the project corridor identified plant communities representative of secondary forest, degraded bush, agricultural plots and wetland vegetation. These vegetation types reflect the influence of long-standing agricultural activities, settlement, logging, and roadside development. It was assessed that their ecological condition and sensitivity vary along the whole length of alignment, however these are further assessed, if needed, prior to execution, through C-ESCMP/ESIA.

Secondary forest and old fallow

These areas are reported to contain tree and shrub species such as *Alchornea cordifolia (Christmas bush), Hevea brasiliensis (rubber, in plantations), Elaeis guineensis (oil palm), Mangifera indica (mango),* and various native hardwoods used for timber, poles, and fuelwood. For the Project, these areas may be affected by RoW clearance, temporary access roads, construction camps, and other associated facilities.

The further assessment, if required, prior to physical execution should distinguish planted or cultivated vegetation from naturally regenerating forest and should identify relatively intact forest patches, habitat connectivity, and trees or plant species of conservation significance ***through C-ESMP/ESIA.*** The presence of secondary vegetation should accordingly not be interpreted as evidence that the habitat is ecologically unimportant.

Agricultural and degraded areas

These areas contain mixed crops, including *cassava (Manihot esculenta), plantain (Musa paradisiaca),* maize, and vegetables, interspersed with fallows dominated by grasses such as *Imperata cylindrica* and *Panicum repens* and shrubs. *Chromolaena odorata* is reported in roadside and fallow areas have been assessed for its potential to spread through vegetation clearance, soil movement, construction traffic, and disturbed ground.

Impacts on agricultural plots, productive trees, and other vegetation used by local communities was also assessed alongside biodiversity impacts, with relevant livelihood and land-access impacts addressed under the applicable E&S management measures.

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Wetlands and Riparian Zones

Vegetation is reported to include *swamp ferns (Acrostichum aureum), sedges (Scleria spp.)*, soft grasses and scattered mangrove species, including *Rhizophora harrisonii*, in low-lying brackish areas near the coast. These features may be particularly sensitive to drainage alteration, sedimentation, erosion, pollution, vegetation removal, and changes in surface-water flow. Their locations and extent has been verified in relation to the road alignment and river, stream, and wetland crossings. Where present within the Project's area of influence, riparian and wetland vegetation have been considered for avoidance and appropriate protection because of its potential role in habitat connectivity, bank stabilization, water-quality protection and provision of ecosystem services.

Flora species recorded during field surveys were predominantly classified as Least Concern (LC) under the IUCN Red List, and no globally threatened plant species were confirmed within the 250 m AoI based on the available survey findings. This finding is limited to the species recorded and the survey coverage, timing, and methods applied; it does not, in itself, demonstrate the absence of threatened species or other biodiversity values across the wider Project area of influence.

Consistent with the available field observations and confirmations, no sensitive or threatened flora species were observed within the direct 250 m corridor. Nevertheless, the presence of KBAs in the wider landscape, *bamboo (Bambusa vulgaris),* other native tree and understory species, and the broader forest and mangrove landscape warrants a precautionary approach to vegetation clearance and biodiversity management. KBA designation and the occurrence of particular plant species do not, by themselves, establish the presence of critical habitat within the Project footprint; their ecological relevance has been assessed using available biodiversity records, habitat characteristics, and the applicable ESS6 criteria.

ii. **Fauna**

The fauna baseline combines direct field observations and community knowledge.

Key findings include:

- **Mammals:**
  - Commonly reported species include cane rat (*Thryonomys swinderianus*), squirrels, duikers, bush rats, and domestic livestock (goats, sheep, cattle) grazing along roadsides and in nearby fields.
  - Large mammals and primates are now rarely observed in the immediate corridor due to fragmentation, hunting pressure and habitat disturbance.
- **Birds:**
  - A variety of forest and edge bird species were recorded, such as pigeons and doves (*Turtur afer*, *Streptopelia semitorquata*), bee-eaters (*Merops albicollis*), weavers (*Ploceus* spp.), bulbuls (*Pycnonotus barbatus*) and sunbirds (*Chalcomitra adelberti*, *Cyanomitra olivacea*). Aquatic species like egrets and herons (*Egretta spp., Ardea cinerea*) were observed close to watercourses and perennial rivers.
  - Most observed species are associated with disturbed forest, riparian forests, secondary growth and human settlement; all recorded species are classified as Least Concern.

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- **Reptiles and Amphibians:**
  - Species noted include common frogs (*Amietophrynus regularis*, *Phrynobatrachus plicatus*), the Liberian worm lizard (*Cynisca liberiensis*), small lizards and skinks.
  - Reptile diversity along the corridor is likely reduced by the high degree of habitat modification and the absence of rocky outcrops, although common reptile species, including snakes, may still occur in remnant vegetation, wetlands, farms, and riparian areas.

- **Fish and Aquatic Fauna:**
  - Rivers and creeks host fish such as catfish (*Chrysichthys auratus*, *Heterobranchus longifilis*), tilapia (*Tilapia zillii*), Brycinus spp. and crayfish, which are important for local subsistence and small-scale commercial fisheries.

While no globally threatened fauna species were confirmed within the 250 m AoI, IBAT indicates that the broader 1 km buffer contains at least 160 IUCN Red List species associated with the KBAs, implying high conservation value in the wider landscape.

iii. Aquatic Ecology

Aquatic ecosystems along the corridor comprise:

- Perennial rivers (Timbo, Gbowee, New Cess) with riffle-pool sequences, sand and gravel substrates and fringing riparian vegetation.
- Seasonal and perennial creeks and small wetlands used for fishing, bathing, laundry and sometimes irrigation.

These ecosystems provide habitat for fish, crustaceans and macro-invertebrates, and deliver key ecosystem services (domestic water, fisheries, cultural values). Baseline water quality is generally good, but localized turbidity and Cr(VI) exceedances may affect sensitive aquatic biota in certain reaches; this will require ongoing monitoring and careful control of construction-related pollution.

iv. Protected Areas and Critical Habitats

There are **no designated national parks, nature reserves or formally protected areas** intersecting the project's 250 m AoI. However:

- The IBAT assessment identified the **Cestos–Senkwen and Weeni Creek KBAs** and associated hydro-basins within approximately 1 km of the alignment, supporting numerous IUCN Red List species and potentially qualifying parts of the landscape as **critical habitat** under ESS6, which are recorded outside the already taken AoI.

- The project, therefore, lies within the sphere of influence of internationally important biodiversity areas, even though the immediate corridor is classified as modified habitat.

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This baseline context implies that any further habitat loss, fragmentation, or indirect impacts (e.g. increased hunting, logging) should be strictly controlled and compensated where necessary.

v. Ecosystem Services

Communities along the corridor rely heavily on ecosystem services from surrounding forests, farms and water bodies, including:

- **Provisioning services:**
  - Food crops from upland and swamp agriculture (rice, cassava, plantain, vegetables).
  - Bushmeat and fish as important protein sources.
  - Fuelwood and charcoal, timber and poles, palm oil and palm wine, medicinal plants and non-timber forest products (NTFPs).
- **Regulating services:**
  - Flood regulation and erosion control provided by forest and wetland vegetation.
  - Local climate regulation and carbon storage in forest biomass and soils.
- **Cultural services:**
  -
  - Traditional and customary practices: Areas associated with Poro and Sande societies and other customary practices, where present and confirmed through culturally appropriate consultation.
  - Sacred and culturally significant natural features: Sacred groves, culturally important trees, community gathering areas, and water bodies associated with traditional beliefs, customary use or community identity.

These services are central to local livelihoods and well-being and will be explicitly considered in the impact assessment and mitigation planning.

5.7 Socio-Economic and Human Environment

5.7.1 Baseline approach and geogRP hic context

The social baseline has been developed using multiple levels of evidence to reflect the different geogRP hic scales at which Project-related social risks and impacts may occur. It combines official population and administrative data with Project-specific household, resettlement, stakeholder engagement and field information.

The principal secondary sources include the 2022 Liberia Population and Housing Census (LPHC), the 2019–20 Liberia DemogRP hic and Health Survey (LDHS), relevant thematic census reports and other available administrative and sectoral information. Project-specific evidence includes the January 2025 Socioeconomic Baseline Survey (SEBS), the Resettlement Action Plan (RP) census and asset inventory, focus group discussions (FGDs), key informant interviews (KIIs), stakeholder consultations, community mapping and field observations.

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These sources are interpreted at four complementary spatial and analytical levels: county, district, corridor/community and Project household. County-level information for Grand Bassa and Rivercess establishes the broader demogRP hic, socioeconomic, health, labour, vulnerability and service-access context. District-level information provides a more geogRP hically relevant administrative reference for the parts of the two counties traversed by the Project.

Corridor and community-level information identifies settlement characteristics, community infrastructure, livelihood areas, transport and mobility patterns, sensitive receptors and locally reported concerns. Household-level SEBS and RP information provides more detailed evidence on the circumstances of surveyed and Project-affected households. This hierarchy is intended to avoid using any one dataset for purposes beyond the scale at which it is reliable.

The Project corridor extends approximately 60.9 km from Buchanan in Grand Bassa County eastwards towards Cestos Junction in Rivercess County. The Project documentation identifies 44 corridor communities, comprising 36 in Grand Bassa County and eight in Rivercess County. Project engagement records also refer to larger administrative, commercial and service nodes including Buchanan, Compound Three, Neekreen, Timbo, Wayzohn City, Dowein, Yarpah Town/Cestos Junction and Cestos City.

For social baseline purposes, the geogRP hic context is not treated as a single uniform buffer around the road. The relevant social area varies according to the impact pathway being assessed. The immediate corridor includes households, structures, businesses, community facilities, road users, livelihood areas and other receptors that may be directly exposed to land acquisition, construction activity, dust, noise and vibration, drainage changes, temporary access restrictions, traffic disruption and road-safety risks.

The wider social area includes communities and institutions functionally dependent on the road, service catchments, transport and market nodes, potential labour source and host communities, and areas in which improved accessibility may contribute to migration, settlement expansion, changes in land values, increased commercial activity, pressure on services or other induced and cumulative effects. This social framing complements the physical and ecological spatial boundaries defined elsewhere in the ESIA rather than assuming that all social effects are contained within a fixed-distance corridor.

Within this wider geogRP hic context, the district-level baseline focuses on District No. 4 (Kpaoegbarn) and Neekreen District in Grand Bassa County and Fen River District in Rivercess County. These districts provide administrative and population context for the corridor; their total populations should not be interpreted as the Project-affected population or as equivalent to the Project Area of Influence.

Project impacts occur within particular settlements, road-user groups, service catchments and livelihood systems within these districts, and the relevance of district-level statistics therefore depends on the impact or receptor being assessed. The revised baseline accordingly uses district

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information together with community-level and Project-specific evidence rather than as a substitute for localized conditions.

The SEBS of January 2025 covered 120 households across the corridor. Because the survey was not designed as a statistically representative sample of the total population of the 44 communities, the results are reported as characteristics of the surveyed households and are not extRP olated to the wider corridor population unless supported by census, administrative or other evidence.

The SEBS nevertheless provides important localized information on household composition, livelihoods, housing, access to services, vulnerability and community perceptions. Population prevalence, service coverage and other corridor-wide conditions are therefore established, where possible, from official or administrative sources and interpreted alongside the Project survey evidence.

The Project documents use a mixture of community, city, statutory-district and local-area names that do not correspond directly with the administrative nomenclature used in the 2022 LPHC. Names such as Dowein, Doedain, Compound Three, Commonwealth and Timbo should therefore not be treated automatically as census administrative districts. Community-to-district attribution will be based on the Project GeogRP hic Information System (GIS) and official administrative boundaries. Until individual community assignments are verified, district statistics are not attributed to specific settlements where the administrative correspondence is uncertain. This prevents population or socioeconomic characteristics from being assigned to communities on the basis of similarly named but different administrative units. The need for this crosswalk is already identified in the working baseline.

Where corridor-specific quantitative information is unavailable, the baseline uses the closest appropriate district, county or national evidence, together with Project-specific consultation and qualitative information, and identifies the limitations of the available data. Different sources are used according to the scale and nature of the issue being assessed, and broader administrative statistics are not assumed to represent individual corridor communities without supporting evidence.

Additional verification is focused on information material to the assessment that cannot be established reliably from existing Project records, administrative datasets or other credible secondary sources. This approach is applied particularly to road-user exposure and crash history, community infrastructure and service capacity, labour and migration, gender-based violence and sexual exploitation and abuse/sexual harassment (GBV/SEA/SH) services, child protection, security and institutional response, land and settlement change, and induced and cumulative social effects.

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Figure 13: Partial View of the Existing Corridor

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5.7.2 County and district demogRP hic and settlement context

The Project corridor crosses Grand Bassa and Rivercess Counties, which differ substantially in population size, degree of urbanization and settlement pattern. The 2022 Liberia Population and Housing Census (LPHC) recorded **293,689 people in Grand Bassa County** and **90,819 people in Rivercess County**. Grand Bassa contains the main urban and peri-urban concentration associated with Buchanan, while Rivercess is substantially more rural and characterized by smaller and more dispersed settlements. These differences provide an important context for understanding variation in population exposure, mobility, access to services, livelihood dependence and the likely distribution of Project impacts and benefits along the corridor.

Indicator	Grand Bassa	River-cess	Relevance to the Project
2022 population	293,689	90,819	Wider population context
Male	150,280	47,717	DemogRP hic structure
Female	143,409	43,102	DemogRP hic structure
Urban population	89,606	10,895	Reflects the stronger urban and peri-urban component in Grand Bassa
Rural population	204,083	79,924	Indicates the predominance of rural settlements and livelihoods outside principal urban areas
Urban share	30.5%	12.0%	Relevant to settlement form, mobility, employment and service access
Rural share	69.5%	88.0%	Relevant to agriculture, natural-resource dependence and accessibility
Households	69,296	21,091	Wider household context
Average household size	4.2	4.3	Population-level reference for interpreting Project survey findings
Female-headed households	28.5%	28.0%	Wider context for household composition and vulnerability

Within the two counties, the Project corridor passes through **District No. 4 (Kpaoegbarn), Neekreen District and Fen River District**. Together, these three districts contain approximately **113,677 people in 31,885 households** across a combined land area of approximately **2,066 km²**. They also comprise **26 clans**, consisting of 10 clans in District No. 4, 12 in Neekreen and four in Fen River. These clan structures form part of the local social and administrative context through which communities are organized and local engagement, dispute resolution and Project communication take place.

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County	District	Population	Households	Male	Female	Area	Population density	Clans
Grand Bassa	District No. 4 (Kpaoegbarn)	41,162	10,580	21,606 (52.5%)	19,556 (47.5%)	1,293 km²	32 persons/km²	10
Grand Bassa	Neekreen	62,883	18,871	31,193 (49.6%)	31,690 (50.4%)	514 km²	122 persons/km²	12
Rivercess	Fen River	9,632	2,434	4,967 (51.6%)	4,665 (48.4%)	259 km²	37 persons/km²	4

The district data show a pronounced difference in population concentration along the corridor. **Neekreen is both the largest and most densely populated of the three districts**, with 62,883 people and a density of approximately 122 persons per km². Its population density is almost four times that of District No. 4 and more than three times that of Fen River. District No. 4 has a larger land area of 1,293 km² but a considerably lower population density of approximately 32 persons per km², while Fen River contains 9,632 people at approximately 37 persons per km². The sex distribution is relatively balanced in all three districts, although Neekreen has a slight female majority, while District No. 4 and Fen River have modest male majorities.

These district-level differences are relevant to the spatial distribution of Project exposure. The higher population concentration within Neekreen indicates a greater potential interface between the road and settlements, road users, businesses and community services at the district scale. The lower overall densities in District No. 4 and Fen River reflect a more dispersed rural context, although population density at district level does not capture localized concentrations along the road itself. Rural settlements frequently follow the road alignment, meaning that relatively low district density can coexist with concentrated roadside exposure to construction traffic, dust, noise, access restrictions and future increases in vehicle speed.

Settlement form also changes along the 60.9 km corridor. Buchanan and surrounding settlements constitute the principal urban and peri-urban concentration, with stronger connections to the port, markets, formal employment, government institutions and higher-level services. Beyond this concentration, much of the corridor consists of smaller linear roadside settlements interspersed with agricultural land, wetlands, secondary vegetation and other rural land uses. Larger settlement and market nodes perform service and transport functions for surrounding communities, while many smaller settlements depend directly on the road for access to markets, schools, health facilities and administrative services.

The Project documentation identifies **44 communities along the corridor, comprising 36 in Grand Bassa County and eight in Rivercess County**. The ESIA, RP and SEP provide settlement-level information on affected structures, businesses, livelihoods, community facilities and

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stakeholder concerns, but a complete 2022 census population count is not available within the reviewed Project records for each of the 44 individual communities. The district figures therefore provide the administrative population context, while the spatial distribution of actual Project receptors is established through the community-level Project information. The wider district population of 113,677 should consequently not be interpreted as the population directly affected by the road.

The Project-specific SEBS covered 120 households comprising 894 individuals across the 44 corridor communities. The surveyed households had an average household size of approximately 7.5 persons, compared with county averages of 4.2 persons in Grand Bassa and 4.3 persons in Rivercess. The SEBS also recorded 53% female-headed households, compared with approximately 28% at county level. These differences indicate that the demogRP hic characteristics of the surveyed households differ materially from the wider county populations. As the SEBS was not established as a statistically representative sample of the full corridor population, its household characteristics are treated as descriptive of the surveyed households and are not extRP olated to the corridor as a whole. County and district census data therefore provide the principal population-level demogRP hic baseline, while the SEBS provides localized household-level evidence on conditions and vulnerabilities within the surveyed communities.

Population mobility is also part of the existing baseline. The 2022 migration analysis indicates that approximately **13.5% of Grand Bassa's population and 17.9% of Rivercess's population were migrants**, using the census definition applied in the thematic analysis. This indicates that the Project is being introduced into an existing context of population movement rather than a static settlement system. The combination of Buchanan's urban and port economy, rural communities dependent on road access, existing migration and marked differences in population concentration along the corridor provides the baseline against which potential Project-related labour movement, commercial growth, settlement expansion and induced development are assessed.

5.7.1 Governance and Administrative Context

The Project corridor traverses Grand Bassa County and Rivercessess County. Governance at county, district and community levels involves County Superintendents, District Commissioners, Clan Chiefs, Town Chiefs, community elders and other local leadership structures, including women’s and youth representatives. Traditional and community authorities have important roles in customary land-use and tenure matters, local dispute resolution, community decision-making and cultural affairs, particularly in rural communities.

The corridor connects Buchanan, an important commercial, administrative and port centre, with numerous rural towns and settlements along the route and terminates at Cestos Junction, which provides access toward Cestos City and the wider Rivercess hinterland. Approximately 44 communities are identified along the Project corridor.

These formal and customary governance structures are relevant to stakeholder engagement, disclosure and grievance management, as well as land acquisition, compensation, livelihood restoration, cultural heritage management and engagement with disadvantaged or vulnerable

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groups. Project engagement should therefore include both statutory authorities and representative community structures, while ensuring that engagement with traditional leadership does not substitute for direct engagement with PAPs, women, youth and other affected groups.

5.7.3 Age structure, children and youth

The population of Grand Bassa and Rivercess Counties is relatively young. The 2022 Liberia Population and Housing Census (LPHC) records approximately 104,130 people below 15 years of age in Grand Bassa, equivalent to around 35% of the county population, while approximately 63,810 people are aged 15–24. Rivercess similarly has a substantial child and youth population.

Children and young people constitute an important group of road users along the Project corridor, particularly as pedestrians, schoolchildren and motorcycle passengers. Existing Project consultations identify pedestrian safety and the movement of children to and from school as community concerns. The youthful demogRP hic structure therefore increases the significance of schools, pedestrian routes, road crossings, transport stopping points and other locations where children and young people interact with the road.

The SEBS found that children aged 0–15 represented approximately 35.7% of the 894 individuals living within the 120 surveyed households, broadly consistent with the youthful population structure shown by the wider demogRP hic data. As discussed above, the SEBS is interpreted as a profile of surveyed households rather than as a statistically representative estimate for the corridor population.

5.7.4 Housing, built form and living conditions

Housing and settlement form vary considerably along the Project corridor, reflecting the transition from the more densely developed urban and peri-urban environment around Buchanan to smaller, predominantly linear roadside settlements through the rural sections of Grand Bassa and Rivercess. These conditions influence exposure to road widening, construction traffic, dust, noise and vibration, drainage changes, temporary access restrictions and future increases in traffic speed.

The 2022 LPHC and the 2019–20 LDHS indicate substantial differences between urban and rural living conditions. At national level, approximately 70% of rural households had earth, sand or mud floors compared with around 19% of urban households. Access to electricity was also substantially lower among rural households, at approximately 4%, compared with about 39% in urban areas. At county level, 10.6% of households in Grand Bassa reported Liberia Electricity Corporation (LEC)/government electricity as their principal lighting source and 11.8% reported solar. In Rivercess, approximately 1% reported LEC/government electricity and 12.3% solar, with battery or rechargeable lights forming the principal lighting source for a large proportion of households..

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The affected structures within the RoW spatial distribution provides a useful indication of roadside built-form concentration. Buchanan contains **432 affected structures**, Yarpah Town **133** and Gio Town **76**, together representing approximately 39% of the affected private structures identified by the RP . The remaining structures are distributed across the smaller towns and villages along the corridor.

This pattern confirms that exposure is not spatially uniform. Buchanan and the larger settlement nodes contain greater concentrations of structures and roadside activity, while other sections comprise smaller settlements with development concentrated along the road and interspersed with agricultural and other rural land uses. The concentration of buildings directly along the transport corridor is particularly relevant to construction access, dust and vibration exposure, pedestrian safety, drainage interfaces and temporary disruption to residential and commercial access.

5.7.5 Water, sanitation and community dependence on natural resources

Access to water and sanitation is constrained across both Project counties, particularly in rural communities. The 2022 LPHC records substantial dependence on surface water and decentralized groundwater sources. In Grand Bassa, approximately 44% of households reported rivers, lakes, springs or creeks as their principal drinking-water source, while approximately 25.8% used an outdoor pipe or pump. In Rivercess, dependence on surface water was higher, at approximately 59.6%, with 31.5% relying on an outdoor pipe or pump.

The 2019–20 LDHS similarly found that 56.0% of the Grand Bassa population and 52.1% of the Rivercess population used an improved drinking-water source. Basic drinking-water service was estimated at 54.1% in Grand Bassa and 50.3% in Rivercess.

Sanitation conditions are also constrained. The LDHS estimated that only 34.9% of the population in Grand Bassa used an improved sanitation facility, while approximately 53.2% practiced open defecation. In Rivercess, approximately 22.6% used improved sanitation facilities and 55.7% practiced open defecation.

The SEBS shows a similar pattern of dependence on decentralized water sources. Of the 120 surveyed households, 85 identified hand pumps as their main water source, 24 reported wells and 11 reported rivers or creeks. Approximately 79% of surveyed households reported access to some form of toilet facility, principally pit latrines.

Surface-water resources also support uses beyond household drinking water. The ESIA identifies rivers and creeks along the corridor as important for domestic use, fishing and other community activities, and recognizes community hand pumps, wells and surface-water sources as sensitive receptors. Project consultation and transect-walk records also identify community water points among the sensitive locations considered during field assessment.

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The RP confirms that communal water and sanitation infrastructure occurs within the Project footprint. The affected public and community assets identified in the RP include wells, hand pumps, latrines, market stalls and community meeting facilities. This provides direct evidence that some community water and sanitation facilities are located sufficiently close to the road corridor to be affected by Project works.

These conditions indicate relatively high community sensitivity to disturbance of water sources. Temporary obstruction of access, sedimentation, accidental contamination, drainage modification or physical damage to hand pumps, wells or surface-water collection points could affect household water access, sanitation conditions, health, time spent collecting water and water-dependent livelihood activities. This sensitivity is greater in smaller rural settlements where alternative water sources and formal water-supply systems are limited.

5.7.6 Education and access to schools

Educational access remains constrained in both Project counties, particularly in rural areas. The 2022 LPHC found that 49.2% of children aged 6–12 in Grand Bassa had never attended school, compared with 40.9% in Rivercess. Current attendance among children aged 6–12 was approximately 47.6% in Grand Bassa and 55.9% in Rivercess. Among children aged 3–5, more than three quarters had never attended school in both counties.

The 2019–20 LDHS similarly indicates substantial education-access constraints, with Rivercess recording a primary-school net attendance ratio of approximately 26%, among the lowest nationally.

The Project SEBS provides a more localized household perspective. All 120 surveyed households reported at least one child attending school, with an average of approximately three students per surveyed household. These findings indicate that school attendance is a material part of daily household mobility within the surveyed communities, although the SEBS is not treated as statistically representative of the full corridor population.

Schools are also directly relevant to the road-safety baseline. The SEP records that Project community mapping and field observations identified schools, clinics, market centres, roadside trading points, religious institutions and transport hubs within corridor settlements. The ESIA road-safety assessment identifies villages, schools, markets and health facilities as locations of elevated pedestrian exposure, including children walking along the carriageway and using informal crossing points.

Community consultations also identified risks to children travelling to school and the need for safe pedestrian crossings. These concerns were reflected in the Project design and mitigation approach through pedestrian crossings, speed-control measures, signage and other safety measures near schools, markets and settlement areas.

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The baseline therefore indicates that children and students form an important group of vulnerable road users along the corridor. Existing reliance on walking, informal crossing points and roadside movement means that improved pavement conditions and higher operating speeds could increase the severity of pedestrian-vehicle conflict if appropriate road-safety measures are not incorporated.

5.7.7 Employment, livelihoods and labour-market context

The labour market in both Project counties is characterized by high levels of own-account and family-based work and comparatively limited formal wage employment. The 2022 LPHC records participation in work activities of approximately **42.9% in Grand Bassa and 55.5% in Rivercess** among persons aged five years and older. Own-account work is the dominant employment category in both counties. In Grand Bassa, 54.5% of persons recorded as working were own-account workers, 26.6% were contributing family workers and 18.9% were salary or wage workers. In Rivercess, the corresponding proportions were 55.2%, 34.3% and 10.5%.

The Project-specific evidence reflects this predominantly informal and household-based economy. The SEBS identifies subsistence and small-scale agriculture, fishing, petty trade, charcoal production, small services and seasonal work as the main livelihood activities. Many surveyed households combine farming with petty trade or other seasonal activities, indicating reliance on multiple income sources and sensitivity to seasonal conditions and road accessibility.

The RP provides a more focused profile of PAP livelihoods within the Project footprint. Approximately **49% of PAPs depend primarily on farming and 46% on petty trade or business activities**, while only about 3% reported formal employment and 2% were recorded as unemployed. The affected area includes roadside vendors, small businesses, transport services, rental activities and other informal enterprises, alongside 61 affected farms and 500 affected businesses. These figures relate specifically to PAPs and are not treated as representative of the wider corridor population, but they confirm the strong dependence of directly affected households on informal, land-based and roadside livelihoods.

The livelihood structure creates a close relationship between household income and access to the road, agricultural land, local markets and roadside commercial space. Temporary access restrictions, disruption to farms and trading locations, movement of roadside businesses and changes in transport conditions can therefore affect income even where there is no formal loss of employment. Conversely, improved year-round road access has the potential to reduce transport constraints, expand market access and improve the movement of agricultural produce and other goods.

The available evidence also indicates a mixed local skills base. The SEBS records skills including carpentry, masonry, welding, bamboo construction, food processing, soap-making, baking and small-enterprise management. However, less than 1% of surveyed household heads reported

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vocational training. This suggests the presence of practical skills relevant to some construction and service activities, alongside a relatively limited formally trained labour pool.

Local interest in Project employment is already evident from stakeholder consultations, particularly among youth and communities along the corridor. The ESRS also identifies unmet employment expectations and labour influx as material social risks. Current Project planning anticipates a construction workforce comprising approximately **75 expatriate or non-resident specialist staff and more than 500 national workers**, including skilled, semi-skilled and unskilled labour. The combination of limited formal employment, strong dependence on informal livelihoods and anticipated demand for construction labour creates both employment opportunities and potential competition around recruitment, particularly where expectations for local hiring exceed the number or skill profile of available positions.

5.7.8 Child labour and forced labour risk context

The 2022 LPHC records a work-activity rate among children aged 5–17 of 9.4% in Grand Bassa and 6.2% in Rivercess. Among children aged 5–14, the corresponding rates were 7.4% and 3.9%. These figures indicate participation of children in economic activity but do not, by themselves, distinguish permissible household work from child labour or hazardous child labour under ESS2.

The LDHS applies a more specific age and hours-based definition of child labour and found that approximately 27.7% of children aged 5–17 nationally met its child-labour criteria. This national figure provides wider context but is not treated as a prevalence rate for the Project corridor.

As described in Section 5.7.7, livelihoods along the corridor are dominated by agriculture, petty trade and other informal and household-based activities. The available Project surveys do not provide a quantitative breakdown of children's participation in these activities, hours worked or exposure to hazardous conditions. No corridor-specific quantitative evidence has been identified establishing the prevalence of hazardous child labour, forced labour or trafficking within the 44 communities.

Child and forced labour presents a material ESS2 risks associated with civil works and potential primary supply workers linked to construction materials and logistics. This is relevant to the Project because construction will require locally or regionally sourced aggregates, laterite, sand, timber, transport and related services.

Gender, GBV and SEA/SH context

Gender-related vulnerability is material within the Project area. The ESRS assigns the Project a **Substantial SEA/SH risk rating**, reflecting the interaction of a high underlying GBV burden, labour influx, predominantly rural and remote communities, economic vulnerability and constrained access to survivor services.

The LDHS indicates a high underlying prevalence of violence against women. In Grand Bassa, approximately 63% of women aged 15–49 reported having experienced physical violence since

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age 15, while approximately 28% reported physical violence often or sometimes during the preceding 12 months. Rivercess recorded a lower prevalence of spousal violence, at approximately 36%, but this does not indicate correspondingly low Project-related SEA/SH risk. Exposure to SEA/SH is influenced not only by underlying prevalence, but also by worker-community interaction, economic dependency, social isolation, access to reporting mechanisms and availability of survivor support.

Help-seeking is also limited. Nationally, approximately 42% of women who had experienced physical or sexual violence sought help, while approximately 48% had never sought help or told anyone. This indicates that reported cases are unlikely to represent the full extent of underlying violence and that stigma, accessibility and confidence in response systems are relevant factors.

Project consultations provide additional corridor-specific evidence. Women raised concerns regarding worker-community interaction, safety and the need for clear codes of conduct and coordination with local authorities and MoGCSP structures. The SEP identifies MoGCSP officers, community focal persons and local authorities as part of the existing institutional network for GBV referral and response.

5.7.10 Community health and health-service capacity

Health conditions along the corridor are shaped by both the disease burden and uneven access to health services. The LDHS records symptoms of ARI among children under five at approximately 4.2% in Grand Bassa and 7.4% in Rivercess during the two weeks preceding the survey. Malaria, diarrhoeal illness, respiratory conditions and maternal-health access are also important health concerns in the two counties.

Access to health services varies materially along the corridor. The SEBS reports better access around Buchanan, Yarpah Town, Gbediah Town and Cestos Junction, while many smaller settlements have no nearby health facility. Poor road conditions during the rainy season further constrain access from rural communities, increasing travel time and dependence on more distant facilities.

This pattern is important in a road-construction context because the same health system may need to respond to construction injuries, traffic crashes, communicable disease, maternal emergencies and other acute events. Existing road-safety consultations also indicate limited emergency-response capacity along parts of the corridor.

5.7.11 Poverty, vulnerability and access to communications

Socioeconomic vulnerability along the corridor reflects the interaction of income security, livelihood dependence, access to services, household circumstances and ability to participate in Project processes. The livelihood profile described in Section 5.7.7 shows substantial dependence on farming, petty trade and other informal activities. These livelihood types are not in themselves indicators of vulnerability, but households with low or unstable incomes, limited alternative

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income sources or limited capacity to absorb temporary livelihood disruption may be more sensitive to loss of access, displacement or interruption of economic activity.

The RP identifies **731 PAPs for additional vulnerability assistance**, comprising 226 persons aged 65 years or older and 505 female household heads. These categories identify groups requiring additional attention under the RP , but age or household headship alone does not determine vulnerability across the wider corridor. Vulnerability depends on the interaction between individual or household circumstances and the nature of Project exposure, including income security, dependency, disability, health status, access to alternative livelihoods and services, tenure security and ability to recover from disruption.

Project consultations identify additional barriers affecting participation and access to Project processes. These include low literacy, transport costs, long distances between settlements and meeting locations, seasonal access constraints, caregiving responsibilities, mobility limitations and limited influence in community decision-making. These barriers are particularly relevant to access to information, consultation, compensation processes and the GM and may compound the effects of poverty, disability, age, gender or remoteness.

Communication access is also uneven. The LDHS records that 74.6% of women aged 15–49 in Grand Bassa and 87.4% in Rivercess reported no weekly access to newspaper, television or radio. Project engagement records similarly show a strong reliance on verbal communication, traditional leaders, community meetings, town halls, local radio and direct community notification.

These conditions mean that vulnerability along the corridor is not defined by a single demogRP hic category. It reflects the interaction of poverty, informal livelihoods, limited services, literacy constraints, remoteness and restricted access to information and transport.

5.7.12 Persons with disabilities and accessibility

persons with disabilityface specific accessibility constraints relevant to both existing road conditions and future construction. Project consultations identified difficulties in reaching health facilities, attending meetings and moving through areas affected by road closures, diversions or relocation of community services. People with mobility, hearing and visual impairments were also identified as experiencing barriers to meeting venues and information access.

These barriers are particularly relevant where settlements rely on walking, informal roadside movement and public transport with limited accessibility. Drainage structures, temporary works, excavations, uneven surfaces and changes in crossing arrangements can create additional barriers for people with reduced mobility.

The 2022 LPHC contains county-level disability data, but the Project records reviewed do not presently provide a verified county prevalence figure or a corridor-specific estimate of persons with disability. The baseline therefore establishes the nature of accessibility barriers through Project consultation evidence but does not support a quantitative estimate of the number of persons with disability within the 44 corridor communities.

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5.7.13 Mobility, public transport and road-use patterns

The Buchanan–Cestos corridor is the principal transport route serving the settlements along the 60.9 km alignment. It supports local passenger movement, agricultural transport, roadside commerce, access to markets and social services, and movement to and from Buchanan and the Port. Smaller rural communities are particularly dependent on the road because alternative routes and formal transport options are limited.

The 2025 feasibility study included classified traffic counts undertaken from 10–13 February 2025. Count locations included the Buchanan end of the corridor at Big Joe Town and the Yarpah Junction/Cestos section. Vehicle classes included cars/taxis, pickups/jeeps/vans, minibuses, buses, light, medium and heavy trucks, and motorcycles.

Observed February 2025 traffic on the Buchanan–Cestos section comprised approximately 44 cars/taxis, 67 pickups/jeeps, three minibuses, no heavy buses, nine light trucks, 26 medium trucks, five heavy trucks and 2,604 motorcycles per day. On the Cestos City Link, the corresponding observed volumes were approximately one car/taxi, 23 pickups/jeeps, two minibuses, one bus, three light trucks, one medium truck, one heavy truck and 785 motorcycles per day.

The feasibility study notes that these counts were affected by the December 2024 failure of the Cestos River Bridge, which disrupted through-traffic and resulted in traffic volumes lower than those previously recorded. For the feasibility analysis, the study therefore developed a 2025 AADT baseline using earlier traffic data adjusted for growth, while retaining the 2025 motorcycle counts. The resulting baseline for the Buchanan–Cestos section was approximately 2,957 vehicles per day, comprising 109 cars/taxis, 203 pickups/jeeps, nine minibuses, three buses, 13 light trucks, six medium trucks, 10 heavy trucks and 2,604 motorcycles. The Cestos City Link baseline was approximately 911 vehicles per day, including 785 motorcycles.

Motorcycles therefore dominate the recorded traffic mix, accounting for approximately 88% of the Buchanan–Cestos AADT baseline and 86% of the Cestos City Link baseline. This is an important feature of the social and mobility baseline because motorcycles provide a major means of movement in rural and poorly accessible sections of the corridor. Project consultations also specifically included motorcycle taxi riders as a stakeholder group.

Public passenger transport is provided through a combination of motorcycle taxis, taxis, minibuses and buses, although the available traffic survey does not distinguish private cars from taxis within the combined car/taxi category and does not distinguish private motorcycles from commercial motorcycle taxis. The relatively small number of minibuses and buses recorded during the traffic survey, together with the very high motorcycle volumes and Project consultation evidence, indicates the importance of motorcycles and smaller shared-transport modes in corridor mobility.

The SEP identifies transport operators and transport unions as Project stakeholders, with interests including travel time and cost, road safety, parking and loading areas, and disruption during

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construction. It also records engagement with transport unions, traders and motorcycle taxi riders during Project preparation. Transport unions are also identified in the wider corridor context, including around Buchanan Port where cargo handling, fuel distribution, fisheries and transport activities depend on the road.

Seasonality materially affects mobility. Poor drainage, rutting, mud and deterioration during the rainy season reduce travel reliability and can restrict access to markets, schools, clinics and administrative centres. These effects are more significant for rural settlements with limited alternative routes and for households dependent on motorcycles, shared taxis and other informal transport services.

5.7.14 Baseline conditions relevant to migration, induced development and cumulative social change

The corridor is not a static social environment. As described in Section 5.7.2, both counties already experience population move

ment, while the settlement pattern ranges from the urban and port economy of Buchanan to smaller rural communities in Grand Bassa and Rivercess.

Buchanan functions as the principal commercial, administrative and port centre, while smaller settlements along the corridor depend heavily on the road for access to markets, services and transport. The corridor also supports agriculture, roadside trading, transport services, fishing and other informal economic activities. Project consultations and the SEP identify existing economic linkages between Buchanan Port, inland agricultural producers, transport operators, traders and service centres along the road.

The existing settlement and livelihood pattern is closely tied to accessibility. Roadside businesses and informal enterprises are already concentrated along several sections of the route, while farms, markets, schools, clinics and other community facilities are distributed through the corridor. This provides the starting condition against which future changes in roadside commerce, settlement growth, freight movement and service demand can be assessed.

Land relations also form part of this baseline. The RP identifies a mixture of formal, customary, inherited and informally recognized tenure arrangements within the affected area. This creates an existing sensitivity to changes in land demand, land values and roadside development, particularly where improved accessibility increases commercial interest in land.

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5.8 Cultural Heritage

Cultural heritage in the corridor includes both tangible and intangible elements:

- **Intangible cultural heritage:**
  - Poro and Sande societies, which are central to identity, initiation and social governance in many communities along the road. Their activities and sacred sites (e.g. groves, shrines) are rarely disclosed but must be treated with sensitivity and confidentiality.
  - Oral traditions, songs, dances and festivals associated with agricultural cycles, initiation and religious observances.

- **Tangible cultural heritage:**
  - No formally recognized archaeological or historical monuments have been identified in the immediate project corridor according to consultations and the socio-economic baseline survey.
  - However, there are **community cemeteries, sacred trees, churches and mosques**, which hold significant cultural and spiritual value. Many of these are located within or near settlements along the road.

Given the sensitive nature of cultural practices and the incomplete information on all burial sites and sacred locations, the ESIA adopts a **precautionary approach** and provides for:

- A Chance Find Procedure to be implemented during all ground-disturbing activities.
- Continued engagement with traditional authorities to identify and avoid or minimize impacts on known and as-yet-undisclosed sites of cultural importance**, consistent with AFDB OS8 and WB ESS 8** and national heritage legislation

No formally designated archaeological or historical monuments were identified within the surveyed corridor. This does not indicate an absence of cultural heritage. Community cemeteries, sacred trees, churches, mosques and potentially undisclosed sacred or ceremonial sites occur within or near corridor settlements. Because information on burial grounds and culturally sensitive locations remains incomplete, confidential and culturally appropriate verification will be undertaken with affected communities and traditional authorities where Project works or ancillary facilities could affect such resources.

Avoidance and minimization will be considered before works are authorized. The Chance Find Procedure will apply to previously unidentified cultural heritage encountered during ground-disturbing activities.

5.9 Summary of Key Environmental and Social Sensitivities

The principal environmental and social sensitivities identified through the baseline studies, BAP, socio-economic surveys, stakeholder engagement and supporting technical studies ***are summarized in Table 45.*** The table identifies receptors and baseline conditions requiring particular attention in the impact assessment. It does not replace the location-specific significance assessment presented in subsequent sections.

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Table 45: SUMMARY OF KEY ENVIRONMENTAL AND SOCIAL SENSITIVITIES

Receptors	Location / Extent	Baseline Sensitivity / Concern
Major rivers, perennial streams and riparian areas	Timbo, Gbowee, New Cess and smaller stream crossings along the corridor	Watercourses support domestic use, fishing, livelihoods, aquatic habitat and drainage functions. TR-01 is identified in the BAP as a High Sensitivity ecological node, while eight perennial stream crossings, SC-01 to SC-08, are Moderate Sensitivity. These receptors are particularly sensitive to sedimentation, spills, bank disturbance, altered drainage and interruption of aquatic connectivity.
Community water sources and groundwater	Hand pumps, shallow wells and surface-water sources used by corridor communities	Groundwater and surface-water sources have a direct social interface because communities depend on them for domestic use and livelihoods. Twelve baseline water samples included both surface-water and groundwater sources. Localized turbidity and Cr(VI) exceedances were recorded, including at one well, while the sampled hand pump was compliant. Confirmatory sampling is required where anomalous Cr(VI) results may affect interpretation or future monitoring.
Highly erodible lateritic soils and exposed slopes	Cut and fill areas, drainage outlets, embankments, borrow areas and other disturbed surfaces	Lateritic soils are susceptible to erosion and gullying when exposed under high rainfall. Loss of soil stability can affect watercourses, farmland, road infrastructure and downstream receptors through sediment transport and altered drainage.
Seasonal wetlands and low-lying drainage areas	WD-01 to WD-06 and other wetland/swamp areas along low-lying sections	Six seasonal wetland depressions are identified as Moderate Sensitivity ecological nodes. They support amphibian habitat, seasonal water retention and local resource use and are sensitive to filling, drainage alteration, sedimentation and contamination.
Forest-edge and secondary vegetation	FE-01 between Big Joe Town and Garpu Town and other fragmented secondary vegetation along the corridor	Much of the corridor is modified, but ecological condition is not uniform. FE-01 contains fragmented secondary vegetation and regenerating tree cover and requires location-specific controls for vegetation clearance, wildlife disturbance and restoration.
Wider biodiversity landscape and KBAs	Wider landscape identified through IBAT screening, including Cestos-Senkwen and Weeni Creek	IBAT screening indicates wider landscape-level biodiversity importance and records or potential occurrence of species of conservation concern. These screening results should inform ESS6/OS6 assessment and precautionary management but should not be interpreted as confirmation that all screened species occur within the Project footprint or that KBA proximity alone establishes critical habitat.
Air quality and noise-sensitive receptors	Roadside residences, schools, clinics, markets and densely settled sections	Existing air quality is influenced mainly by road dust, traffic and localized combustion sources. Baseline noise is generally low to moderate, making schools, health facilities, residences and markets particularly sensitive to increases in dust, exhaust, construction noise and vibration.
Roadside settlements, mobility and community infrastructure	44 corridor communities, including dense settlement sections, schools, clinics, markets, water points and transport nodes	Communities are highly dependent on the road for access to services, markets and livelihoods. Pedestrians, motorcycles, roadside traders, children and users of community facilities are particularly sensitive to access disruption, construction traffic and increased operational speeds. Existing mapping identifies community facilities

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		and sensitive receptors, but a consolidated spatial inventory is still required for the impact assessment.
Livelihoods and ecosystem-service dependence	Farms, wetlands, rivers, forests and roadside commercial areas throughout the corridor	Households depend on agriculture, fishing, petty trade, forest products and community water sources. Changes in water quality, drainage, vegetation, access or land availability may therefore create direct livelihood, food-security and community-health consequences and should be assessed as linked environmental-social impact pathways.
Disadvantaged and vulnerable groups	Across corridor communities, particularly remote and poorer settlements	Women-headed households, persons with disabilities, children, elderly persons, very poor households, informal workers and remote communities may face greater exposure to impacts or greater barriers to compensation, information, employment, safe mobility, services, grievance channels and Project benefits. Differentiated impacts and mitigation should be assessed by location and impact pathway.
Community health, WASH and social-service capacity	Rural settlements and service centres along the corridor	Rural communities have uneven access to health facilities, safe water, sanitation, emergency response and other services. Labour influx and construction activities could increase pressure on services and exposure to communicable disease and SEA/SH risks. GBV/SEA/SH referral services and institutional response capacity require further mapping before worker mobilization.
Cultural heritage and culturally sensitive locations	Cemeteries, sacred trees, religious sites, Poro and Sande sites and other known or potentially undisclosed locations	Both tangible and intangible cultural heritage occurs along the corridor. Information on burial grounds and sacred locations remains incomplete. Known and reasonably identifiable heritage should be verified confidentially and avoided or minimized through design; the Chance Find Procedure should apply to previously unidentified resources rather than substitute for baseline identification.
Climate and natural hazards	Entire corridor, particularly low-lying, riverine and coastal sections near Buchanan	High rainfall, riverine flooding, erosion, sea-level rise and coastal erosion are relevant baseline hazards. These conditions affect drainage, slope stability, bridges, culverts, ancillary-site selection and long-term road resilience.

***Baseline data limitation: Locations for some ancillary facilities, including camps, quarries, borrow pits, processing areas and associated access routes, remain to be confirmed. The sensitivities summarized above therefore do not represent a complete site-specific baseline for those facilities. Site-specific E&S screening and baseline verification will be required before approval or use of any such location.

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6.0 ENVIRONMENTAL AND SOCIAL RISK AND IMPACT ASSESSMENT

This chapter presents a comprehensive and quantitative assessment of the potential environmental and social risks and impacts associated with the Project, in full compliance with national legislation and the applicable lenders' Environmental and Social Standards and GIIPs. The assessment systematically considers the project design, selected alternatives, and baseline environmental and social conditions, drawing on both primary field data and secondary sources.

Impacts and risks are identified across all project phases, including pre-construction, construction, and operation, decommissioning with particular attention to direct, indirect, and cumulative effects. ***Each identified impact and risk is quantitatively evaluated*** in terms of magnitude, spatial extent, duration, likelihood, and receptor sensitivity, and is assigned a level of significance both before and after mitigation measures are applied.

The chapter further distinguishes between residual impacts, which remain after mitigation, and unavoidable impacts, which cannot be fully eliminated but can be managed through monitoring and adaptive management measures.

This approach ensures that decisionmakers and stakeholders can clearly understand the trade-offs between project benefits and potential environmental and social costs and provides a robust basis for the design and implementation of targeted mitigation and enhancement measures.

6.1 Impact Assessment Methodology

The purpose of the impact assessment is to identify and evaluate the significance of potential E&S impacts associated with the 60.9 km Buchanan–Cestos Junction corridor and associated Project activities, and to identify measures to avoid, minimize or otherwise manage adverse impacts while enhancing beneficial effects.

Impacts were identified through review of the Project design and proposed activities, baseline conditions, field investigations, technical studies, stakeholder consultations, resettlement impacts and stakeholder engagement findings, and professional judgement. The assessment considers both adverse and beneficial impacts across the relevant Project phases and examines direct, indirect, induced and cumulative effects where relevant.

The assessment covers the principal E&S impact pathways associated with the Project, including:

1. **Physical environment and pollution**, including air quality, noise and vibration, soils and erosion, surface and groundwater, drainage, waste and hazardous materials.
2. **Biodiversity, natural resources and ecosystem services**, including vegetation clearance, habitat disturbance, aquatic environments and community dependence on natural resources.

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3. **Land use, resettlement and livelihoods**, including land acquisition, physical and economic displacement, impacts on businesses, agriculture, access to land and livelihood resources.
4. **Labour and working conditions**, including OHS, workforce management, labour influx and risks associated with child and forced labour.
5. **Community health, safety, mobility and access**, including construction safety, traffic and road safety, pedestrian exposure, access disruption, public transport, community infrastructure and utilities, communicable disease, security and worker-community interaction.
6. **Social inclusion, gender and community relations**, including SEA/SH, impacts on vulnerable or disadvantaged groups, employment expectations, social cohesion, stakeholder concerns and access to Project benefits.
7. **Cultural heritage**, including graves, cemeteries, sacred sites, places of worship and intangible cultural heritage.
8. **Indirect, induced and cumulative impacts**, including changes in settlement, traffic, land use, natural-resource pressure, economic activity and demand for services.

This methodology provides a structured and transparent approach for evaluating potential E&S impacts and risks associated with the Project and for identifying appropriate mitigation and enhancement measures.

Impact significance is assessed by considering the **magnitude of change** and the **sensitivity or vulnerability of the affected receptor**, taking account of factors such as spatial extent, duration, reversibility, frequency and likelihood, as applicable. The resulting significance rating is determined using the impact significance matrix presented below.

For discrete or event-based risks where both the probability of occurrence and severity of consequence are relevant, a separate risk-rating approach is applied. Likelihood and consequence are each scored from 1 to 5 and combined as **likelihood × consequence**. Scores of 1–4 are rated Low, 5–9 Moderate, 10–16 Substantial and 17–25 High. This risk-rating approach complements, rather than replaces, the impact significance assessment.

The assessment follows the following process:

a. **Review of Project design and alternatives**, including the proposed alignment, construction activities, associated facilities and operational characteristics.

b. **Baseline characterization**, drawing on primary field data, technical studies, secondary information and stakeholder engagement to establish existing environmental and social conditions and receptor sensitivity.

c. **Identification of impacts and risks**, including beneficial and adverse, direct and indirect, temporary and permanent, and induced and cumulative effects where relevant.

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d. **Evaluation of significance**, based on the nature and magnitude of the anticipated change and the sensitivity or vulnerability of the affected environmental or social receptor.

e. **Application of the mitigation hierarchy**, prioritizing avoidance, followed by minimization and mitigation of adverse impacts, restoration where appropriate, and compensation or offsetting of significant residual impacts where applicable.

f. **Consideration of cross-cutting factors**, including climate and disaster risk, gender and social inclusion, vulnerability, human rights considerations and cumulative effects where relevant to the identified impact pathway.

Impact Identification Tools

1. **Checklists:** Structured checklists grouped by E&S components (e.g. soils, water, air, biodiversity, land use, livelihoods, vulnerable groups, cultural heritage, labour conditions, community health and safety). These were used to ensure systematic coverage of all possible interactions between project activities and receptors.

2. **Interaction Matrices:** An impact interaction matrix was used to cross-reference project activities (e.g. site clearance, earthworks, camp operation, traffic diversion, operation of the upgraded road) with environmental and social receptors (e.g. communities, watercourses, roadside businesses, habitats). The matrix allowed quick screening of likely significant interactions (direct, indirect and cumulative).

3. **Expert Judgement and Field Verification:** The checklist and matrix outputs were verified and refined through site visits, stakeholder consultations, and the professional judgement of the ESIA team.

Impact Significance Criteria

Each identified impact is evaluated to determine its significance. Impact significance is based on two principal components:

1. **Impact magnitude**, reflecting the scale and characteristics of the predicted change; and

2. **Receptor sensitivity or vulnerability**, reflecting the importance, susceptibility and capacity of the affected environmental or social receptor to accommodate, adapt to or recover from the change.

Available Project-specific quantitative information is used where appropriate, supported by qualitative evidence, stakeholder information and professional judgement.

Impact magnitude is determined with reference to:

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- **Magnitude:** Scale or intensity (e.g., hectares of forest cleared, number of PAPs, sediment load).
- **Extent:** Spatial coverage (site-level, local, regional).
- **Duration:** Short (<1 year), Medium (1–5 years), Long (>5 years), Permanent.
- **Reversibility:** Reversible or irreversible.
- **Likelihood:** Probability of occurrence (low, medium, high).
- **Receptor Sensitivity/Vulnerability:** Ecological sensitivity, socio-economic vulnerability, legal protection.

Table 46: Impact Magnitude Categories

Risk and impact classification color legend: **Critical/Very High** **High/Substantial/Major** **Moderate-High** **Moderate/Medium** **Low-Moderate** **Low/Minor** **Positive/Beneficial** **Not applicable/Mixed**. Written ratings are retained for accessibility and black-and-white printing.

Magnitude	Description	Illustrative Project-Specific Examples
High	Major change to the receptor or receiving environment	e.g., >1,000 PAPs affected, >50 ha of forest or vegetation cleared, major watercourse affected
Moderate	Noticeable but not major change to the receptor or receiving environment	e.g., 200–1,000 PAPs affected, 10–50 ha of vegetation affected, moderate water or soil impact
Low	Minor change to the receptor or receiving environment	e.g., <200 PAPs affected, minor vegetation disturbance, minor erosion or sedimentation
Negligible	Minimal or no measurable change	Impacts are barely detectable

Note: The quantitative examples presented in this table are indicative and project-specific. They are used to guide the ESIA team's assessment of impact magnitude and should not be interpreted as fixed universal thresholds.

Table 46A: Receptor Sensitivity/Vulnerability Criteria

Sensitivity	Description	Typical Examples (for this Project)
Very Low	Receptor of low environmental or social value; high resilience or adaptability to change.	Highly modified roadside land, degraded vegetation, and short-term casual users.
Low	Receptor of some value, but relatively robust or adaptable.	Mixed farmland, non-vulnerable households with diversified livelihoods.
Medium	Receptor of clear value and/or legal protection, with some vulnerability to change.	Small wetlands, primary livelihood activities, schools and clinics, and small businesses.
High	Receptor of high critical value or legal protection, with very limited capacity to absorb change.	Vulnerable groups, community water sources, graveyards, any remaining natural habitat patches, and cultural sites.

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i. Determining Significance

Impact significance is derived from a combination of **magnitude** and **sensitivity**, taking into account duration, reversibility and likelihood. The ESIA uses four principal levels of significance:

- **Negligible** – no meaningful effect.
- **Low** – minor effect; easily managed; typically acceptable with standard good practice.
- **Moderate** – noticeable effect; requires specific mitigation; may be of concern if widespread or long-term.
- **High** – serious effect; may be unacceptable unless mitigated/offset; requires strong management and monitoring.

Table 46B: Typical Significance Matrix

	Sensitivity: Very Low	Sensitivity: Low	Sensitivity: Medium	Sensitivity: High
Magnitude: Negligible	Negligible	Negligible	Negligible	Low
Magnitude: Minor	Negligible	Low	Low	Moderate
Magnitude: Moderate	Low	Low	Moderate	High
Magnitude: Major	Moderate	Moderate	High	High

Significance is initially assessed **before mitigation** ("residual impact without mitigation"), then reassessed **after mitigation** to determine the "residual impact with mitigation".

ii. Types of Impacts

The assessment differentiates between:

1. **By project phase**
   - Pre-construction (planning, surveys, land acquisition, setting out).
   - Construction (site preparation, civil works, traffic management, camp operations).
   - Operation (traffic, maintenance, induced development).
   - Decommissioning (if applicable; e.g. removal of temporary facilities).

2. **By causal pathway**
   - **Direct impacts:** Directly attributable to project activities (e.g. vegetation clearance, noise from equipment).
   - **Indirect impacts:** Resulting from project-induced changes, such as increased access, in-migration, and changes in land use.
   - **Cumulative impacts:** Combined effects of the Project with other existing or planned projects in the same area (e.g. multiple roads, logging, mining or agricultural expansion).

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- **Induced impacts:** Longer-term socio-economic changes triggered by improved accessibility (e.g. new businesses, settlement growth along the corridor, pressure on land and services).

iii. Consideration of Climate Change, Disaster Risk and Human Rights

The impact assessment was systematically considered:

- **Climate change:**
  - Project emissions of greenhouse gases (GHGs) and energy use.
  - Climate resilience of the infrastructure (e.g. heavier rainfall, flooding, erosion).
  - Influence of climate-related hazards on community safety and livelihoods.
- **Disaster risk:**
  - Increased exposure of communities to road accidents, flooding and slope instability.
  - Project's role in supporting or undermining local disaster preparedness.
- **Human rights:**
  - Non-discrimination and equal access to project benefits (including gender).
  - Avoidance of forced and child labour.
  - Protection of rights to property and livelihoods (fair compensation and resettlement).
  - Free, meaningful and inclusive participation in decision-making.

6.2 IMPACT AND RISK ASSESSMENT

The following table distinguishes **project impacts**, understood as direct effects on environmental and social receptors, from project risks, understood as potential adverse consequences that may arise if impacts are not properly managed or if certain conditions materialize.

The table combines available project-specific indicators with qualitative assessment of magnitude, extent, duration, likelihood, and receptor sensitivity to support the identification of key environmental and social risks requiring mitigation and monitoring.

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Table 47A: Semi-Quantitative E&S Risk Assessment

Risk ID	Risk Event / Potential Consequence	Likelihood (1–5)	Consequence (1–5)	Score	Rating	Basis
R-01	Failure or delay in RP implementation, including compensation and livelihood restoration affecting 1,093 PAPs	4	5	20	High	Land acquisition is confirmed and the affected population has high socio-economic sensitivity.
R-02	Habitat fragmentation, edge effects and invasive-species spread following vegetation removal	4	4	16	Substantial	Clearing is likely during construction and may affect remaining habitat patches and riparian areas.
R-03	Sediment release and water-quality degradation at stream and river crossings	4	4	16	Substantial	Earthworks and exposed surfaces create a likely pathway to sensitive aquatic receptors if controls fail.
R-04	Traffic accident involving communities, schools or vulnerable road users	3	5	15	Substantial	Exposure occurs during construction and operation and may result in serious injury or fatality, particularly for pedestrians, schoolchildren, motorcyclists and other vulnerable road users.
R-05	OHS incident involving machinery, vehicles, work at height, excavation or hazardous materials	4	5	20	High	High-risk construction activities and a large workforce create material accident potential.
R-06	GBV/SEA/SH incident linked to worker-community interaction or labour influx	3	5	15	Substantial	Potential consequences are severe and rural referral capacity is limited.
R-07	Improper waste handling causing soil/water contamination and public-health nuisance	3	3	9	Moderate	Waste generation is expected, but effects are localized and manageable with established controls.
R-08	Accidental discovery or disturbance of previously unidentified graves, shrines, sacred sites, archaeological material or other cultural heritage	2	5	10	Substantial	Likelihood is lower, but consequences may be severe for affected communities. Undisclosed sacred sites and previously unidentified cultural heritage may occur within areas subject to excavation or other ground disturbance
R-09	Induced access facilitating illegal logging, hunting or longer-term habitat conversion	2	5	12	Substantial	Substantial | Likelihood is lower, but consequences may be severe in terms of habitat conversion/loss. .
R-10	Labour influx and worker-community interaction resulting in communicable disease, pressure on services or social tension.	4	5	15	Substantial	Construction will involve approximately 75 non-resident specialists and more than 500 national workers. Project consultations identified concerns regarding population influx, worker-community interaction and pressure on already limited social services, while many smaller corridor settlements have limited access to health services.

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Risk ID	Risk Event / Potential Consequence	Likelihood (1–5)	Consequence (1–5)	Score	Rating	Basis
R-11	Loss, degradation, or conversion of natural habitat during construction and development of associated facilities	3	4	12	Substantial	Vegetation clearance and construction activities may affect secondary forest, riparian vegetation, wetlands, and other potentially natural habitats. The extent and significance depend on verified habitat classification, ecological condition, and the area affected.
R-12	Disturbance or loss of critical habitat and biodiversity features of conservation significance	2	5	10	Substantial	Available biodiversity records and the presence of KBAs in the wider landscape warrant screening against ESS6 critical habitat criteria. Critical habitat has not been established solely by these screening results; the risk rating should be reviewed following the documented assessment.
R-13	Aquatic habitat degradation and impacts on aquatic biodiversity	4	4	16	Substantial	Earthworks, stream crossings, sedimentation, drainage alteration, and accidental pollution may affect fish, crustaceans, aquatic macroinvertebrates, and aquatic habitat functions in rivers, creeks, and wetlands.
R-14	Introduction or spread of invasive alien species through construction activities	3	3	9	Moderate	Movement of machinery, soil, aggregates, and construction materials may spread invasive alien plants, including Chromolaena odorata where confirmed. Inadequate rehabilitation may facilitate further establishment.
R-15	Wildlife injury, mortality, disturbance, and obstruction of movement	3	3	9	Moderate	Vegetation clearance, construction machinery, traffic, noise, and habitat fragmentation may affect terrestrial fauna and wildlife movement. Actual risk depends on species occurrence, habitat use, and the location of construction activities.
R-16	Failure to meet applicable biodiversity outcome requirements where natural or critical habitat is affected	2	2	10	Substantial	If ESS6 requirements for natural or critical habitats are triggered, failure to demonstrate compliance with the applicable conditions, mitigation measures, and biodiversity outcome requirements could result in significant residual impacts and safeguard non-compliance.

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Table 47B: E&S Assessment

Impact ID	Direct Impact	Quantitative Extent / Receptor	Magnitude (1–4)	Sensitivity (1–4)	Significance	Basis
I-01	Land acquisition and physical/economic displacement	1,093 PAPs; 1,643 affected private structures; 500 businesses; 61 farms and 5,656 economic trees	4	4	High	The impact exceeds the major-magnitude threshold and affects highly sensitive livelihood and residential receptors.
I-02	Vegetation clearance and habitat disturbance	Approximately 45 ha of secondary forest and bamboo within the project footprint	3	3	Moderate	The impact is measurable and localized within a largely modified corridor.
I-03	Sediment increase at water crossings	Five key streams and other corridor watercourses may experience localized sediment loading during earthworks	3	3	Moderate	The effect is likely to be temporary and localized but affects valued water resources.
I-04	Construction noise and vibration	Typical daytime levels of 60–70 dB(A), with short peaks near heavy equipment and trucks	2	3	Low–Moderate	The effect is temporary but may disturb settlements, schools and clinics.
I-05	Construction-camp waste generation	Approximately 5–10 m³/day of mixed waste	2	3	Low–Moderate	The impact is site-specific and reversible with proper management.
I-06	Temporary access disruption	Homes, farms, businesses, schools and health facilities along the 60.9 km corridor may experience temporary disruption	3	3	Moderate	The impact is short-term but affects essential access and livelihoods.
I-07	Operational access and economic benefits	Reduced travel time and transport cost; improved access for 44 corridor communities	3	3	Moderate–High Positive	The project provides long-term connectivity, trade and service-access benefits.
1-08	Disturbance or relocation of identified graves/cemetery	Known graves and cemetery within the Project footprint	3	4	High	Burial sites are culturally sensitive receptors and disturbance may result in permanent loss of place-based cultural and spiritual value even where culturally appropriate relocation is undertaken.
1-09		Vegetation clearance and disturbance affecting secondary forest, bamboo, riparian vegetation,	3	4	Moderate	Habitat significance depends on ecological condition, biodiversity values, extent of loss, and potential effects on

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Impact ID	Direct Impact	Quantitative Extent / Receptor	Magnitude (1–4)	Sensitivity (1–4)	Significance	Basis
	Loss and degradation of natural habitats	wetlands, and other potentially natural habitats within the project footprint and associated facilities				habitat connectivity. Modified habitat designation alone does not exclude significant biodiversity values.
1-10	Habitat fragmentation and disruption of ecological connectivity	Forest patches, riparian corridors, wetland connections, and potential wildlife movement routes intersecting or adjoining the alignment	3	3	Moderate	Road construction and operation may fragment habitats, create edge effects, and impede wildlife movement. The extent and significance depend on site-specific ecological evidence.
1-11	Disturbance, injury, or mortality of terrestrial fauna	Wildlife using vegetation clearance areas, construction sites, temporary access roads, and adjoining habitats	3	3	Moderate	Vegetation clearance, machinery, traffic, noise, and increased human access may disturb or injure fauna. Hunting and other unsustainable resource use may increase where access to previously less accessible areas is facilitated.
1-12	Impacts on aquatic biodiversity and freshwater habitats	Live key streams and other rivers, creeks, wetlands, riparian habitats, fish, crustaceans, and aquatic macroinvertebrates potentially affected by construction	3	3	Moderate	Sedimentation, altered drainage, bank disturbance, accidental spills, and pollution may affect aquatic habitat quality and ecological functions. Existing turbidity and Cr(VI) findings should be considered in establishing the baseline and monitoring requirements.
1-13	Introduction and spread of invasive alien species	Disturbed roadside vegetation, construction areas, borrow pits, quarries, temporary access routes, and rehabilitation sites	2	3	Low Moderate	Earthworks, transported soil, construction machinery, and inappropriate revegetation may facilitate the spread of invasive alien species, including Chromolaena odorata where its presence is confirmed.
I-14	Loss or impairment of ecosystem services	Forests, farms, wetlands, watercourses, fishing areas, and natural-resource collection areas used by corridor communities	3	3	Moderate	Vegetation clearance, water pollution, habitat degradation, or restricted access may affect food resources, fisheries, fuelwood, medicinal plants, erosion control, and other ecosystem services. Significance depends on

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Impact ID	Direct Impact	Quantitative Extent / Receptor	Magnitude (1–4)	Sensitivity (1–4)	Significance	Basis
						community dependence and the availability of alternatives.
1-15	Loss or degradation of riparian and wetland vegetation	Vegetation at river and stream crossings, low-lying wetlands, and other hydrologically connected areas affected by construction or drainage works	3	3	Moderate	Disturbance may reduce bank stability, increase sedimentation, alter local drainage, and impair habitat and water-quality functions. The rating should be refined using verified habitat extent and crossing-specific conditions.

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6.3 MITIGATION MEASURES

The table below summarizes **feasible mitigation measures** addressing each significant and moderate impact and risk.

Table 47C: Mitigation Measures for E&S Risks and Impacts, Associated Risks, and Management Actions

Impact (Direct Effect)	Risk (Potential Consequence)	Mitigation Measures
Loss of households, assets, and livelihoods	Delayed or inadequate RP implementation, livelihood deterioration, disputes and grievances	Implement RP ; provide fair compensation; deliver livelihood restoration support; ensure targeted assistance to vulnerable groups; maintain an accessible grievance mechanism
Forest clearance and habitat disturbance	Biodiversity loss, habitat fragmentation, edge effects, and invasive species spread	Limit clearing to the approved RoW implement replanting and restoration measures, andapply offsets where required; avoid sensitive habitats and KBAs andmonitor invasive species
Increased sediment load and localized water quality deterioration	Degradation of aquatic habitats, downstream siltation, and reduced water usability	Install silt fences, sediment tRP s, and buffer zones; schedule work to reduce exposure during peak rains; stabilize exposed areas RP idly; monitor water quality
Increased noise and vibration during construction	Temporary disturbance, stress, nuisance, and possible sleep disruption for nearby receptors	Restrict high-noise activities near settlements to appropriate daytime periods; maintain equipment and silencers; use temporary barriers where justified; manage blasting or other high-vibration activities; provide advance notice to nearby communities, schools and health facilities.
Increased traffic, accident exposure, and vehicle emissions	Collision risk, pedestrian and motorcycle injury, community safety impacts and localized emissions	Implement TMP and road-safety measures; maintain safe pedestrian access and crossings; use traffic marshals and appropriate signage; control Project vehicle speeds; provide driver training; maintain vehicles; undertake community road-safety awareness; monitor incidents and adapt controls based on accident and near-miss trends. ESS4 requires traffic and road-safety risks to be identified and monitored throughout the Project life cycle
Generation of mixed solid and liquid waste at camps and work sites	Soil and water contamination, poor sanitation, and vector-borne disease risks	Segregate waste and dispose of it at licensed facilities; compost biodegradable waste where appropriate; enforce camp sanitation and waste management procedures
Easier access to forest and natural resource areas	Illegal hunting, logging, encroachment, and longer-term biodiversity loss	Conduct community awareness campaigns; strengthen local monitoring and patrols where feasible; restrict illegal hunting and logging; integrate biodiversity monitoring into project implementation
Worker OHS exposure	Serious injury, fatality, occupational disease and unsafe working conditions	Implement the LMP and OHS Plan; undertake task-specific risk assessments; provide safe work procedures, PPE, training and supervision; establish permit-to-work systems for high-risk activities; maintain first-aid and emergency response arrangements; investigate and report incidents; maintain a worker GM.
Labor influx and worker-community interaction	Communicable disease transmission, pressure on local services, social tension, conflict	Prioritize transparent local recruitment where skills are available; communicate recruitment procedures and eligibility; manage worker

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Impact (Direct Effect)	Risk (Potential Consequence)	Mitigation Measures
	and unmet employment expectations	accommodation and conduct; provide worker and community health awareness; coordinate with local health and administrative authorities; monitor workforce-related pressure on services and grievances; implement community liaison throughout construction.
GBV/SEA/SH associated with worker-community interaction	Increased risk of SEA/SH, particularly affecting women, girls and other vulnerable community members, arising from labour influx and interactions between project workers and surrounding communities.	Ensure effective implementation of the project and contractor SEA/SH Action Plans, including mandatory worker Codes of Conduct, regular training and awareness raising, confidential and survivor-centred reporting mechanisms, referral pathways to appropriate support services, and monitoring of contractor compliance.
Temporary access disruption	Temporary access disruption	Temporary access disruption
Known graves, cemetery and other cultural heritage	Disturbance, loss of cultural or spiritual value, conflict with affected families or communities	Prioritize avoidance; where disturbance cannot be avoided, consult affected families, traditional and religious authorities and relevant institutions before any works; agree culturally appropriate procedures, rites and relocation arrangements; implement the RP provisions for the 21 identified graves and cemetery.
Previously unidentified cultural heritage	Accidental damage to archaeological, burial, sacred or other cultural resources	Implement the Chance Find Procedure; stop work and secure the area where a potential find is encountered; obtain competent assessment and consult relevant authorities and communities before work resumes.
Improved access to forests and natural-resource areas	Increased hunting, logging, encroachment and longer-term habitat conversion	Restrict worker access to natural-resource areas unrelated to Project activities; prohibit hunting, wildlife trade and unauthorized timber harvesting by Project personnel; control temporary access roads and reinstate them where no longer required; require legal sourcing of timber and other natural materials; monitor evidence of Project-enabled pressure and coordinate with relevant authorities where material changes are identified.

6.4 Impact Identification by Project Phase and Activity

Key project activities and their associated potential impacts are summarized in Table 51.

Table 51: Summary of Key Interactions by Project Phase

Phase	Key Activities	Main Receptors	Primary Impact Types
Pre-construction	Detailed design, surveys, land acquisition, marking of ROW, site selection for camps and borrow areas	Landowners/users, roadside businesses, vulnerable households, local authorities	Economic/physical displacement, loss of assets, anxiety/uncertainty, land-use change, grievances
Construction	Vegetation clearance, earthworks, drainage works, pavement and structures, operation of camps and	Soils, surface water, air quality, communities, biodiversity, cultural sites, workers	Erosion, sedimentation, water and soil contamination, dust, noise, traffic risks, OHS risks, GBV/SEA/SH, influx impacts

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Phase	Key Activities	Main Receptors	Primary Impact Types
	workshops, haulage of materials, traffic diversions		
Operation	Increased traffic, improved travel speeds, roadside commercial development, routine maintenance	Road users, roadside communities and businesses, community health facilities, schools, habitats	Road safety, air/noise emissions, induced development, land use change, pressure on services, economic opportunities
Decommissioning	Removal of temporary works and facilities, rehabilitation of sites Closure of camps, borrow pits, quarries, diversions, stockpiles and temporary work areas; waste removal and site rehabilitation	Soils, watercourses, communities Workers, communities, landowners/users, soils, watercourses and habitats	Waste generation, local disturbance, short-term OHS risks, opportunities for site restoration

Biophysical Impacts (ESS1, ESS3 and ESS6)

The assessment of biophysical impacts was undertaken using a mixed qualitative and quantitative approach. In addition to professional judgment, the ESIA considered project-specific quantitative indicators such as the estimated vegetation clearance footprint, the number of potentially affected streams and rivers, baseline water quality and noise measurements, expected waste volumes, and the likely footprint of earthworks and ancillary facilities.

These indicators were used, where available, to support the assignment of impact magnitude and significance, while also taking account of extent, duration, reversibility, likelihood, and receptor sensitivity.

i. Soils and Geology (Erosion, Contamination, Stability)

Baseline Context: The corridor traverses predominantly weathered and lateritic soils, with sections prone to erosion, especially on embankments, cut slopes, and near drainage crossings. Construction and operation will overlay these with new or improved road surfaces and drainage structures.

Potential Impacts

- **<u>Construction Phase</u>**
  - Topsoil stripping and compaction from heavy equipment, causing loss of soil structure and fertility.
  - Increased erosion on exposed surfaces, stockpiles and embankments, potentially leading to sedimentation of nearby watercourses.
  - Localized soil contamination from spills of fuel, lubricants, asphalt/bitumen and other hazardous materials.
  - Slope instability where cut-and-fill works are not adequately designed or protected.
- **<u>Operation Phase</u>**

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- Concentrated runoff from paved surfaces causes erosion at culvert outlets and downstream channels.
- Long-term contamination risk from accidental spills from vehicles (e.g. oil, fuel) and at maintenance yards.

Significance (Before Mitigation)

- Magnitude: Moderate (localized but potentially severe at erosion hotspots).
- Sensitivity: Medium to High (where communities and watercourses are nearby).
- Significance: Moderate to High.

Key Mitigation Measures

- Minimizing area and duration of exposed soil; progressive rehabilitation with topsoil replacement and revegetation.
- Design and implementation of erosion and sediment control measures (silt tRP s, check dams, contouring, rip-RP , appropriately sized culverts and drains).
- Good housekeeping and spill prevention: bunded storage for fuels/oils; drip trays; designated refueling and maintenance areas with impermeable surfaces.
- Slope stabilization measures (benching, retaining structures, vegetation).
- Training of workers and contractors on spill response and soil protection.

Residual Impact (With Mitigation): Residual impacts on soils and geology are expected to be **Low**, localized and manageable, with some permanent change where embankments and cuttings are created.

ii. Hydrology and Water Quality

Baseline Context: The existing road crosses several streams and drainage lines, with local wetlands or low-lying areas adjacent to the right-of-way (ROW). Community water uses include domestic supply, small irrigation, fishing and livestock watering.

Potential Impacts

- **Construction Phase**
  - Increased sedimentation from exposed soils and earthworks, particularly at watercourse crossings.
  - Pollution from concrete washouts, fuels, oils, and construction waste entering water bodies.
  - Temporary disruption of natural drainage patterns due to diversions, temporary access roads, stockpiles and improper sizing or placement.
  - Contamination from poorly managed workers' camps (greywater, sewage, solid waste).

- **Operation Phase**
  - Changes in runoff patterns and concentrations due to improved pavement and drainage; risk of local flooding if culverts are undersized or blocked.

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- Pollution from road runoff carrying oil, rubber particles and other contaminants.
- Potential increased abstraction of surface water by new development along the corridor.

Significance (Before Mitigation)

- Magnitude: Moderate.
- Sensitivity: Medium to High (receptors include community water sources and aquatic ecosystems).
- Significance: Moderate to High.

Key Mitigation Measures

- Implement erosion and sediment control plans at all watercourse crossings.
- Use best practice construction methods to avoid direct discharge of pollutants during works.
- Design drainage systems to accommodate projected peak flows, including climate change scenarios, and to avoid creating new flood risks.
- Prohibit disposal of waste and spoil in watercourses and wetlands; establish buffer zones.
- Install oil separators and silt tRP s where appropriate; maintain drainage structures regularly.
- Proper design and management of camp sanitation systems (septic tanks, soak-aways, regular desludging) and solid waste collection.

Residual Impact (With Mitigation): Residual impacts on hydrology and water quality are expected to be **Low to Moderate**, with any remaining effects localized and largely reversible if drainage and maintenance are properly implemented.

Chromium Exceedance: Potential Sources, Verification and Corrective Actions

The reported concentration of Chromium (VI) in chapter 4, the applicable permissible limit requires further investigation to establish whether the exceedance is associated with natural geological conditions, existing anthropogenic activities, or project-related sources before mobilization to the site by the Contractor and reflect that in the C-ESMMP.

Potential sources may include the natural weathering and leaching of chromium-bearing geological formations and soils; discharge or seepage from industrial activities, metal processing, electroplating, tanneries, and chemical handling; improper disposal of industrial waste and runoff from contaminated land. Construction-related sources, including fuel and chemical storage, equipment maintenance and inappropriate disposal of construction materials, may also contribute if such activities occur near the affected water sources.

Sampling and laboratory confirmation:

Follow-up sampling shall be undertaken before mobilization to the site by the Contractor. Samples shall be collected from the affected sampling locations and, where appropriate, from upstream and downstream locations to determine the extent and potential origin of contamination. If the water

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source is used for domestic purposes, samples shall also be collected directly from the community collection point. Sampling shall follow an approved sampling protocol, including appropriate preservation, chain-of-custody documentation and quality assurance/quality control procedures. Samples shall be analyzed by an EPA-recognized or otherwise appropriately accredited laboratory for Hexavalent Chromium Cr (VI), total chromium and relevant supporting water-quality parameters, using validated analytical methods with suitable detection limits. The laboratory results shall be compared against the applicable Liberian drinking-water standards and relevant WHO guideline values.

Confirmation of community use:

During the sampling before the contractor get into the site, the Contractor and Supervision Consultant shall consult the relevant community representatives and verify whether the affected water sources are used for drinking, cooking, washing or other domestic purposes. The assessment shall document the type of water source, users, frequency of use, approximate number of households served, and availability of alternative safe water supplies. Until the results are confirmed, the water shall not be assumed to be safe for drinking where an exceedance has been reported.

Actions if the exceedance is confirmed:

If laboratory results confirm that Cr (VI) concentrations exceed the applicable drinking-water limit, the following actions shall be implemented:

- Immediate notification and precautionary measures: Promptly notify the affected communities through community leaders and appropriate communication channels. Where the source is used for drinking or cooking, advise communities not to use it for these purposes until its safety is established. Provide or arrange access to an alternative safe water supply, where necessary.
- Regulatory and project notification: Notify the EPA and the PIU, sharing the confirmed laboratory results, sampling locations, affected receptors and proposed corrective actions. Notifications shall be documented.
- Source investigation: Undertake a targeted investigation to identify the likely source and pathway of contamination, including assessment of nearby land uses, industrial or commercial activities, waste disposal areas, geological conditions and project-related activities.
- Corrective and remedial measures: Implement appropriate measures based on the identified source, which may include controlling or stopping contaminant releases, improving drainage and waste management, isolating contaminated sources, and providing suitable water treatment or alternative supplies. Any treatment system shall be selected based on validated treatment performance for Cr (VI).
- Follow-up monitoring: Conduct confirmatory and periodic monitoring of the affected sources to assess the effectiveness of corrective measures. The water source shall only be recommended for drinking and domestic consumption once repeat laboratory results

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demonstrate compliance with applicable standards and the relevant authorities have been consulted.

- Documentation and reporting: Maintain records of community notifications, EPA and PIU communications, laboratory reports, source investigations, corrective actions, alternative water provision and subsequent monitoring results. Findings and progress shall be incorporated into the project environmental and social monitoring reports.

iii. Air Quality and Greenhouse Gas Emissions

Baseline Context: Current air quality along the corridor is influenced mainly by existing traffic, unpaved road conditions (dust), domestic biomass use and small-scale open burning. Sensitive receptors include roadside dwellings, schools, health centers and markets.

Potential Impacts

- **Construction Phase**
  - Dust emissions from earthworks, traffic on unpaved access roads, material handling, and stockpiles.
  - Exhaust emissions (NOx, SOx, PM, CO) from construction equipment and trucks.
  - Localized smoke from accidental burning of waste or vegetation

- **Operation Phase**
  - Reduction in dust where unpaved sections are upgraded to paved surfaces.
  - Potential increase in exhaust emissions due to higher traffic volumes and speeds, though an improved road surface may reduce per-vehicle fuel consumption.
  - Small increase in GHG emissions associated with induced traffic and maintenance activities.

Significance (Before Mitigation)

- Construction air emissions: Magnitude Moderate, Sensitivity Medium–High (at densely populated sections) – **Moderate** significance.
- Operational emissions: Magnitude Minor–Moderate, Sensitivity Medium – **Low to Moderate** significance.

Key Mitigation Measures

- Regular water-spraying of active work areas and unpaved access roads near sensitive receptors.
- Covering trucks carrying fine materials; speed controls in populated areas.
- Well-maintained and compliant construction equipment; avoidance of unnecessary idling.
- Prohibition of open burning of waste.
- Incorporating traffic management and calming measures through settlements to limit high-speed acceleration/emissions.
- Promotion of public transport and non-motorized transport facilities where feasible.

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Residual Impact (With Mitigation): Construction-related air impacts should reduce to **Low**. Operational GHG emissions are expected to be modest in absolute terms; overall residual air quality impact is **Low to Moderate**, with a net reduction in dust compared to the existing unpaved or poorly paved condition.

iv. Noise and Vibration

Baseline Context: Existing noise is dominated by road traffic, with relatively low background levels in rural stretches and higher levels around settlements and markets.

Potential Impacts

- **Construction Phase**
  - Elevated noise from heavy machinery, trucks, compaction, and occasional blasting if required.
  - Vibration impacts on nearby structures during compaction or pile driving.
  - Disturbance to residents, schools, and health facilities close to the road and construction sites.

- **Operation Phase**
  - Increased traffic volumes and speeds leading to higher peak noise levels near settlements.
  - Reduced engine noise where smooth surfaces eliminate pothole-related rattling, partly offsetting traffic growth.

Significance (Before Mitigation)

- Construction: Magnitude Moderate, Sensitivity Medium–High – **Moderate to High** significance at hotspots.
- Operation: Magnitude Minor–Moderate, Sensitivity Medium – **Low to Moderate** significance.

Key Mitigation Measures

- Restricting high-noise activities to daytime where feasible; advance notification to communities for unavoidable night-time works.
- Use of well-maintained equipment and silencers; siting noisy equipment away from sensitive receptors.
- Temporary noise barriers at particularly sensitive locations if needed.
- Road design measures (speed humps, signage, speed limits) through settlements to manage noise.

Residual Impact (With Mitigation): Residual noise and vibration impacts are expected to be **Low to Moderate**, primarily near dense settlements and sensitive receptors along the ROW.

v. Biodiversity, Habitats and Ecosystem Services

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Baseline Context: For biodiversity assessment purposes, a 250 m wide ecological assessment corridor, extending approximately 125 m on either side of the road centerline, was applied. Actual Project disturbance is confined to the ROW and associated work areas, while potential indirect and induced biodiversity effects are considered beyond this corridor where relevant impact pathways extend.

This area is already heavily modified by long-term human activity and the existing road, consisting mainly of:

- Agricultural land (fields, plantations, fallows).
- Degraded secondary vegetation and scattered trees.
- Built-up areas, markets, and small businesses.
- Limited pockets of riparian vegetation and small wetlands.

No legally protected areas or critical habitats have been confirmed within the 250 m corridor of influence along the 60.9 km Buchanan–Cestos City Junction Road, based on the available ecological baseline information. However, the absence of confirmed records does not exclude the potential presence of protected or threatened species. Ecological sensitivity may be associated with river and stream crossings, seasonal wetlands, vegetation patches, and forest-edge habitats occurring along the corridor. These areas should be screened during project execution/ construction, with appropriate mitigation measures incorporated into the C-ESMP to minimize habitat disturbance, vegetation clearance, and impacts on local wildlife.

Ecosystem Services: The main ecosystem services include the provision of food and fuelwood, water regulation (wetlands, streams), erosion control, and supporting livelihoods (e.g., small-scale fishing, grazing, harvesting of wild products).

Potential Impacts

- **Construction Phase**
  - Loss of vegetation within the ROW for widening, borrow areas, and camps.
  - Disturbance to fauna due to noise, vibration, and human presence.
  - Habitat fragmentation and barriers to wildlife movement if culverts and crossings are not designed appropriately.
  - Pollution of habitats from spills, waste, and sedimentation.
  - Possible increase in hunting by project workers

- **Operation Phase**
  - Increased traffic leading to wildlife-vehicle collisions, especially for species crossing the road.
  - Induced deforestation and habitat degradation from improved access (e.g. agricultural expansion, fuelwood collection, informal settlements).
  - Increased hunting leading to increased pressure on faunal populations along the route

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- Potential alteration of drainage affecting wetlands and aquatic habitats.

Significance (Before Mitigation): Within the 250 m AoI, direct construction impacts are mainly on **already modified habitats** (Magnitude Minor–Moderate, Sensitivity Low–Medium) – **Low to Moderate** significance. Induced impacts in the broader landscape could be more significant if not managed, particularly in areas where more natural habitat remains (potentially **Moderate**).

Key Mitigation and Management Measures

- Apply the **mitigation hierarchy**: avoid clearing beyond the defined ROW; use existing disturbed areas wherever possible for camps and borrow sites.
- Retain mature trees and patches of vegetation where safety allows; replant native species along embankments and in community-agreed areas.
- Good construction practices to prevent pollution of watercourses and wetlands.
- Include measures to maintain connectivity for small fauna (e.g. adequate culvert sizing, vegetated verges where feasible).
- Collaborate with local authorities and communities to manage induced development and land use change along the corridor (planning, zoning, enforcement).
- Environmental awareness for workers on wildlife protection and hunting bans.

Residual and Cumulative Biodiversity Risks

Even though the immediate AoI is heavily modified and no sensitive species were observed, **residual and cumulative biodiversity risks** remain:

- Permanent loss of some trees and shrub cover in the ROW.
- Potential medium-term increase in land conversion beyond 250 m due to improved access.
- Continued disturbance and road-kill risks for mobile species.

With effective mitigation and coordination with land-use planning, residual impacts are expected to remain **Low to Moderate** and not critical at the regional scale. Cumulative impacts require ongoing monitoring and collaboration with other projects and authorities.

Measures for Invasive Species:

The risk of invasive species' spread due to soil disturbance shall be managed through an Early Detection and RP id Response (EDRR) programme covering all clear and disturbed areas. Regular field surveys and visual inspections shall be conducted monthly to identify invasive species and prevent their uncontrolled spread.

- ***Disturbed slopes and road edges shall be revegetated promptly*** using suitable native species following vegetation clearance and earthworks, with quarterly monitoring of vegetation recovery through permanent monitoring plots. Invasive woody species in dry and semi-arid construction zones shall be controlled through appropriate manual or mechanical removal, with biannual transect surveys to assess changes in invasive plant cover.
- ***Drainage channels, culverts, and ephemeral drainage zones shall be inspected*** before and after the monsoon season, and invasive vegetation shall be controlled where it obstructs

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drainage or threatens riparian habitats. ***The Contractor shall prevent the spread of invasive species through contaminated soil***, construction materials, machinery, vehicles, and livestock-mediated movement by implementing equipment-cleaning and site-hygiene protocols, maintaining cleaning records, and conducting monthly site audits. ***A post-construction invasive species monitoring and control pro***gramme shall also be implemented, with annual ecological surveys to assess long-term trends in invasive species density and the effectiveness of control measures. The Contractor shall implement these measures, with oversight and verification by the Construction Supervision Consultant and IIU as applicable.

Socio-Economic Impacts (ESS1, ESS5 and ESS10)

i. Land Acquisition, Physical and Economic Displacement

The Project requires land within the defined ROW and for ancillary facilities (camps, borrow pits, access roads). This may lead to:

The cleared RP identifies 1,093 PAPs affected through structure, asset and livelihood losses. The verified inventory includes 1,643 affected private structures, 500 affected businesses, 61 farms containing 5,656 economic trees, 160 tenants, 127 landlords and 731 vulnerable PAPs across the 44 project communities.

- Permanent loss of land, crops and trees.
- Relocation of structures (houses, kiosks, fences) within the ROW.
- Temporary or permanent loss of business locations (roadside stalls, shops, workshops).
- Disturbance to informal users (e.g. vendors, transport operators).

The nature and magnitude of displacement impacts (physical and economic) are detailed in the separate **Resettlement Action Plan (RP) / RP RP** ESIA provides an overview and ensures alignment between impact assessment and resettlement planning.

Significance (Before Mitigation): For affected households and businesses, sensitivity is often **High**; magnitude can range from Minor (partial loss of land) to Major (relocation of dwelling or main income source). Significance is therefore **Moderate to High** at the household level.

Key Mitigation Measures

- Implementation of the RP in accordance with ESS5 and applicable national requirements, including compensation at replacement cost, livelihood restoration, transitional assistance and differentiated support where required., including:
  - Fair compensation at replacement cost for lost assets.
  - Livelihood restoration measures tailored to affected persons (e.g. support to re-establish businesses, skills training).
  - Special assistance for vulnerable households (top-up support, extended transitional assistance).
- Meaningful consultation with affected persons; clear eligibility criteria; transparent valuation procedures.
- Grievance mechanism for resettlement issues, accessible and well-publicized.

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Residual Impact (With Mitigation): Where RP /ARP measures are fully implemented, residual impacts on land acquisition and displacement are expected to reduce to **Low to Moderate**, though irreversible land-take remains.

ii. Impacts on Livelihoods, Businesses and Access to Resources/Services

Beyond direct land take, the Project may affect livelihoods through:

- Temporary disruption of access to farms, markets, schools and health facilities during construction.
- Temporary relocation or reduced accessibility to roadside businesses due to excavation, diversions, and safety measures.
- Improved access during operation, supporting expansion of trade, market access, employment opportunities and reduced travel time and cost.

Significance (Before Mitigation)

- Construction: Short-term adverse impacts – **Low to Moderate**.
- Operation: Long-term positive impacts on livelihoods and regional connectivity – **Moderate to High positive**.

Key Mitigation and Enhancement Measures

- Minimize disruption to local access during construction; provide temporary footbridges or detours.
- Maintain clear, safe access to businesses wherever practicable.
- Prioritize local employment and procurement where feasible, especially for unskilled and semi-skilled labour.
- Develop road safety measures (sidewalks, crossings, speed control) to ensure safe access to schools, health centers and markets.

Residual Impact (With Mitigation): Residual negative impacts on access and livelihoods during construction are expected to be **Low**. Long-term socio-economic benefits are **Moderate to high**, especially where vulnerable groups can access project benefits.

iii. Impacts on Disadvantaged or Vulnerable Groups and Gender Dynamics

Vulnerable groups may include: female-headed households, children, the elderly, persons with disabilities, very poor households, and socially marginalized groups. They may:

- Be disproportionately affected by land acquisition and livelihood disruption.
- Face barriers to accessing compensation and project-related opportunities.
- Experience heightened risks of GBV, SEA/SH, and exploitation during construction.

Gender dynamics may be affected by:

- Employment opportunities that may favor men if not proactively targeted.
- Increased female workloads or care burdens due to project-induced changes.

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- Safety concerns for women and girls due to increased traffic and the presence of non-local workers.

iv. Social Cohesion, Security and Conflict Risks

The Project may generate both positive and negative effects on social cohesion:

- **Potential Risks**
  - Perceptions of inequitable distribution of project benefits (e.g. employment, roadside business opportunities).
  - Grievances over land acquisition, compensation and construction disturbances.
  - Tensions between local communities and incoming workers or migrants.
  - Possible increases in petty crime or anti-social behavior near camps and contractor yards.

- **Potential Positive Outcomes**
  - Strengthened relationships with authorities and agencies if engagement is inclusive and responsive.
  - Enhanced cooperation among communities to manage opportunities and issues along the corridor.

Mitigation measures include transparent information sharing, inclusive stakeholder engagement, fair recruitment practices, local employment targets, and a robust grievance mechanism (Section 7.12).

LABOR AND WORKING CONDITIONS (ESS2/OSS2)

i. Terms of Employment, Labor Rights, Non-Discrimination

The Project will employ direct workers, primary supply workers and contracted workers (including subcontractors). Risks include:

- Non-compliance with labour laws (e.g. working hours, wages, social security).
- Discrimination in recruitment, promotion or dismissal based on gender, ethnicity, religion, disability or other status.
- Lack of clear contracts and conditions of employment, especially for seasonal or informal workers.
- The Contractor shall immediately notify the PIU and Supervision Consultant of any suspected or confirmed child labor or forced labor case.
- Cases involving children shall be handled in the child's best interests, with appropriate involvement of competent child protection authorities and referral services.
- No child shall be dismissed or simply removed without an appropriate remediation and protection arrangement.
- Confirmed cases shall be recorded in a confidential incident register, with corrective actions, responsible persons and completion dates.
- Repeated or serious violations shall trigger contractual sanctions, including suspension or termination of the subcontractor responsible or supplier, as appropriate.

Mitigation measures include:

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- Ensuring all workers receive written contracts, transparent terms, and benefits consistent with national law and ESS2.
- Prohibiting forced labor and child labor; verifying the age of workers.
- Enforcing non-discrimination and equal opportunity policies; providing training on labor rights and inclusion.

ii. **Occupational Health and Safety (OHS)**

Construction activities pose significant OHS risks, including:

- Accidents from machinery, vehicles, working at height, excavation, and manual handling.
- Exposure to dust, noise, vibration, and hazardous substances.
- Heat stress, fatigue, and ergonomic issues.

Mitigation measures:

- Development and implementation of an OHS Management Plan in line with national regulations and good international practice.
- Provision of appropriate personal protective equipment (PPE) and training on its use.
- Regular toolbox talks, safety briefings, and supervision.
- Incident reporting, investigation, and corrective actions.
- Emergency preparedness and response plans, including first aid, fire safety, and evacuation procedures.

iii. **Workers' Accommodation and Welfare**

Where worker camps are used, risks include overcrowding, poor sanitation, inadequate water supply, unsafe structures, and social conflict with host communities.
Mitigation measures:

- Design and management of workers' accommodation consistent with good international industry practice (e.g. adequate space, sanitation, potable water, lighting, security).
- Clear rules of conduct; prohibition of alcohol and drugs where necessary.
- Access to basic health services and recreational facilities.
- Engagement with host communities to manage interactions and expectations.
- ---- Ensure all workers, subcontractors and labor suppliers sign the Code of Conduct before mobilization.
- Conduct mandatory induction and periodic awareness sessions on acceptable behaviour, workplace discipline and SEA/SH prevention.
- Prohibit harassment, discrimination, violence, exploitation, child labour, forced labour, alcohol and drug abuse.
- Require workers to respect local communities, cultural values, religious practices and community property.
- Establish confidential grievance and reporting mechanisms and protect complainants against retaliation.
- Conduct regular inspections and monitor compliance with the Code of Conduct.
- Apply appropriate disciplinary actions, including suspension or termination, for violations.

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- Maintain signed CoCs, training records, complaints and corrective action records for reporting to the PIU.

iv. Workers' Grievance Mechanism

A dedicated **workers' grievance mechanism** will be established to:

- Receive and address complaints and suggestions related to working conditions, wages, discrimination, harassment, and OHS concerns.
- Operate at multiple levels (site supervisor, labor officer, project management) with clear timeframes and confidentiality provisions.
- Ensure workers are informed about the mechanism and can access it without fear of retaliation.

RESOURCE EFFICIENCY AND POLLUTION PREVENTION/MANAGEMENT (ESS3/OSS3)

i. Resource Efficiency (Materials, Water, Energy)

The Project will use significant quantities of aggregates, cement, asphalt, water and fuel.
Risks include:

- Over-extraction of materials from borrow pits or quarries with associated environmental impacts.
- Competition for water with local communities.
- Inefficient energy use leads to avoidable GHG emissions.

Mitigation measures:

- Use of licensed and environmentally managed borrow pits and quarries, with rehabilitation plans.
- Optimizing design to minimize material quantities (e.g., appropriate pavement thickness, re-use of existing materials where feasible).
- Efficient water use in construction (recycling, minimizing leaks, selecting appropriate sources).
- Promoting energy efficiency in equipment and operations; preventive maintenance to reduce fuel consumption.

ii. Pollution Prevention (Dust, Emissions, Wastewater, Soil Contamination)

- Wastewater from camps and workshops will be treated or managed through appropriate systems (e.g., septic tanks, oil-water separators, designated washing areas).
- Solid and hazardous waste management will follow a Waste Management Plan covering segregation, storage, transport, recycling, and disposal at approved facilities.

iii. Hazardous Materials Management

Hazardous materials include fuels, oils, lubricants, asphalt/bitumen and chemicals.
Mitigation measures:

- Bunded and secure storage areas with spill kits and emergency procedures.

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- Training of staff in safe handling, transfer and spill response.
- Emergency response plans for major accidental releases.
- Proper labelling, inventory control and controlled disposal in line with regulations.

iv. GHG Emissions and Climate Impacts

Construction and operation will generate GHG emissions primarily from fuel use. While total emissions are modest relative to national totals, the Project will:

- Apply energy efficiency measures to minimize emissions.
- Design drainage and structures to be climate-resilient (e.g. sized for projected increases in rainfall intensity, avoiding erosion and flooding).
- Consider potential for climate-smart measures (e.g. roadside tree planting) to provide limited carbon sequestration and cooling.

LAND ACQUISITION, RESTRICTIONS ON LAND USE AND RESETTLEMENT (ESS5/OSS5)

The Project's land requirements along the ROW and at ancillary facilities entail:
The displacement footprint comprises 1,093 PAPs, including physical and economic displacement associated with affected structures, businesses, farms, crops, economic trees, tenancy interests and other eligible assets documented in the cleared RP .

- **Permanent land take** for widening safety improvements, drainage, and structures.
- **Restrictions on land use** within the ROW (e.g. building setbacks, prohibition of new permanent structures).
- **Physical displacement** where households or businesses must relocate.
- **Economic displacement** where livelihoods or income sources are affected without physical relocation.

A separate **RP /ARP** provides detailed:

- Census and socio-economic profile of affected persons.
- Asset inventory and valuation methodology.
- Compensation and livelihood restoration packages.
- Implementation arrangements, budget and monitoring framework.

The ESIA recognizes that:

- Land acquisition and resettlement impacts are among the most sensitive social issues.
- Residual impacts (e.g. lifestyle changes, social networks disruption) may persist even with adequate compensation, and require careful implementation, communication and monitoring.

HABITAT AND BIODIVERSITY CONSERVATION (ESS6/OSS6)

In line with OSS6 and ESS6, the Project has been screened for **natural** and **critical habitats**:

- No critical habitats have been identified within the direct AoI.
- Remaining natural habitat pockets (e.g. riparian strips, small wetlands, tree clumps) are limited but locally important for ecosystem services and species.

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The Project applies the **mitigation hierarchy**:

1. **Avoidance** – Use existing ROW as far as possible, avoid sensitive patches and water bodies.
2. **Minimization** – Restrict clearing to the minimum area; protect large trees and riparian strips; control pollution.
3. **Restoration** – Replant native vegetation and stabilize disturbed areas; rehabilitate borrow pits.
4. **Offsets (if needed)** – If monitoring reveals significant residual loss of natural habitat, explore offset options in collaboration with authorities (e.g. community-based tree planting, protection of high-value habitat elsewhere).

The objective is to achieve **no net loss** of biodiversity in modified habitats and to avoid significant impacts on any natural habitat.

IMPACTS ON VULNERABLE GROUPS (ESS1/OSS1 AND ESS10/0SS10)

The WB ESS1 and ESS10 require special attention to groups that may be disproportionately affected or have limited capacity to cope with change. For this Project, vulnerable groups may include:

- Female-headed households, particularly where income, assets or social support are limited.
- Poor households with limited assets, income security or alternative livelihood options.
- Elderly persons and persons with disabilities where mobility, access to information, services or compensation processes may be constrained.
- Persons with chronic illness where Project impacts may affect access to care, mobility or household coping capacity.
- Children and youth where exposure to traffic, construction activities, exploitation or exclusion from opportunities creates specific risks.
- Households dependent on a single livelihood source or resource that may be affected by land acquisition, access restrictions or construction disturbance.
- Residents of remote or poorly serviced settlements where access to information, consultation processes, health services, markets or grievance channels may be constrained. Informal workers and livelihood users whose activities or rights may be less visible in formal Project processes

Potential Disproportionate Impacts

- Higher sensitivity to land and livelihood loss due to limited safety nets.
- Difficulty accessing information, consultations, compensation processes, and project benefits.
- Increased exposure to GBV/SEA/SH, particularly for women, girls, and children.
- Reduced mobility or safety in crossing roads and accessing services.

Targeted Mitigation and Benefits

- Tailored support in the RP /ARP (additional assistance, flexible payment arrangements, livelihood support).
- Accessible consultation formats (use of local languages, timing and locations suitable for women, persons with disabilities and elderly people).
- Prioritization of vulnerable groups for employment, training or community development benefits where feasible.

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- Integration of GBV/SEA/SH and child protection measures into all community engagement activities.

With these measures, residual negative impacts on vulnerable groups should be reduced to **Low to Moderate**, while ensuring they share proportionately in the Project's socio-economic benefits.

CULTURAL HERITAGE IMPACTS (ESS8/OSS8)

Cultural heritage includes both tangible (e.g. graveyards, sacred trees, shrines, historic buildings) and intangible cultural values.

Potential Impacts

- Direct impact on known physical sites if located within or close to the ROW or ancillary facilities.
- Indirect impacts on cultural practices if access routes are altered or if landscape features with cultural meaning are disturbed.
- Risk of accidental discovery of artefacts or sites during excavation (chance finds).

Mitigation Measures

- Pre-construction surveys and consultations to identify and map cultural heritage sites.
- Avoidance of known sites through micro-alignment adjustments where feasible.
- Where avoidance is not possible, development of culturally acceptable relocation or preservation measures in consultation with relevant authorities and communities.
- Adoption and implementation of a **Chance Finds Procedure** detailing steps to be taken if artefacts or cultural remains are encountered (stop work, cordon area, inform authorities, professional evaluation, culturally appropriate management).
- ----- Identify sacred and culturally sensitive sites through consultation with local communities and religious leaders.
- Avoid such sites through alignment adjustments and establish protective buffer zones.
- Maintain confidentiality of sensitive site locations and restrict unauthorized access.
- Prohibit excavation, construction or disturbance near identified sites without prior consultation and approval.
- Implement the Chance Find Procedure for any previously unidentified cultural or sacred remains.
- Conduct regular monitoring to ensure protection measures are followed.

Residual impacts on cultural heritage are expected to be **Low**, provided avoidance and chance find procedures are strictly implemented.

STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE (ESS10/OSS10)

Stakeholder engagement has been an integral part of the ESIA process and is aligned with ESS10 and national requirements.

Key ESIA-Stage Issues Raised

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During consultations (meetings, focus groups, key informant interviews), stakeholders raised concerns and expectations, including:

- Fair and timely compensation for land and assets.
- Priority employment for local residents and youth.
- Road safety for children and pedestrians, especially near schools and markets.
- Noise, dust, vibration and disturbance during construction.
- Impacts on water sources and community infrastructure.
- Risks of GBV/SEA/SH and social conflicts associated with workers.
- Desire for transparency, ongoing information and accessible grievance channels.

How These Are Addressed

- Integration of stakeholder concerns into the ESIA impact assessment and ESMMP.
- Development of the RP /ARP to address resettlement and compensation issues.
- Incorporation of design measures for road safety and access.
- Establishment of a Project Grievance Mechanism (GM) for communities.
- Commitment to continuous engagement and information disclosure throughout the project life-cycle, as detailed in the Stakeholder Engagement Plan (SEP).

CUMULATIVE AND INDUCED IMPACTS

The Project's impacts may interact with other existing or planned developments (e.g., other road upgrades, logging, agriculture, urban expansion) within the broader region.

Potential Cumulative Impacts

- Increased deforestation and habitat degradation due to multiple infrastructure projects and agricultural expansion facilitated by improved access.
- Combined pressure on water resources and quality from several projects, settlements, and small industries.
- Cumulative noise, air emissions, and traffic risks along the transport network.
- Increased in-migration and associated strain on public services (schools, health centres, housing).

Induced Impacts

- Emergence of new roadside markets, settlements, fuel stations and workshops.
- Changing land values and land use patterns along the corridor.
- Expansion of formal and informal economic activities, both positive and negative (e.g. better market access vs. informal, unplanned development).

While many induced impacts are positive in terms of economic growth and connectivity, they also require **spatial planning and enforcement** by competent authorities. The Project will cooperate with government and other stakeholders to monitor cumulative trends and support strategic measures where feasible (e.g. zoning, enforcement against encroachment within the ROW, coordination with other projects).

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Residual Impacts and Significance after Mitigation

Table 52 summarizes the main residual impacts after implementation of the proposed mitigation and management measures.

Table 52: Summary of Key Residual Impacts After Mitigation

Impact Area	Residual Nature	Residual Significance
Soils and erosion	Permanent modification at cut/fill sections; localized residual erosion risk at some outlets	**Low (local, manageable with maintenance)**
Hydrology and water quality	Altered drainage patterns; minor residual risk of local flooding and sediment/pollutant runoff	**Low–Moderate (depends on drainage maintenance)**
Air quality and GHG	Reduced dust compared to baseline; modest GHG emissions and traffic-related pollutants	**Low–Moderate**
Noise and vibration	Ongoing traffic noise near settlements; overall increase in some locations	**Low–Moderate (higher at roadside dwellings very close to the carriageway)**
Biodiversity and habitats	Permanent conversion of modified roadside habitats; small loss of trees; potential long-term induced habitat conversion	**Low–Moderate (cumulative risks require monitoring)**
Land acquisition and resettlement	Permanent loss of land/assets; lifestyle adjustments for some households, relocation and livelihood adjustments may persist for some PAPs despite compensation and livelihood restoration	**Low–Moderate (household-level significance remains noticeable but mitigated through RP)**
Livelihoods, businesses and access	Temporary construction disruption is reduced following reinstatement; some livelihood effects may persist where businesses or income sources require re-establishment	**Low to Moderate adverse, depending on restoration outcomes**
Project access and economic benefits	Improved year-round mobility, market access, access to services and economic activity	**Moderate to High positive, subject to distribution of benefits and continued road accessibility**
Vulnerable groups	Some individuals or households may retain greater sensitivity to residual livelihood, mobility, safety or access impacts and may have less capacity to benefit from Project opportunities	**Not assigned independently; reflected through differentiated receptor sensitivity and residual significance of the relevant impact pathway**
Community health and safety	Residual traffic and road-safety risk during operation; continuing public-health and worker-community risks associated with mobility, traffic growth and induced development	**Moderate (Requiring continued road-safety management, monitoring and enforcement and awareness)**
Cultural heritage	Residual risk associated with known graves and cemetery where avoidance is not possible, together with potential chance finds during ground disturbance	**Low (with Chance Finds Procedure)**
Occupational health and safety	Residual risks from road maintenance, working near live traffic, confined spaces, equipment operation and emergency response activities during operation.	Low–Moderate (subject to implementation of the OHS management system, safe work procedures and periodic audits)
Traffic management and road safety	Residual risks of vehicle collisions, pedestrian injuries, livestock-related accidents and unsafe crossing movements, particularly near settlements, markets and access points.	Moderate (requires road-safety audits, signage, speed management, safe crossings and enforcement)
Waste management and	Residual risk of improper disposal of road-maintenance waste, used oil, contaminated materials and other operational wastes.	Low (subject to approved waste-management procedures and authorized disposal)

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Impact Area	Residual Nature	Residual Significance
pollution prevention		
Gender-based risks and social inclusion	Residual concerns may include unequal access to project benefits, mobility constraints, road-safety concerns and risks of harassment or exploitation associated with increased traffic and roadside activity.	Low–Moderate (subject to gender-responsive road-safety measures, accessible grievance channels and appropriate prevention and response mechanisms)
Emergency preparedness and response	Residual risks associated with road accidents, vehicle fires, hazardous-material spills, extreme weather and delays in emergency access during incidents.	Low–Moderate (dependent on emergency-response arrangements, incident reporting, coordination and periodic drills)
Contractor demobilization and site reinstatement	Residual risks from incompletely restored temporary work areas, borrow or disposal sites, camps, material storage areas and access routes.	Low (provided that reinstatement, rehabilitation and closure inspections are completed and verified)
Grievance redress and stakeholder engagement	Some grievances related to compensation, access, road safety, livelihood restoration or operational disturbances may remain unresolved or require follow-up after construction.	Low–Moderate (subject to an accessible grievance mechanism, timely resolution and monitoring of outstanding cases)

Overall, the Project's adverse residual impacts are assessed as Low to Moderate, predominantly localized and manageable, provided that mitigation and management are effectively implemented and monitored.

Statement on Degree of Irreversible Damage and Unavoidable Residual Impacts

In line with the **EPA ESIA Guidelines**, the ESIA must clearly indicate the degree of irreversible damage and the nature of unavoidable residual impacts.

- The Project will cause **irreversible** impacts in the form of:
  - Permanent land-take within the ROW and at ancillary sites.
  - Permanent modification of local land use and landscape character along the road corridor.
  - Permanent removal of some roadside vegetation and trees.
- These irreversible impacts are confined largely to an **already modified environment** and are not expected to cause significant or unacceptable loss of natural habitats, critical resources or cultural heritage at the regional scale.
- **Unavoidable residual impacts** after full implementation of mitigation and management include:
  - Long-term changes in traffic, noise and air emission levels along the corridor.
  - Continuing road safety risks associated with increased traffic and higher speeds.
  - Permanent changes in the socio-economic fabric (both positive and negative) due to induced development.

Based on the assessment, the Project is **not expected to result in large-scale or severe irreversible environmental damage**, provided that:

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- The mitigation measures and management plans (ESMMP, RP /ARP , SEP, OHS, GBV/SEA/SH, traffic safety, waste and pollution control) are adequately implemented and monitored.
- Authorities and stakeholders collaborate on managing cumulative and induced impacts through appropriate planning and enforcement.

UNCERTAINTIES AND LIMITATIONS OF THE ESIA

All impact assessments carry inherent uncertainties. Key limitations and uncertainties for this ESIA include:

- **Baseline Data Limitations**
  - Some environmental and social data (e.g. biodiversity distribution, seasonal water quality, traffic counts) are based on surveys conducted over limited time periods and may not capture full seasonal variability.
  - Secondary data sources may be outdated or incomplete in certain locations.
- **Future Development Scenarios**
  - The scale and pace of induced development and other projects in the region are partly uncertain, affecting projections of cumulative impacts.
  - Climate change projections, while considered, have inherent uncertainties regarding the timing and magnitude of impacts.
- **Behavioral and Institutional Factors**
  - The effectiveness of mitigation depends on contractor performance, institutional capacity, and sustained commitment to enforcement and monitoring.
  - Community responses to the Project (e.g. settlement patterns, use of new opportunities) may differ from expectations.

To address these uncertainties, the ESIA adopts a **precautionary approach**, including:

- Applying conservative assumptions where data gaps exist.
- Recommending adaptive management and periodic review of environmental and social performance.
- Emphasizing monitoring, reporting, and stakeholder feedback mechanisms so that unforeseen impacts can be identified and addressed on time.

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7.0 E&S Implementation Capacity

This section assesses the institutional, technical, and operational capacity of public entities responsible for E&S oversight, regulation, and enforcement in Liberia, with specific reference to the project's area of influence. The assessment is undertaken in line with the requirements of the AFDB ISS and WB ESSs which emphasize the need to evaluate borrower capacity to effectively implement and monitor.

7.1 Institutional and Regulatory Framework

E&S governance in Liberia is primarily vested in the Environmental Protection Agency (EPA)), which is mandated under the Environmental Protection and Management Law (EPML) to:

- Review and approve ESIA
- Issue environmental permits and licenses
- Monitor compliance with approved ESMMP
- Enforce environmental regulations through inspections, audits, and sanctions.

The EPA operates in coordination with several sectoral institutions whose mandates intersect with E&S management, including:

- Ministry of Public Works MPW – oversight of road infrastructure development;
- Liberia Land Authority LLA – land acquisition, resettlement, and land tenure issues;
- Forestry Development Authority (FDA) – forest resources and biodiversity management;
- Ministry of Mines and Energy (MME) – quarrying and material sourcing;
- Ministry of Agriculture (MoA) – land use and agricultural impacts;
- Ministry of Labour – occupational health and safety, labor standards;
- Ministry of Gender, Children and Social Protection – gender and vulnerable groups;
- Ministry of Health – public health considerations.

At the project level, the Project Implementation Unit (PIU) within the Ministry of Public Works is expected to play a central role in coordinating ESMMP implementation and ensuring compliance with both national regulations and AFDB ISS and World Bank ESF requirements.

7.2 Decentralized E&S Governance Structures

Liberia has established a decentralized framework for environmental management to support local-level oversight and stakeholder engagement. This includes:

- County Environmental Committees (CECs)

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- District Environmental Committees (DECs)
- County Environmental Officers (CEOs) and field inspectors

These decentralized structures are intended to:

- Facilitate local monitoring of project activities;
- Support environmental awareness and community engagement;
- Participate in ESIA disclosure and public consultations;
- Provide feedback on compliance and grievances at the local level.

In the context of the project corridor (e.g., Grand Bassa, Rivercess County and surrounding jurisdictions), these structures are critical for ensuring that E&S issues are promptly identified and addressed at the community level.

7.3 Assessment of Institutional Capacity

A detailed assessment of institutional capacity was conducted, focusing on legal mandate, human resources, technical capability, logistical support, and inter-agency coordination.

(a) Strengths

- Established Legal Framework: Liberia has a well-defined legal basis for ESIA and environmental management under the EPML, supported by sector-specific regulations.
- Clear Institutional Mandate: The EPA has a clearly defined role as the lead regulatory authority for E&S oversight.
- Growing Decentralization: Expansion of EPA presence at the county level is improving local monitoring and stakeholder engagement.
- Increasing Technical Expertise: Ongoing training and certification programs are strengthening ESIA review and compliance monitoring capacity.
- Experience with Donor-Funded Projects: Key institutions (EPA, MPW) have prior experience implementing projects under AfDB, World Bank and other development partners, including familiarity with safeguard requirements.

(b) Capacity Constraints

- Human Resource Limitations: A limited number of qualified E&S specialists, particularly at the county and district levels, constrains effective monitoring and enforcement.

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- Logistical and Operational Constraints: Inadequate transport, field equipment, and operational budgets limit the frequency and coverage of compliance inspections, especially in remote project areas.
- Incomplete Decentralization: Although structures such as CECs and DECs exist, their functionality varies, with some lacking adequate training, funding, and operational support.
- Weak Inter-Agency Coordination: Coordination between EPA, sector ministries, and local authorities is sometimes fragmented, particularly at decentralized levels.
- Monitoring and Enforcement Gaps: Limited capacity for continuous monitoring and follow-up reduces the effectiveness of ESMMP enforcement.
- Outdated or Generalized Guidelines: Some ESIA guidelines and sector-specific standards require updating to reflect evolving international best practices and AfDB ISS requirements.

Financial Constraints: Budgetary limitations affect staffing, training, logistics, and overall institutional performance. ***Where relevant to project activities, these would be addressed through appropriate allocation in annual work plan and budget by IIU/MPW***.

7.4 CAPACITY AT PROJECT LEVEL PIU

The PIU within the MPW shall be responsible for supervising the implementation of the ESMMP, ensuring contractors' compliance with applicable environmental and social (E&S) requirements, coordinating with the EPA and other relevant regulatory authorities, and maintaining E&S monitoring and reporting in accordance with the World Bank ESF.

- Environmental Specialist: Responsible for environmental monitoring, pollution control, biodiversity protection, and implementation of environmental mitigation measures
- Social/Resettlement Specialist: Responsible for overseeing land acquisition, resettlement, livelihood restoration, stakeholder engagement, and grievance redress.
- OHS/Community Health and Safety Specialist: Responsible for occupational safety, traffic and road safety, emergency preparedness, and the management of community health and safety risks.
- SEA/SH Specialist or Dedicated Focal Point: Responsible for overseeing measures to prevent and respond to sexual exploitation and abuse and sexual harassment (SEA/SH), including confidential reporting and referral mechanisms.
- Field-Level Stakeholder and Community Liaison Personnel: Responsible for community consultations, information dissemination, stakeholder coordination, and follow-up on grievances.

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During implementation, if capacity gaps are identified, the PIU shall arrange for the appointment or engagement of suitably qualified personnel, targeted training on the World Bank ESF and applicable ESSs, and adequate resources for site inspections, monitoring, reporting, contractor supervision, and compliance audits.

Contractors and supervising engineers shall also maintain appropriately qualified E&S staff with clearly defined responsibilities for implementing, monitoring, and verifying compliance with the approved ESMMP and C-ESMPs. The adequacy of these institutional and staffing arrangements shall be verified before construction mobilization and maintained throughout project implementation.

7.5 CAPACITY OF CSC

Environmental Specialist: The CSC Environmental Specialist will oversee implementation of the ESMMP through regular site inspections, supervision, and monitoring of all construction activities, including active and inactive work areas and ancillary facilities such as borrow areas, quarries, plants, camps, and workshops.

Social Specialist: The CSC Social Specialist will oversee the implementation of social safeguard requirements under the ESIA, ESMMP, and RP , including measures related to labour influx, community health and safety, vulnerable groups, and labour compliance. The specialist will review contractor documents, including the Labour Influx Management Plan (LIMP) and Code of Conduct (CoC), monitor the functioning of the Grievance Mechanism (GRM), and ensure timely resolution of grievances. The specialist will oversee implementation of gender-related requirements under the ESIA and ESMMP, including gender inclusion, prevention of gender-based violence (GBV), sexual exploitation and abuse (SEA), and sexual harassment (SH), and enforcement of the workers' Code of Conduct.

OHS Specialist: The CSC Occupational Health and Safety (OHS) Specialist will review and approve the Contractor's OHS plans and monitor compliance with the ESMMP, contractual requirements, and applicable World Bank Group EHS Guidelines.

7.6 CAPACITY OF CONTRACTOR

The Contractor's Environmental Specialist will prepare the C-ESMMP, and all required environmental and social management plans (monitoring, traffic, plantation, camps) before construction. He will ensure implementation of the ESMMP, execution of corrective actions, and timely submission of compliance reports to the SC.

The Contractor's HSE team will develop and enforce site-specific HSE procedures, JSAs, and TBTs, ensuring strict compliance with ESMMP, contract requirements, and World Bank EHS

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Guidelines. It will ensure PPE use, monitor environmental controls and supervise high-risk activities (excavation, lifting, working at height, traffic). Regular inspections, audits and incident investigations will be conducted with corrective actions tracked to closure. The team will ensure emergency preparedness, first aid and fire safety arrangements, maintain HSE records and submit periodic reports.

7.5 Gap Analysis and Recommended Capacity Strengthening Measures

To address the identified gaps, the following measures are recommended:

- Institutional Strengthening: Provide targeted support to EPA and county-level structures (CECs/DECs) through training, equipment, and operational funding.
- Capacity Building and Training: Conduct regular training on ESIA, ESMMP implementation, AFDB ISS and WB ESFand relevant World Bank ESSs.. for E&S staff of CC, CSC, and other project staff during implementation.
- Logistical Support: Facilitate provision of vehicles, field equipment, and monitoring tools to decentralized E&S officers.
- Enhanced Coordination Mechanisms: Establish formal coordination platforms between EPA, PIU, sector ministries, and local authorities.
- Strengthening PIU Capacity: Recruit qualified E&S specialists within the PIU and ensure continuous professional development.
- Monitoring and Reporting Systems: Develop standardized tools for data collection, monitoring, and reporting, including digital tracking where feasible.
- Community Engagement Strengthening: Support local committees to enhance GM and participatory monitoring.

7.5.1 Decentralized ESA Oversight and Capacity Strengthening in Grand Bassa and Rivercess Counties

Effective implementation of the ESMMP will require coordination between the MPW/IIU/PIU, the Contractor, the Supervision Consultant and relevant institutions in Grand Bassa and Rivercess Counties. Most construction-related community interactions, access disruptions, traffic and road-safety issues, land-related concerns, public-health matters and grievances will arise at county, district and community level. Decentralized institutions therefore have an important role in regulatory oversight, local coordination, technical support, referral, enforcement and escalation of issues within their respective mandates.

These institutions will not assume the responsibilities of the PIU, Contractor or Supervision Consultant for C-ESMMP implementation. The PIU will retain overall responsibility for E&S management, coordination, monitoring and reporting. The Contractor will implement contractual E&S measures through the C-ESMMP and associated plans, while the Supervision Consultant will

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verify implementation and supervise Contractor compliance. EPA will retain its independent regulatory oversight and enforcement role.

County and district administrations will primarily support local coordination, communication and escalation of matters requiring administrative intervention. Sector agencies, including LLA, MoGCSP, health authorities and police, will be engaged where their statutory mandate, technical input, referral function or enforcement authority is required. Traditional authorities and community structures will support communication, local engagement and grievance processes in accordance with the SEP and GM.

Capacity strengthening under this subsection is therefore limited to measures necessary for these institutions to perform their defined Project interface effectively. It does not create new E&S implementation responsibilities. Where project-specific capacity constraints have not been established through consultation or institutional assessment, the Project will focus on clarifying roles, information-sharing protocols, referral arrangements and coordination procedures rather than assuming institutional deficiencies.

Table 53: Decentralized ESA Oversight, Coordination and Targeted Capacity Support Arrangements Rivercess

Institution / Actor	Role / Project Interface	Capacity or Coordination Consideration	Project Action / Support	Lead / Timing
EPA county/regional representation or designated inspection team	Exercise regulatory oversight in accordance with EPA mandate, including review of compliance information, inspections and investigation of material environmental incidents where required.	Effective oversight depends on timely access to Project documentation, monitoring information and construction sites.	Provide approved ESIA/ESMMP, C-ESMMPrelevant monitoring reports and construction schedules; facilitate site access and inspections as required; maintain formal regulatory reporting channels.	PIU throughout implementation; Contractor and Supervision Consultant to provide information as required.
Grand Bassa and Rivercess County Administrations	Support county-level administrative coordination, communication with district authorities and escalation of issues requiring county intervention.	County officials need clear information on Project sequencing, responsibilities, grievance escalation and key community risks.	Provide concise Project, ESMMP, RP , SEP and GM orientation; establish clear PIU contact and escalation channels; involve county authorities in coordination meetings where matters require county-level action.	PIU before construction and as required during implementation.
District authorities and local government structures	Facilitate community entry, local notifications, coordination with traditional authorities and referral of unresolved community concerns.	Informal handling of community concerns may bypass Project documentation and escalation procedures if roles are unclear.	Orient relevant officials on Project communication, GM intake/referral and escalation procedures; provide PIU and CLO contact details and standard notification/referral formats.	PIU Social Team before works commence in affected districts and as required thereafter.
MPW County Engineers / local	Provide technical coordination on road	E&S matters encountered during	Orient relevant engineers on key ESMMP requirements,	MPW/IIU and Supervision

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Institution / Actor	Role / Project Interface	Capacity or Coordination Consideration	Project Action / Support	Lead / Timing
road sector representatives	works, drainage, access restoration, diversions and interface with local road infrastructure.	engineering activities need to be referred to the appropriate PIU/Supervision Consultant E&S personnel.	incident escalation, access restoration, drainage-related risks and interfaces with the PIU E&S team. Participate in joint inspections where technically relevant.	Consultant before and during construction.
LLA county representatives / relevant land administration actors	Provide statutory or technical input on land tenure, ownership, customary land, boundary or land-right disputes where required.	Their involvement is required primarily for matters that cannot be resolved through routine RP implementation or where formal land administration input is necessary.	Provide relevant RP information and request LLA support for complex tenure, ownership or boundary matters where required. Establish a clear referral route for unresolved land-related cases.	PIU RP /Social Team during RP implementation and as cases arise.
MoGCSP county structures / relevant social-protection actors	Support statutory social-protection functions, child-protection coordination and SEA/SH referral arrangements where required.	Project SEA/SH management must connect to available survivor services without transferring Project risk-management responsibilities to government social-protection agencies.	Confirm available service providers and referral pathways; establish confidential referral protocols; coordinate with MoGCSP on child-protection or survivor-support matters where required.	PIU Social/SEA-SH focal function before worker mobilization and throughout construction as needed.
County and district health offices / local health facilities	Provide public-health coordination, medical referral and emergency-response interface within their existing mandate.	The Project needs clear referral arrangements for medical emergencies and communicable-disease issues, particularly in areas with limited health-service access.	Map appropriate referral facilities; establish emergency contact and referral arrangements; coordinate public-health awareness activities where relevant. Contractor remains responsible for workplace first aid, worker health and emergency transport.	Contractor, Supervision Consultant and PIU before camp/worksite operation and during construction.
LNP / Traffic Police / relevant road-safety authorities	Exercise statutory traffic enforcement and support accident response, high-risk traffic situations and road-safety coordination where required.	Construction traffic and diversions require advance coordination where public-road safety or enforcement support is necessary.	Share relevant TMP provisions and work schedules; coordinate police involvement at high-risk locations or major diversions where required. Contractor remains responsible for signage, flaggers, barriers and site traffic controls.	Contractor and Supervision Consultant, with PIU coordination, before relevant traffic changes and during active works.
Community-level GRCs and traditional/local leaders	Support grievance intake and referral, culturally appropriate communication and local resolution of eligible community	Roles, escalation limits and confidentiality requirements need to be understood,	Provide GM orientation, grievance registers where appropriate, escalation procedures and clear instruction that SEA/SH cases follow confidential	PIU Social Team before works commence and throughout implementation.

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Institution / Actor	Role / Project Interface	Capacity or Coordination Consideration	Project Action / Support	Lead / Timing
	concerns in accordance with the GM.	particularly for sensitive complaints.	survivor-centred referral pathways and are not handled through ordinary community dispute resolution.	
CLOs and Contractor site-level E&S staff	Implement daily community-interface functions, provide work notifications, receive complaints, manage access and safety interfaces and implement Contractor E&S commitments.	Clear distinction is required between Contractor-level complaint resolution and grievances requiring PIU/GRC escalation or confidential referral.	Define complaint intake, recording, escalation and closure authority in the C-ESMMP/SEP/GM; ensure PIU access to grievance records and oversight of unresolved or material cases.	Contractor and PIU from mobilization through demobilization.
PIU Environmental and Social Safeguards Team	Oversee implementation of the ESMMP, coordinate E&S supervision, review monitoring reports, manage escalation of significant incidents, and ensure compliance with applicable World Bank ESF requirements.	Existing PIU staffing, workload, technical expertise, and authority to supervise E&S performance need to be verified before determining whether additional specialists are required.	Assess existing capacity and designate or recruit suitably qualified Environmental, Social/Resettlement, OHS/Community Health and Safety, and SEA/SH personnel or focal points, as required. Establish clear reporting lines, inspection schedules, and corrective-action tracking.	PIU/MPW before construction mobilization and throughout implementation.
Supervision Consultant E&S Team	Independently monitor and verify the Contractor's implementation of E&S requirements, inspect worksites, review monitoring results, and recommend corrective actions.	Adequate staffing, field presence, technical competence, and clear authority to report non-compliance are essential for effective supervision.	Verify the adequacy of the supervision consultant's E&S staffing and include defined inspection, reporting, non-compliance notification, and corrective-action verification procedures in the supervision arrangements.	PIU and Supervision Consultant before construction and throughout implementation.
Contractor Environmental, Social and OHS Personnel	Implement the approved C-ESMP/C-ESMMP, manage site-level environmental and social risks, maintain records, and ensure compliance by subcontractors and workers.	Staffing and resources must be proportionate to work activities, site risks, workforce size, and the number of active work fronts.	Require the Contractor to submit an appropriately staffed E&S management organization, method statements, monitoring schedules, emergency procedures, and incident-reporting arrangements before mobilization.	Contractor before mobilization and throughout construction.
Women's Organizations and Organizations	Support inclusive stakeholder engagement and help identify barriers to	Standard community consultations may not adequately capture the concerns of	Undertake targeted consultations where appropriate, provide accessible information and	PIU Social Team and Contractor before and throughout implementation.

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Institution / Actor	Role / Project Interface	Capacity or Coordination Consideration	Project Action / Support	Lead / Timing
Representing Vulnerable Groups	participation, accessibility, safety, and access to project benefits.	women, persons with disabilities, or other groups facing participation barriers.	grievance channels, and incorporate relevant feedback into traffic safety, access management, livelihood restoration, and community engagement measures.	
Local Biodiversity, Forestry and Wildlife Authorities	Provide technical input on vegetation clearance, wildlife encounters, sensitive habitats, tree replacement, and biodiversity protection where relevant to the project footprint.	The need for specialist advice depends on confirmed ecological sensitivities, applicable permits, and the potential for impacts on natural habitats or protected species.	Identify relevant authorities, communicate clearance schedules, establish procedures for ecological pre-clearance and wildlife encounters, and coordinate implementation of biodiversity mitigation and restoration measures.	PIU and Contractor before vegetation clearance and throughout relevant works.
Traditional Authorities and Community Representatives	Facilitate culturally appropriate engagement, community entry, communication of construction activities, and identification of locally significant sites or community concerns.	Engagement must account for customary governance structures, representation of women and vulnerable groups, and the risk of excluding less influential community members.	Consult relevant traditional authorities and representative community members while maintaining direct, accessible engagement channels for affected people and ensuring that participation does not replace formal GM procedures.	PIU Social Team and Contractor before works in affected communities and throughout implementation.

Based on the above assessment, the project will adopt a decentralized ESA coordination approach. The PIU shall convene pre-construction orientation sessions in Grand Bassa and Rivercess Counties before commencement of works, involving county administrations, district authorities, EPA representatives, MPW county engineers, LLA, gender and health actors, traffic police, GRC members, the Contractor and the Supervision Consultant.

The orientation shall cover ESMMP obligations, RP provisions, GM procedures, GBV/SEA/SH referral pathways, traffic and community safety, incident notification, environmental monitoring, borrow pit/quarry reinstatement, waste management and reporting requirements.

During implementation, decentralized actors shall participate in periodic joint monitoring missions, grievance review meetings and community feedback sessions, while the PIU and Supervision Consultant shall remain responsible for technical oversight, documentation, corrective action tracking and reporting to the WB.

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This arrangement will ensure that local institutions are not treated only as consultees, but as active participants in ESMMP implementation, community-level monitoring and safeguards accountability.

7.6 IMPLICATIONS FOR ESMMP IMPLEMENTATION

The effectiveness of ESMMP implementation will depend on:

- Strong collaboration between the PIU, EPA, and decentralized structures;
- Adequate resourcing of E&S oversight institutions;
- Clear roles and responsibilities across all implementing entities;
- Continuous monitoring, reporting, and adaptive management.

Where national systems show capacity gaps, project-specific measures, consistent with WB ESF/ESSs, will be required to bridge these gaps and ensure compliance.

Liberia has a functional and evolving institutional framework for E&S management, anchored by the EPA and supported by sectoral ministries and decentralized structures. While significant progress has been made in strengthening institutional capacity and decentralization, key gaps remain in human resources, logistics, coordination, and enforcement effectiveness.

Addressing these gaps through targeted capacity strengthening measures will be essential to ensure effective implementation of the ESMMP and compliance with both national requirements and AFDB ISS and WB ESS.

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8.0 GRIEVANCE MECHANISM

The Project will establish and implement a comprehensive Grievance Mechanism (GM) to ensure that all concerns, complaints, and feedback from affected communities and stakeholders are addressed in a timely, transparent, and effective manner. GM is designed to provide a formalized and accessible platform through which Project-Affected Persons (PAPs), community members, workers, and other stakeholders can raise issues related to project activities.

The GM will apply to all types of grievances arising during the project lifecycle, including pre-construction, construction, and operation phases. It will ensure that complaints are:

- Properly received, documented, and acknowledged;
- Assessed and investigated in a fair and unbiased manner;
- Addressed through appropriate corrective actions; and
- Communicated back to the complainant with clear outcomes.

The PIU will maintain the master Project grievance register. The Contractor may maintain a site-level complaints log for construction-related complaints, but all relevant Project grievances will be recorded in or transmitted to the master GM in accordance with the agreed intake and escalation procedures. The database will include key information such as:

- Nature and category of complaint;
- Date and location of occurrence;
- Details of the complainant (where not anonymous);
- Actions taken to resolve the complaint;
- Status and outcome of grievance.

A credible, independent, transparent, and culturally appropriate GM will be implemented, ensuring that all stakeholders, including vulnerable and marginalized groups, can safely and confidently voice their concerns without fear of retaliation. The GM will also serve as an important management tool to improve project performance, strengthen community relations, and prevent escalation of conflicts.

To operationalize the GM, the Project will establish and maintain the required GRC arrangements, with the PIU responsible for governance and oversight. The Contractor will participate where grievances relate to construction activities or corrective actions within its responsibility.

8.1 GRIEVANCE RESOLUTION COMMITTEE (GRC)

A GRC will be established at three (Community/Site-Level GM, CSC/PIU-Level GM and Project-Level / Formal Review) levels to ensure effective handling of grievances. The GRC will coordinate relevant stakeholders, allocate resources for grievance resolution, and ensure that all complaints are addressed in a timely and fair manner.

The key roles and responsibilities of the GRC will include:

- Receiving and registering complaints;

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- Facilitating dialogue between complainants and relevant parties;
- Investigating grievances and determining their validity;
- Recommending and implementing corrective actions;
- Monitoring the effectiveness of resolutions;
- Maintaining detailed records from complaint receipt to final resolution.

The GRC will ensure that public participation and consultation remain integral to the grievance resolution process. This will help build trust, promote transparency, and reduce the likelihood of disputes.

The Committee will be composed of qualified, experienced, and socially competent individuals capable of engaging effectively with communities and gaining the trust of complainants. Membership will:

- Include both male and female representatives to ensure gender inclusivity;
- Reflect local community representation, including traditional leaders and vulnerable groups where appropriate;
- Include project representatives such as the Community Liaison Officer (CLO), Environmental and Social Safeguards Officers, and local authorities.

The GRC will be mandated to address all types of grievances, including environmental, social, economic, labor-related, and cultural concerns arising from project activities.

8.2 Principles of the GM

The effectiveness of the GM will be guided by the following core principles:

- **Equity**:
  All grievances, regardless of scale or complexity, will be treated fairly and with equal importance. No individual will be discriminated against based on gender, socio-economic status, religion, or political affiliation.
- **Accountability**:
  The Project will remain accountable to affected communities by ensuring that concerns are addressed responsibly and corrective measures are implemented where necessary.
- **Transparency**:
  Stakeholders will have access to clear information about how the GM functions, how to submit complaints, and what to expect during the resolution process.

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- **Accessibility**:[9]
  The GM will be easily accessible to all stakeholders. Measures will be taken to remove barriers such as language, literacy, distance, cost, or fear of reprisal.
- **Anonymity**:
  Complainants will have the option to remain anonymous, and their identities will be protected at all times.
- **Timely Response**:
  Grievances will be addressed promptly within defined timeframes to prevent escalation and ensure stakeholder satisfaction.
- **Confidentiality**:
  All complaints and associated information will be handled with strict confidentiality to protect complainants.
- **Participatory and Inclusive**:
  The GM will actively encourage participation from all stakeholders, including vulnerable and marginalized groups.
- **Integration with Existing Systems**:
  The GM will build upon existing traditional and formal dispute resolution mechanisms, including customary practices and formal judicial systems, to enhance acceptability and effectiveness.

8.3 WORKERS' GRIEVANCE MECHANISM (ESS2)

A dedicated workers' grievance mechanism will be established to address workplace-related concerns. This mechanism will be separate but aligned with the overall GM and will comply with national labor laws, international labor standards and WB ESS2 requirements

Workers will be able to raise grievances without fear of retaliation, and the process will be communicated clearly to all employees through training and awareness programs.

Common types of worker grievances may include:

- Workplace conditions (e.g., sanitation, safety, rest areas);
- Interpersonal conflicts or harassment;
- Payment issues (e.g., delayed wages, unpaid overtime);
- Violations of labor rights (e.g., discrimination, unfair treatment).

[9] Refer to Table 57A-Impact Management & Implementation Matrix

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The grievance process will include:

1. Initial Complaint: Verbal complaint to supervisor;
2. Formal Submission: Written complaint using a grievance form;
3. Acknowledgment: Formal receipt of grievance;
4. Investigation and Mediation: Engagement with the worker to resolve the issue;
5. Resolution or Escalation: If unresolved, escalation to higher management or external bodies by workers (e.g., labor court).

Workers will also have the right to be accompanied by a representative during grievance proceedings.

8.4 Structure and Levels of Grievance Redress

Grievances will be addressed through a multi-tiered structure:

- **First Level (Community/Site Level):**
  Managed by local GRC with community representatives and CLO; ensures quick, accessible resolution.
- **Second Level (Project Level):**
  Includes Project Coordinator and Safeguards Officers; handles escalated or complex cases.
- **Third Level (County Level):**
  Involves local government authorities for grievances beyond project-level capacity.
- **Judicial Level:**
  Courts serve as the final avenue if grievances remain unresolved.

This tiered approach ensures that grievances are resolved at the lowest possible level, minimizing delays and costs.

8.4.1 GM Governance, Contractor Intake Role, and Confidential SEA/SH Referral Pathway

The project GM shall be independent, locally accessible, culturally appropriate and empowered to receive, document, refer, resolve and close grievances in a transparent and timely manner. While the Contractor, through its Community Liaison Officer, HSE Manager or site-level safeguards staff, may receive and document complaints arising from construction activities, the Contractor shall not have sole authority to screen, resolve or close project grievances.

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All grievances received at contractor level shall be entered into the project grievance register and transmitted to the PIU Social Safeguards Team and the relevant GRC for verification, follow-up, resolution and closure.

The PIU shall maintain the master grievance register and shall be responsible for overall GM oversight, quality control, reporting and escalation of unresolved cases. Community-level GRCs shall support culturally appropriate intake, local verification and resolution of grievances that can be addressed at community level, while unresolved or sensitive grievances shall be escalated to the PIU, county-level authorities or other competent institutions, as appropriate.

The Supervision Consultant shall verify that the Contractor is documenting complaints, implementing corrective actions and reporting grievances without delay.

SEA/SH-related complaints shall not be handled through open public GRC meetings. Such cases shall be managed through a confidential, survivor-centered referral pathway that protects privacy, safety, dignity and informed consent.

Complaints may be received by designated and trained Project Implementation Unit (PIU) and Contractor SEA/SH focal points, or directly by approved gender-based violence (GBV) service providers. Any SEA/SH allegation received by a Contractor representative, GRC member or other project personnel shall be referred immediately, and no later than 24 hours after receipt, to the designated PIU SEA/SH focal point or an approved service provider, subject to the survivor's informed consent and applicable child safeguarding requirements.

The receiving focal point shall explain the available support options, confidentiality safeguards and referral process without pressuring the survivor to disclose details or pursue a complaint. With the survivor's consent, referrals shall be facilitated promptly to mapped and verified service providers offering medical care, psychosocial support, legal assistance and protection services, as appropriate. Urgent medical and safety needs shall be prioritized.

SEA/SH allegations shall not be investigated or mediated by GRCs or Contractor community liaison personnel. Personally identifiable information shall be accessible only to authorised personnel on a need-to-know basis and shall not be entered into the general grievance register. Only non-identifying information necessary for case tracking, monitoring and reporting shall be recorded. The PIU SEA/SH focal point shall coordinate referrals, maintain confidential records and ensure that any required reporting to the financing institutions follows agreed protocols without compromising survivor confidentiality. The Project and Contractor SEA/SH Action Plans shall establish the detailed case-handling procedures, service provider arrangements and reporting responsibilities before worker mobilisation.

GRC members, Contractor staff and community representatives shall be trained to refer SEA/SH allegations immediately to the designated PIU GBV/SEA/SH focal point or approved service provider without investigating the allegation, disclosing survivor identity or requiring public

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testimony. Non-identifying information may be recorded only for monitoring and reporting purposes.

The GM implementation budget shall support community sensitization, grievance intake and documentation tools, GRC meetings, training, transport, communication, monitoring, SEA/SH referral coordination, and reporting. The estimated project-wide GM budget of US$125,250.00 over 48 months is included within the US$173,750.00 consolidated SEP/GM line and shall not be added again to the ESMMP budget as indicated in Table 54.

Table 54: GM Governance, Intake, Escalation and Closure Responsibilities

GM Function	Responsible Actor	Specific Role	Key Control / Requirement
Community-level grievance intake	Community GRCs, local leaders, CLO and PIU Social Safeguards Team	Receive complaints from PAPs, communities, road users, workers and other stakeholders through accessible local channels.	All grievances shall be recorded using standard forms and entered into the project grievance register.
Contractor site-level intake	Contractor CLO, HSE Manager or Social Safeguards Officer	Receive construction-related complaints, document them, acknowledge receipt and transmit them to the PIU/GRC.	The Contractor may receive and support resolution of complaints but shall not unilaterally close project grievances.
Master grievance register	PIU Social Safeguards Team	Maintain the official grievance database, assign tracking numbers, monitor timelines, verify closure and report trends.	The PIU shall remain the owner of the master GM and shall consolidate reporting to MPW, AfDB and other relevant stakeholders.
Community verification and resolution	Community GRCs and PIU Social Safeguards Team	Verify facts, consult affected parties and support culturally appropriate resolution of non-sensitive grievances.	Resolutions shall be documented, signed or otherwise confirmed by the complainant, and monitored for implementation.
Contractor corrective action	Contractor, under supervision of the Supervision Consultant	Implement corrective actions related to construction impacts, access disruption, dust, noise, traffic, damage, worker conduct or site safety.	Corrective actions shall be verified by the Supervision Consultant and PIU before grievance closure.
Oversight and quality control	PIU, Supervision Consultant and MPW	Review grievance trends, unresolved cases, closure quality, contractor performance and escalation needs.	Monthly grievance summaries shall be included in E&S monitoring reports.
SEA/SH confidential referral	PIU GBV/SEA/SH Focal Point, approved service providers and	Receive or facilitate confidential referral of SEA/SH-related	SEA/SH complaints shall not be discussed in public GRC meetings and shall not be

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GM Function	Responsible Actor	Specific Role	Key Control / Requirement
	MGCSP where relevant	complaints through survivor-centred channels.	investigated by community committees.
Escalation of unresolved grievances	PIU, county authorities, competent agencies or courts, as applicable	Escalate cases that cannot be resolved at community/project level, including land disputes, compensation appeals, serious harm or legal matters.	Escalation shall be documented, with timelines, responsible parties and follow-up actions.
Closure and feedback	PIU Social Safeguards Team, with GRC and Supervision Consultant verification	Confirm that agreed actions have been completed and that the complainant has received feedback.	Closure shall require documented evidence and complainant acknowledgement where possible.

8.5 Grievance Redress Process

The GM will follow a structured step-by-step process ***as listed below***:

1. Receipt of Complaint through multiple channels (hotline, suggestion boxes, meetings, etc.);
2. Registration and Acknowledgment of complaint;
3. Screening and Assessment of grievance validity;
4. Investigation and Resolution through appropriate actions;
5. Communication of Outcome to complainant;
6. Escalation (if required);
7. Documentation and learning for continuous improvement.

Clear timelines will be established to ensure efficiency, typically ranging from 1 day for registration to 14 days for resolution, depending on complexity.

8.6 Sources of Community Grievances

Potential sources of grievances may include:

- Inadequate consultation or stakeholder engagement;
- Poor communication or misinformation;
- Exclusion from project benefits or decision-making;
- Environmental impacts (dust, noise, pollution);

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- Land acquisition and compensation issues;
- Community concerns relating to local recruitment, employment opportunities or perceived inequity in access to Project employment.;
- Perceived lack of transparency or accountability.

Understanding these sources will enable proactive mitigation and conflict prevention.

8.8 IMPLEMENTATION OF THE GM

To ensure effective implementation, the Project will:

- Build Awareness: Conduct outreach through meetings, workshops, and communication materials to ensure all stakeholders understand the GM.
- Provide Accessible Communication Tools: Use posters, leaflets, radio announcements, and community meetings to disseminate information.
- Train Project Staff: Ensure all staff understand GM procedures and their roles in handling grievances.
- Promote a Positive Feedback Culture: Encourage viewing grievances as opportunities to improve project performance and strengthen relationships.
- Ensure Non-Retaliation: Guarantee that stakeholders can raise concerns without fear of reprisal.
- Monitor and Improve the System: Regularly review GM performance and adjust as needed.

8.10 GM IMPLEMENTATION BUDGET

To support the effective implementation of the project-level Grievance Mechanism, a dedicated budget has been provided under the ESMMP. Table 55 presents a budget that covers disclosure and sensitization, operational launch, grievance resolution sittings, training and refresher training of GRC members, documentation materials, radio announcements, and communication support for grievance handling throughout the project lifecycle.

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Table 55: Itemized Budget for Implementation of the Grievance s Mechanism ($_{GM}$)

No.	Budget Item	Main Purpose / Items Covered	Frequency / Duration	Estimated Cost (USD)
1	GM disclosure and sensitization workshops	Community-level dissemination of the GM; awareness sessions for PAPs, local communities, and GRC members on submission channels, timelines, escalation options, confidentiality, and non-retaliation	One-off	10,000
2	GM launch workshop	Formal operational launch of the mechanism, including venue, logistics, training materials, and stakeholder participation	One-off	10,000
3	Special GRC sittings for grievance resolution	Meetings of community, local/district, and county/project GRCs to review and resolve grievances, including complex and escalated cases	As required over 48 months	38,000
4	Training and refresher training of GRC members	Initial and quarterly refresher training for GRC members on procedures, timelines, documentation, confidentiality, conflict resolution, RP /ESMMP interface, SEA/SH referral pathways, and reporting	Quarterly over 48 months	40,000
5	GM registers, forms, and documentation materials	GM intake forms, registers, case files, complaint box opening forms, appeal forms, closure forms, and other documentation materials for grievance logging and record keeping	Annual over 48 months	2,000
6	GM disclosure through local radio	Radio announcements and public information broadcasts to support awareness, accessibility, and corridor-wide disclosure of GM channels	Annual over 48 months	5,000
7	Airtime for GRC members and CLOs	Communication support for grievance intake, complainant follow-up, case coordination, field verification, escalation, and feedback to complainants	Monthly over 48 months	20,250
	Total Estimated GM Budget (ESMMP)		**48 months**	**125,250**

Note: The above budget represents the estimated total cost of GM implementation over the 48-month project period, including pre-construction, construction, and defects-liability stages. It covers disclosure and start-up activities, grievance resolution sittings, capacity building, communication support, documentation materials, and routine awareness activities along the project corridor. These costs should be read as part of the broader ESMMP implementation budget and cross-referenced accordingly in the overall environmental and social budget summary.

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The GRC should be identified and notified preferably during the ESIA preparation stage, with its composition, roles, and grievance-handling procedures incorporated into the ESIA to facilitate an effective, transparent, and accessible GM throughout project implementation. A copy of notification should be placed in Annexure.

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9.0 ENVIRONMENTAL AND SOCIAL MITIGATION AND MONITORING PLAN (ESMMP)

The detailed ESMMP mitigation and monitoring matrices are provided in Appendix 3 and form part of the project's implementation and contractual requirements.

9.1 INTRODUCTION

This ESMMP has been designed to ensure that the environmental and social impacts and risks identified during the ESIA preparation are effectively managed throughout the construction and operational phases of the Project.

The ESMMP outlines the mitigation and management measures to which both the Proponent and the Contractor are committed and details how the Project will allocate organizational capacity and resources to implement these measures. It also provides a schedule for implementing mitigation and management actions, ensuring compliance with Liberia's applicable laws and regulations, as well as the applicable lenders' E&S standards.

The primary objectives of the ESMMP are to:

- Formalize and communicate the program for environmental and social management; and
- Establish a framework for implementing environmental and social management activities.

Adhering to international best practice, the Project aims to minimize and, where possible, prevent adverse impacts while enhancing positive outcomes. These principles have guided the ESIA process and informed the strategies outlined in this ESMMP.

As the Project is expected to be financed by the Government of Liberia (GOL) and the WB; ***the overall responsibility for implementing the ESMMP rests with the Proponent, the Ministry of Public Works (MPW), and the Contractor,*** who will execute the Project activities.

The Contractor's performance will be monitored by MPW and supervised by the WB to ensure that Project implementation aligns with this ESMMP and meets all agreed environmental and social management standards.

9.2 OBJECTIVES OF THE ESMMP

The objectives of this ESMMP are as follows:

- To outline standards and guidelines for compliance with environmental/social management;
- To communicate the aims and goals of the ESMMP and incorporate environmental and social management into the project planning, construction and operational phases;
- To guide the Contracting Entities, sub-contractors and other workers involved in the Project in meeting the legislative and best practice commitments set out in the ESIA;
- To set out cost-effective mitigation measures to minimize the extent of negative environmental and social impacts and to enhance positive impacts;

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- To guide method statements that are required to be implemented to achieve the environmental specifications; and
- To define corrective actions to be taken in the event of non-compliance with the specifications of this ESMMP to prevent long-term environmental degradation.

To ensure consistency between the impact assessment and the ESMMP, each significant and moderate environmental and social impact identified in Section 6 is linked in Tables 57A and 57B to a corresponding mitigation measure, monitoring indicator, implementation responsibility, implementation timing and cost source.

This traceability approach ensures that no major or moderate impact remains without a defined management action, monitoring requirement, responsible institution or budget provision. The ESMMP measures shall be implemented through the Contractor's C-ESMMP and sub-plans, the RP , the GM, the environmental and social monitoring plan, and the overall project implementation budget.

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9.3 ESMMP Minimum Requirements Matrix

This subsection consolidates the minimum ESMMP requirements expected for Bank review. The compliance matrix identifies where each required element is addressed, while Tables 57A and 57B links the principal risks and impacts to mitigation measures, measurable indicators, implementation and oversight responsibilities, timing, monitoring frequency, and budget or BOQ sources. It shall be read together with the Section 6 subsection on residual impacts and significance after mitigation, Section 9.8 on reporting and corrective action, Chapter 10 on the consolidated budget, and Appendix 3 on detailed monitoring methods, locations, frequency and estimated costs.

Table 56: ESMMP Minimum Requirements Compliance Matrix

Minimum ESMMP Requirement	Where addressed	Implementation evidence required	Clearance status	Responsible party	Verification
Project phase, activity, risk and impact	Chapter 6; Tables 47A–47C; Appendix 3	Approved work method, site plan and risk register	Included	PIU, Supervision Consultant and Contractor	Risks and impacts identified for each relevant activity, location and project phase.
Mitigation hierarchy and specific management measure	Sections 6.3–6.4; Table 47C; C-ESMMP sub-plans	Method statement, inspection record and corrective-action log	Included	PIU, Supervision Consultant and Contractor	Avoidance, minimization, mitigation and, where applicable, compensation or offset measures are defined and verifiable.
Location and sensitive receptor	Sections 5 and 6; Appendix 3	GIS/site map, receptor register and photogRP hic baseline	Included	PIU, Supervision Consultant and Contractor	Sensitive receptors and site-specific constraints are mapped and reflected in work plans.
Measurable indicator and performance target	Tables 57A and 57B; Appendix 3	Monitoring sheet, laboratory result, incident/GM record	Included	PIU, Supervision Consultant and Contractor	Indicators, targets, thresholds and corrective-action triggers are measurable and documented.
Monitoring method, equipment and frequency	Appendix 3; Section 9.8	Calibrated equipment, chain-of-custody forms and monitoring reports	Included	Contractor and Supervision Consultant; PIU oversight	Monitoring follows approved methods, applicable standards and defined frequencies.
Implementation, supervision and regulatory responsibilities	Sections 7 and 9.4; Tables 53, 57A and 57B	Staffing records, approved organogram and supervision reports	Included	PIU, EPA, Supervision Consultant and Contractor, according to their mandates	Roles, reporting lines, inspection responsibilities and escalation procedures are assigned.
Implementation timing and schedule	Table 14; Chapter 3 implementation schedule	C-ESMMP programme linked to the works schedule	Included	PIU, Supervision Consultant and Contractor	Mitigation measures are scheduled before the relevant activity

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					and maintained throughout the required period.
Cost, funding source and contract/BOQ linkage	Chapter 10; Table 59	Itemized C-ESMMP cost schedule cross-referenced to priced BOQ items	Mandatory before mobilization	PIU, procurement/contract management team and Contractor	E&S measures have defined funding sources, contract responsibilities and adequate budget provisions.
Stakeholder engagement, GM and SEA/SH referral	Chapters 8 and 12; SEP; standalone GM	Disclosure records, grievance register and confidential referral records	Included; no double counting	PIU Social Team, Contractor and designated service providers	Accessible GM, stakeholder engagement arrangements and confidential SEA/SH referral procedures are operational.
Incident notification, emergency response and corrective action	Sections 9.5 and 9.8; Emergency Response Plan	Incident notices, investigation reports and closure evidence	Included	Contractor, Supervision Consultant and PIU	Notification timelines, investigation responsibilities, emergency arrangements and corrective-action closure are defined.
Reporting, audit, adaptive management and completion verification	Sections 9.8–9.9; Chapter 10	Monthly/quarterly reports, annual audit and completion records	Included	Contractor, Supervision Consultant and PIU	Reporting, non-compliance tracking, corrective actions and completion verification are documented.
Environmental and social assessment updates and change management	ESIA; Chapter 6; ESMMP; C-ESMMP change-control procedure	Updated risk assessments, revised method statements and approved management-plan revisions	Mandatory where design, scope, location or risk changes materially	PIU, Supervision Consultant and Contractor	Material changes are screened, assessed and approved before implementation; additional assessment or consultation is undertaken where required.
Labor management and working conditions	Labor Management Procedures (LMP), where required; C-ESMMP; worker code of conduct	Employment records, worker induction records, labor inspections and worker grievance records	Verify before workforce mobilization	PIU, Contractor and Supervision Consultant	Applicable labor requirements, worker terms, nondiscrimination, prohibition of child and forced labor, worker GM and subcontractor compliance are addressed.
Occupational health and safety (OHS)	OHS Plan; C-ESMMP; emergency procedures	Risk assessments, toolbox talks, inspection reports, training records and incident logs	Verify before work starts and maintain throughout construction	Contractor; Supervision Consultant verification; PIU oversight	Task-specific risk controls, PPE, safe systems of work, competent personnel and incident-response arrangements are implemented.
Community health and safety	Community Health and Safety Plan; Traffic Management Plan; Emergency Response Plan	Traffic inspections, public safety records, community incident reports and corrective-action records	Verify before affected activities commence	Contractor, Supervision Consultant and PIU	Risks from construction traffic, public access, hazardous materials, communicable diseases and emergency situations are controlled.

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SEA/SH risk assessment and response arrangements	SEA/SH Action Plan or relevant ESMMP sub-plan; SEP; GM	Worker codes of conduct, training records, confidential referral protocols and evidence of accessible reporting channels	Verify before workforce mobilization; maintain throughout implementation	PIU-designated focal point, Contractor and qualified service providers	Risk-appropriate prevention and response measures are in place. Survivor information is confidential, and sensitive cases are excluded from ordinary grievance registers and community dispute resolution.
Land acquisition, resettlement and livelihood restoration	RP /LARP, where applicable; livelihood restoration measures; ESMMP	Compensation records, entitlement records, livelihood restoration monitoring and grievance closure evidence	Applicable measures to be completed before displacement or taking possession, in accordance with the approved RP and ESS5	PIU RP /Social Team and relevant land authorities	Eligibility, entitlements, compensation, assistance, relocation and livelihood restoration obligations are met before relevant impacts occur, subject to applicable ESS5 provisions.
Biodiversity conservation and sustainable management of living natural resources	Biodiversity assessment; Biodiversity Action Plan, where required; ecological management sub-plan	Ecological surveys, clearance permits, pre-clearance records, restoration monitoring and biodiversity indicators	Verify before vegetation clearance or works in sensitive habitats	PIU, qualified ecologist, Contractor and Supervision Consultant	Habitat impacts, protected species, ecological connectivity, invasive species and restoration requirements are addressed according to the mitigation hierarchy.
Cultural heritage and chance finds	Cultural Heritage Management Plan, where required; Chance Finds Procedure	Site clearance records, chance-find notifications, authority consultation records and protection measures	Chance Finds Procedure to be in place before ground disturbance	PIU, Contractor, Supervision Consultant and relevant heritage authorities	Known heritage features are protected; work stops and the prescribed notification, protection and consultation process is followed when chance finds occur.
Stakeholder engagement and information disclosure	SEP; Chapters 8 and 12; disclosure and consultation records	Consultation minutes, attendance records, disclosure materials, feedback logs and response records	Verify before construction and update throughout implementation	PIU Social Team and Contractor	Engagement is timely, accessible, inclusive and responsive to stakeholder concerns; commitments are tracked and communicated.
Grievance Mechanism (GM) functionality	SEP; standalone GM; ESMMP; RP GM, where applicable	Notified GRC, designated focal points, grievance register, referral records and resolution tracking	Operational before construction and maintained throughout implementation	PIU, designated GRC, Contractor and relevant service providers	Intake, acknowledgement, assessment, referral, resolution, appeal/escalation and closure procedures are defined; confidential SEA/SH pathways are separate.
Resource efficiency, pollution prevention and hazardous materials management	Waste Management Plan; Pollution Prevention Plan; materials and hazardous-substances procedures	Waste transfer records, emissions and discharge monitoring, spill records and hazardous-material inventories	Verify before relevant activities commence	Contractor and Supervision Consultant; PIU oversight	Air emissions, noise, wastewater, waste, chemical storage, spills and resource consumption are managed in accordance with applicable requirements and GIIP.

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Climate change risks and resilience	Climate risk assessment; ESMMP; drainage, slope-stability and emergency plans	Climate risk screening, drainage inspections, slope-stability records and evidence of resilient design measures	Verify during design review and before relevant works	PIU, design team, Supervision Consultant and Contractor	Material climate-related risks are assessed and incorporated into design, construction, emergency preparedness and maintenance measures.
Cumulative impacts and induced development	ESIA cumulative-impact assessment; relevant ESMMP measures and monitoring programme	Baseline and follow-up monitoring, coordination records and documented adaptive management actions	Address in the ESIA and monitor where material risks are identified	PIU and relevant authorities, with technical support as needed	Material cumulative impacts are assessed at an appropriate spatial and temporal scale, with responsibilities for monitoring and response defined.
Contractor supply chain and primary suppliers	Procurement documents; labor-management and E&S clauses; supplier due diligence procedures, where applicable	Supplier screening records, contract clauses, inspections and corrective-action records	Verify before procurement and throughout relevant supply arrangements	PIU procurement team and Contractor	Relevant labor, safety, resource extraction and environmental risks are assessed and managed in accordance with applicable ESS requirements.
Emergency preparedness, response and external coordination	Emergency Response Plan; OHS and Community Health and Safety Plans	Emergency contact lists, drills, incident records, referral arrangements and equipment inspection logs	Verify before worksite/camp operation and periodically thereafter	Contractor, Supervision Consultant and PIU	Credible emergency scenarios, responsibilities, communications, evacuation, medical referral and coordination with emergency services are addressed.
E&S competence, training and institutional capacity	ESMMP training plan; PIU and Contractor staffing arrangements	Approved organograms, qualifications, induction and refresher training records, competency assessments	Verify before mobilization and periodically during implementation	PIU, Supervision Consultant and Contractor	Qualified personnel are available for identified risks, and personnel receive training appropriate to their duties.
Non-compliance management and corrective-action closure	ESMMP; supervision procedures; contract E&S clauses	Non-compliance notices, corrective-action plans, deadlines, verification reports and closure register	Mandatory throughout construction and other relevant project phases	Contractor, Supervision Consultant and PIU	Each material non-compliance has an assigned responsible party, deadline, escalation route and documented verification of closure.
Decommissioning, demobilization and site restoration	Site Restoration Plan; waste-management procedures; C-ESMMP	Site inspection records, waste disposal evidence, reinstatement photogRP hs and completion certificates	Clearance before acceptance of completed works and demobilization, as applicable	Contractor, Supervision Consultant and PIU	Temporary work areas, camps, storage areas and affected land are restored, wastes are removed, and outstanding E&S issues are resolved or formally managed.

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Table 57A: Impact Management and Implementation Matrix

ESMMP Action Code / Project Phase	Activity, Major / Moderate Impact and Location	Corresponding Mitigation / Management Measure	Indicator / Target / Monitoring Method	Implementation Responsibility	Monitoring / Oversight	Implementation Timing / Monitoring Frequency	Cost / Funding Source / BOQ or Contract Reference
I-01	[Source: I-01/R-01] Land take and permanent land-use change within the ROW and project footprint	Implement RP before civil works; confirm affected assets; compensate eligible PAPs at replacement cost; avoid unnecessary additional land take	Compensation completed before displacement; no civil works commence in uncompensated sections; RP completion audit conducted	PIU E&S Team / PFMU	WB / Independent Monitor / Supervision Consultant	Before displacement and before civil works in affected sections	Cleared RP budget: USD 5,047,158.69; RP Budget Items A.1-B.3
I-02	[Source: I-02/R-02/R-09] Vegetation loss and habitat disturbance within the corridor, borrow pits and ancillary sites	Limit clearing to approved footprint; avoid riparian/sensitive areas; mark no-go zones; progressively restore disturbed areas; rehabilitate borrow pits and quarries	Clearing remains within approved limits; restoration completed; borrow pits/quarries rehabilitated; no unauthorized vegetation clearance	Contractor	Supervision Consultant / PIU / FDA where required	Before clearing; weekly during active clearing; monthly restoration inspection; final verification before demobilization.	Included in the priced works BOQ and Contractor C-ESMMP; cross-reference vegetation clearance, restoration and borrow-pit/quarry rehabilitation items before mobilization.
I-03	[Source: I-01/R-01] Economic tree crop and useful plant loss	Verify affected farms and trees through RP ; compensate at replacement cost; provide livelihood restoration support where required	Tree/crop compensation completed; livelihood restoration tracked; unresolved PAP grievances closed	PIU E&S Team / PFMU	WB/ Independent Monitor / Supervision Consultant	Before clearance of affected farms or trees	RP budget
I-04	[Source: I-03/R-03] Soil erosion, slope instability and sedimentation from earthworks	Stage clearing; install drainage, silt tRP s, sediment controls and slope stabilization; revegetate exposed areas	No uncontrolled erosion; drainage and sediment controls installed and maintained; corrective actions closed	Contractor	Supervision Consultant / PIU	Before earthworks; daily visual inspection; monthly formal inspection; after heavy rainfall; final	Included in the priced works BOQ and Contractor C-ESMMP; cross-reference drainage, erosion, sediment-

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ESMMP Action Code / Project Phase	Activity, Major / Moderate Impact and Location	Corresponding Mitigation / Management Measure	Indicator / Target / Monitoring Method	Implementation Responsibility	Monitoring / Oversight	Implementation Timing / Monitoring Frequency	Cost / Funding Source / BOQ or Contract Reference
						closure before demobilization.	control, slope-stabilization and revegetation items.
I-05	[Source: I-03/R-03/R-07] Water quality deterioration from runoff, wastewater, oils and fuels	Maintain stream buffers; prohibit discharge into streams; provide camp sanitation; implement spill prevention and response; monitor water quality	No untreated discharge; spills recorded and closed; water quality monitoring completed at agreed points	Contractor	Supervision Consultant / PIU / EPA	Before camp/fuel-area operation; weekly inspection; semi-annual laboratory monitoring; immediately after any spill or complaint.	Included in the priced works BOQ and Contractor C-ESMMP; cross-reference sanitation, spill prevention/response and water-quality monitoring items.
I-06	[Source: Section 6.4 - air quality and dust] Dust and air emissions from haulage, earthworks and equipment	Water haul roads; cover trucks; enforce speed limits; maintain equipment; avoid unnecessary idling	PM10 monitoring completed; dust complaints reduced; corrective actions closed	Contractor	Supervision Consultant / PIU	Daily control during active works; quarterly monitoring and complaint-triggered checks; intensified during peak dry season.	Included in the priced works BOQ and Contractor C-ESMMP; cross-reference water-bowing, covered haulage, equipment maintenance and air-quality monitoring items.
I-07	[Source: I-04] Noise and vibration impacts on settlements and sensitive receptors	Restrict noisy works near schools/clinics; maintain equipment; notify communities; apply temporary barriers where needed	Noise monitoring completed; no unresolved complaints near sensitive receptors	Contractor	Supervision Consultant / PIU	During high-noise works; quarterly monitoring and complaint-triggered measurements near sensitive receptors.	Included in the priced works BOQ and Contractor C-ESMMP; cross-reference equipment maintenance, barriers, notification and noise-monitoring items.
I-08	[Source: I-01/R-01] Physical and economic displacement	Implement RP ; compensate structures, businesses, crops and affected	PAP compensation completed; business/livelihood	PIU E&S Team / PFMU	WB Independent Monitor / Supervision Consultant	Before displacement and before civil works in affected sections	RP budget

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ESMMP Action Code / Project Phase	Activity, Major / Moderate Impact and Location	Corresponding Mitigation / Management Measure	Indicator / Target / Monitoring Method	Implementation Responsibility	Monitoring / Oversight	Implementation Timing / Monitoring Frequency	Cost / Funding Source / BOQ or Contract Reference
		assets; provide transitional and livelihood support; assist vulnerable PAPs	assistance tracked; RP grievances resolved				
I-09	[Source: I-01/R-01] Cropland and livelihood impacts	Avoid unnecessary disturbance; compensate verified farmland and crops; restore temporary access to farms; implement livelihood restoration measures	Affected farms compensated; temporary access restored; livelihood restoration progress documented	PIU E&S Team / Contractor, as applicable	Supervision Consultant / PIU / Independent Monitor	Before land entry and during construction	RP budget and Contractor BOQ/CESMMP
I-10	[Source: I-06] Temporary access disruption to homes, farms, markets, schools and health facilities	Prepare and implement traffic and access management plan; maintain safe diversions; provide advance notice; ensure pedestrian and business access	Access maintained; diversions safe and signed; access-related grievances resolved	Contractor	Supervision Consultant / PIU / Traffic Police	Before diversion; daily inspection during active traffic management; immediate correction of unsafe conditions.	Included in the priced works BOQ and approved Traffic and Access Management Plan; cross-reference diversions, signage, flaggers, crossings and access-restoration items.
I-11	[Source: R-04] Community health and safety risks, including traffic accidents and pedestrian injury	Implement traffic management plan; install signage; use flaggers/marshals; maintain safe crossings; conduct road safety awareness	Traffic controls functional; incidents recorded and investigated; road safety sessions conducted	Contractor	Supervision Consultant / PIU / Traffic Police	Before and during works affecting traffic/community access; daily control and monthly performance review.	Included in the priced works BOQ/C-ESMMP and PIU road-safety awareness allocation, as applicable; no duplicate charging.
I-12	[Source: Section 6.4 - community health and labour influx] Communicable	Implement worker health awareness; HIV/STI sensitization; camp rules; local recruitment;	Awareness sessions completed; worker induction records available; labour influx complaints tracked	Contractor / PIU E&S Team	Supervision Consultant / PIU / Ministry of Health	Before worker mobilization; induction for every worker; refresher sessions at least quarterly and	PIU communicable-disease awareness allocation plus Contractor C-ESMMP obligations included

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ESMMP Action Code / Project Phase	Activity, Major / Moderate Impact and Location	Corresponding Mitigation / Management Measure	Indicator / Target / Monitoring Method	Implementation Responsibility	Monitoring / Oversight	Implementation Timing / Monitoring Frequency	Cost / Funding Source / BOQ or Contract Reference
	disease and labour influx risks, including HIV/STIs	worker-community interaction controls--				after significant workforce changes.	in the priced works BOQ; no duplicate charging, and implement CoC.
I-13	[Source: R-06] GBV/SEA/SH and social tension	Implement GBV/SEA/SH Action Plan; require Codes of Conduct; train workers; establish confidential survivor-centred referral pathway	All workers sign CoC; GBV/SEA/SH training completed; referral pathway active; non-identifying reporting used	Contractor / PIU E&S Team	Supervision Consultant / PIU / MGCSP	Before worker mobilization; induction for every worker; quarterly refresher training; continuous confidential referral readiness.	PIU GBV/SEA/SH allocation and Contractor Code of Conduct/training obligations included in the priced works BOQ; project-wide GM allocation covers non-RP intake and referral support.
I-14	[Source: R-05] Occupational health and safety risks to workers	Implement OHS Plan; provide PPE; conduct toolbox talks; maintain first aid and emergency response; report and investigate incidents	PPE compliance verified; induction/toolbox records available; incident rate tracked; corrective actions closed	Contractor	Supervision Consultant / PIU	Before mobilization and throughout works; daily toolbox talks/inspections, monthly statistics and immediate incident notification.	Included in the priced works BOQ and Contractor OHS Plan, including staffing, PPE, first aid, emergency equipment, training, inspections and incident management.
I-15	[Source: R-08] Cultural heritage and chance finds, including graves, shrines and sacred trees	Avoid known sites; consult communities; implement Chance Finds Procedure; relocate cultural assets only through agreed procedures	Chance finds recorded; no unauthorized disturbance; culturally agreed relocation completed where unavoidable	Contractor / PIU	Supervision Consultant / Local Authorities / EPA	Before works in sensitive areas and during excavation	ESMMP/RP budget, as applicable
I-16	[Source: I-05/R-07] Solid, hazardous and camp waste generation	Prepare waste management plan; segregate waste; provide bins and sanitary	Waste records maintained; no open dumping/burning; hazardous waste	Contractor	Supervision Consultant / PIU / EPA	Before camp operation and throughout construction; daily housekeeping,	Included in the priced works BOQ and Contractor Waste and

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ESMMP Action Code / Project Phase	Activity, Major / Moderate Impact and Location	Corresponding Mitigation / Management Measure	Indicator / Target / Monitoring Method	Implementation Responsibility	Monitoring / Oversight	Implementation Timing / Monitoring Frequency	Cost / Funding Source / BOQ or Contract Reference
		facilities; use approved disposal sites; manage hazardous waste, oils and used materials through licensed/approved channels	stored safely; camp sanitation inspected			weekly inspection and monthly waste reconciliation.	Hazardous Materials Management Plan; cross-reference bins, storage, transport, disposal, spill kits and camp sanitation items.
I-17	[Source: I-07] Positive impacts: improved access, trade, services, road safety and livelihood opportunities	Enhance local employment; prioritize local procurement where feasible; maintain community engagement; include women, youth and vulnerable groups in project opportunities	Local employment records maintained; community engagement continued; women/youth participation tracked	Contractor / PIU	Supervision Consultant / PIU / Local Authorities	Throughout construction and early operation	Contractor contractual obligations and project implementation budget, as applicable; local employment and procurement reporting shall not create additional compensation entitlement.
I-18 — Construction	Borrow pits, quarries and material sourcing: land degradation, dust, noise, erosion, habitat loss and community disturbance at material extraction and supply locations	Use authorized sources and verify permits before procurement; prioritize existing approved sources; assess new sources before use; prohibit unauthorized extraction; establish safe setbacks, drainage, erosion controls and traffic measures; progressively rehabilitate exhausted sites	All sources authorized; source inspections documented; no unauthorized extraction; rehabilitation completed against approved plans; verify permits, site conditions and closure records	Contractor / approved material suppliers	Supervision Consultant / PIU / EPA and relevant authorities	Before source approval and procurement; monthly inspections during use; closure inspection before final acceptance	Contractor's priced BOQ and C-ESMP; material-source approval, rehabilitation and monitoring costs to be identified in the contract
I-19 — Pre-construction and	Temporary camps, offices, workshops and	Approve camp locations before establishment; avoid	Camp approval documented; potable water and sanitation	Contractor	Supervision Consultant / PIU / EPA and	Before camp establishment; daily housekeeping;	Priced BOQ and Contractor C-ESMP; camp

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ESMMP Action Code / Project Phase	Activity, Major / Moderate Impact and Location	Corresponding Mitigation / Management Measure	Indicator / Target / Monitoring Method	Implementation Responsibility	Monitoring / Oversight	Implementation Timing / Monitoring Frequency	Cost / Funding Source / BOQ or Contract Reference
construction	worker accommodation: sanitation risks, wastewater, waste accumulation, nuisance, resource pressure and community health impacts	sensitive receptors, flood-prone areas and watercourses; provide adequate potable water, toilets, handwashing, drainage, wastewater treatment and waste storage; maintain fire safety, ventilation, lighting, security and worker welfare facilities; restore temporary sites after use	facilities functional; no uncontrolled wastewater discharge; inspection deficiencies corrected; worker accommodation meets applicable requirements		relevant labor or public health authorities	weekly formal inspection; monthly compliance reporting; close-out inspection before demobilization	establishment, sanitation, water supply, waste management and rehabilitation items
-20 — Preconstruction and construction	Drainage alteration, stream crossings, culverts and flood-prone sections: altered flows, localized flooding, bank erosion, sedimentation and damage to farms or settlements	Verify drainage design and existing flow paths; maintain natural drainage and stream connectivity; install culverts and crossings to approved design; avoid unnecessary channel diversion; protect banks; maintain temporary drainage during construction; remove obstructions and reinstate disturbed channels	Drainage structures installed to approved specifications; no persistent construction-related blockage or avoidable flooding; erosion and sediment controls functional; inspections undertaken before and after significant rainfall	Contractor	Supervision Consultant / PIU / relevant water, public works and environmental authorities	Before works at each crossing; daily during active drainage works; after heavy rainfall; monthly inspection and before acceptance	
I-21 — Preconstruction and	Labor recruitment, employment conditions and worker-	Apply the project Labor Management Procedures (LMP), where required; use	Worker contracts and records available; age verification completed; worker GM	Contractor / subcontractors	Supervision Consultant / PIU / relevant	Before recruitment and mobilization; worker induction at entry; monthly labor	Contractor contractual obligations and priced BOQ; labor management,

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ESMMP Action Code / Project Phase	Activity, Major / Moderate Impact and Location	Corresponding Mitigation / Management Measure	Indicator / Target / Monitoring Method	Implementation Responsibility	Monitoring / Oversight	Implementation Timing / Monitoring Frequency	Cost / Funding Source / BOQ or Contract Reference
construction	management practices: labor disputes, discrimination, child or forced labor, unfair employment practices and poor working conditions	written employment terms; prohibit child and forced labor, harassment and discrimination; maintain worker records and a confidential worker GM; verify subcontractor labor practices; communicate worker rights and employment conditions in accessible languages	operational; complaints tracked confidentially; subcontractor compliance checks documented		labor authorities	compliance checks; periodic subcontractor audits	training, worker GM and supervision costs

Table 57B: Risk Management and Implementation Matrix

ESMMP Risk Action Code	Risk Event	Prevention/Control	Preparedness / Corrective Action	Indicator / Trigger	Implementation	Oversight	Funding Source
RM-01	[Source: R-03/R-07] Hydrocarbon spill at a camp, workshop or water crossing	Bunded storage, spill kits, trained handlers and prohibition of refueling near watercourses	Stop source, contain and recover spill, notify PIU/EPA as required, investigate and close corrective action	No uncontrolled spill; response initiated immediately; closure documented	Contractor HSE Manager	Supervision Consultant / PIU / EPA	Priced works BOQ and approved C-ESMMP
RM-02	[Source: R-04] Major traffic accident involving a project vehicle	Traffic Management Plan, speed limits, trained drivers, signage and marshals	Emergency response, medical referral, notification, investigation and corrective action	Serious incident notification within required timeframe; corrective action closed	Contractor Project Manager / HSE Manager	Supervision Consultant / PIU / Traffic Police	Priced works BOQ / traffic-management items

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ESMMP Risk Action Code	Risk Event	Prevention/Control	Preparedness / Corrective Action	Indicator / Trigger	Implementation	Oversight	Funding Source
RM-03	[Source: R-03] Uncontrolled erosion or sediment release	Drainage sequencing, sediment tRP s, slope stabilization and wet-season controls	Stabilize exposed area, repair drainage, remove sediment and intensify monitoring	No uncontrolled discharge; post-rainfall inspections completed	Contractor HSE Manager	Supervision Consultant / PIU	Priced works BOQ and approved C-ESMMP
RM-04	[Source: R-06] GBV/SEA/SH allegation	Codes of Conduct, training, confidential channels and service-provider referral arrangements	Immediate survivor-centred referral, confidential non-identifying reporting and proportionate action under the CoC	Referral pathway operational; de-identified trends reported	PIU and Contractor GBV/SEA/SH focal points	PIU / MoGCSP / AfDB, as applicable	USD 120,000 GBV/SEA/SH Action Plan allocation
RM-05	[Source: R-08] Chance find of a grave, shrine or cultural object	Pre-work consultation, screening and worker induction	Stop works, secure the area, notify PIU and relevant authorities, and obtain clearance before resumption	No unauthorized disturbance; chance-find records maintained	Contractor Site Manager	PIU / Supervision Consultant / local authorities	Priced works BOQ and approved C-ESMMP
RM-06	[Source: Section 6.4 - stakeholder engagement and information disclosure] Community grievance escalation or work stoppage	Accessible GM, advance notice, community liaison and transparent communication	Register, investigate, agree corrective action and escalate unresolved cases	Grievances acknowledged and processed within GM timeframes	PIU CLO / Contractor CLO	PIU E&S Team / GRC	USD 125,250 project-wide GM allocation within SEP/GM budget
RM-07	Occupational accident, serious injury or fatality during construction	Occupational Health and Safety Plan, task-specific risk assessments, PPE, toolbox talks, safe work procedures, competent supervision and permit-to-work system	Stop unsafe work, provide emergency medical assistance, secure the incident site, notify the PIU and relevant authorities, investigate and implement corrective actions	All incidents recorded; serious incidents notified within applicable requirements; corrective actions closed	Contractor HSE Manager	Supervision Consultant/PIU E&S Team	

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ESMMP Risk Action Code	Risk Event	Prevention/Control	Preparedness / Corrective Action	Indicator / Trigger	Implementation	Oversight	Funding Source
RM-08	Improper disposal of hazardous waste, wastewater or sewage	Management Plan, segregated storage, licensed/authorized disposal arrangements, spill-proof containers and functional sanitation facilities	Contain releases, stop improper disposal, recover contaminated material, arrange authorized disposal and restore affected areas	No unauthorized discharge or disposal; waste manifests and disposal records maintained; sanitation facilities functional	Contractor Environmental team	Supervision Consultant/PIU E&S Team	
RM-09	Unauthorized quarrying, borrow-pit use or operation of ancillary facilities causing environmental or community harm	Prior approval of material sources and ancillary sites, environmental and social screening, required permits, landowner consent, safe access, drainage and rehabilitation plans	Suspend use of non-compliant sites, prevent further damage, implement corrective measures, rehabilitate affected areas and obtain required approvals before resumption	No unauthorized material sources or ancillary facilities; permits and screening records available; rehabilitation requirements fulfilled	Contractor Environmental team	Supervision Consultant/PIU E&S Team	

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Contractor pricing and approval conditions: every entry in Tables 57A and 57B identified as Contractor BOQ/C-ESMMP shall be financed through the priced civil-works contract. Before mobilization, the Contractor shall submit an itemized C-ESMMP cost schedule stating the BOQ item number, quantity, unit, unit rate, total amount, implementation period, responsible officer, monitoring evidence, and payment-certification basis.

The Supervision Consultant and PIU shall confirm adequacy and prevent double counting against the PIU-managed ESMMP, SEP/GM, GBV/BAP and cleared RP allocations. Approval of the C-ESMMP and its cost/BOQ linkage schedule is a condition precedent to commencement of the relevant works.

Access to GM: The Community GM and Worker GM shall provide free, accessible and confidential complaint submission channels, including telephone, SMS/WhatsApp, email, written submissions and direct verbal reporting. Complaints shall be registered, acknowledged, investigated and resolved through the established three-tier GM procedure, without restricting access to statutory administrative or judicial remedies.

Resettlement, Livelihood Restoration and Social Protection

This section provides an overview of the resettlement, livelihood restoration, and social protection measures for the Buchanan–Cestos Junction Road Rehabilitation Project, covering approximately 60.9 km of road works. The section synthesizes key findings from the socio-economic baseline studies, asset inventories, and household surveys conducted along the project corridor, and outlines the strategic approach adopted to manage land acquisition, displacement impacts, and community welfare.

The resettlement framework has been developed in compliance with applicable Liberian laws and regulations, as well as the requirements of the national and lenders' applicable E&S standards on Involuntary Resettlement, Land Acquisition, Population Displacement, and Compensation. The approach prioritizes avoidance and minimization of displacement wherever feasible, followed by fair compensation and restoration of livelihoods for affected persons.
Key measures summarized include the following:

- Resettlement Planning and Compensation: Identification of Project-Affected Persons (PAPs), valuation of affected assets, and provision of fair and prompt compensation at replacement cost.
- Livelihood Restoration: Targeted interventions to restore or improve income sources and living standards of affected households, particularly for vulnerable groups and those dependent on roadside economic activities.
- Social Protection Measures: Support mechanisms such as transitional assistance, grievance redress access, and inclusion strategies to safeguard vulnerable populations, including women, the elderly, and low-income households.
- Stakeholder Engagement: Continuous consultation with affected communities to ensure transparency, participation, and acceptance of resettlement processes.

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While this section provides a consolidated summary of the resettlement and social management approach, detailed methodologies, valuation procedures, entitlement matrices, implementation schedules, and individual compensation records are presented in the standalone RP , which forms an integral companion document to this ESIA.
Overall, the objective of these measures is to ensure that affected people are not worse off because of the project and, where possible, experience improved socio-economic conditions consistent with national policies and AfDB and World Bank safeguard requirements.

9.4 Institutional Responsibilities

MPW, through the designated IIU/PIU, retains overall accountability for implementation of the Project's E&S commitments and for ensuring compliance with the ESIA, ESIA, ESCP and other applicable E&S instruments.

The Contractor is responsible for implementing the E&S requirements applicable to its works through the approved C-ESMMP and associated plans. Contractor management and E&S personnel will manage day-to-day implementation within the Contractor organization.

The Supervision Consultant will supervise and independently verify Contractor compliance and implementation of corrective actions. EPA and other competent authorities will exercise their respective regulatory and statutory functions, while WB and AfDB will undertake financing oversight and implementation support in accordance with the applicable financing arrangements.

Following table illustrates the summary function of each entity in implementing ESSMP.

Actor	Core ESMMP function
MPW/IIU/PIU	Overall Borrower/Project accountability for E&S performance, resources, approvals, oversight, corrective-action follow-up and reporting to EPA/WB/AfDB.
Contractor	Implementation of contractual E&S requirements through the approved C-ESMMP and associated plans; day-to-day controls, monitoring and corrective action within its works.
Contractor PM/HSE/E&S staff	Internal Contractor management and execution. These are not separate parties with independent "overall" responsibility. Their responsibilities sit within the Contractor's responsibility.
Supervision Consultant	Independent verification and supervision of Contractor compliance, review of C-ESMMP/method statements, inspection, non-compliance tracking and verification of corrective action.
Independent auditor/monitor	Independent assurance only where required. This should be commissioned by MPW/PIU, not by the Contractor if it is genuinely intended to be independent.
EPA	Regulatory permitting, inspection, compliance oversight and enforcement.
Other authorities	Statutory, technical, referral or enforcement support as required. They are not routine ESMMP implementers.

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Actor	Core ESMMP function
WB	Financing oversight, review and implementation support. They do not supervise the Contractor operationally.

vi. Funding Entity/Donor (GoL/AfDB)

The Project is expected to be financed by the World Bank and by the Government of Liberia through the National Road Fund (NRF) for the Project. World Bank will provide monitoring of the implementation of the project through its own Environmental and Social Experts.

9.5 C-ESMMP REQUIREMENTS

In addition to the above mitigation measures for different impacts from the project activities, the Contracting Entity or the ***Contractor will prepare a CESMMP to ensure that all impacts are mitigated at the highest possible level.***

The Contractor will utilize the already identified information on negative impacts and proposed mitigation measures in accordance with the national regulatory and the World Bank requirements.

Below, an indicative guideline is stated for the preparation of a C-/ ESMMP and specific Management Strategy Implementation Plans (sub-management plans) that is aligned with this ESIA. These instruments will be prepared by the Contractor to be used as a tool for the contractor to manage any ESHS risks management anticipated during the construction period and for the proponent to review and supervise the efficiency of the contractor on the management of E&S and OHS and CHS risks.

The key management strategy and implementation plans (Site-specific) that will comprise the C/ ***ESMMP*** to be prepared and operationalized during project implementation, including but not limited to the following:

- Waste Management Plan
- Emergency Response Plan
- Materials Handling, Use, and Storage
- Erosion/Sediment Control Management Plan
- Water Management Plan
- Traffic Management Plan
- Borrow Pits and Quarry Sites Operation Plan
- Health and Safety Management Plan
- Labor Influx Management Plan
- Workers' Code of Conduct
- Materials Management Plan
- Construction Camp and Site Management Plan
- Community Health and Safety Plan

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- Air Quality, Dust, Noise and Vibration Management Plan
- Spill Prevention, Control and Response Plan
- Biodiversity, Vegetation Clearing and Restoration Plan
- Stakeholder Communication and Community Liaison Plan
- Worker Grievance Mechanism Procedure
- GBV/SEA/SH Prevention, Code of Conduct and Survivor-Centered Referral Plan
- Chance Finds Procedure
- Site Restoration, Demobilization and Closure Plan
- C-ESMMP Monitoring, Reporting, Corrective Action and BOQ Cost-Linkage Schedule

The above subplans are mandatory where relevant to the Contractor's scope and work locations. Each subplan shall define applicable risks, legal and safeguard requirements, location-specific controls, responsible staff, measurable indicators and targets, monitoring methods and frequency, records, incident/escalation arrangements, implementation schedule, estimated cost, funding source and BOQ/contract reference. No work covered by a subplan shall commence until that subplan has been approved by CSC/PIU.The Contractor shall prepare and obtain approval of the C-ESMP and all other required site-specific environmental and social management plans from the CSC and PIU as applicable, prior to mobilization and commencement of construction activities. Furthermore, all necessary permits, licences, clearances and authorizations from the relevant regulatory authorities for ancillary facilities, including quarries, borrow areas, construction camps, batching plants, asphalt plants, workshops, and disposal sites, shall be obtained and submitted to the CSC and PIU for verification before mobilization or establishment of these facilities.

The following Sections present the specific management plans as part of the C-ESMMP foreseen for construction and operations, based on the outcomes of the impact assessment. **These would be updated by the contractor before site mobilization.**

i. **Waste Management Plan**

A Waste Management Plan (WMP) will be developed to manage solid and liquid wastes and to avoid any discharges into the soil or water during the project implementation. It will establish procedures for the storage, collection, and disposal of waste, including liquid and solid waste, as well as hazardous and non-hazardous waste.
The WMP will provide for the following:

- Compliance with the Environmental Protection and Management Laws of Liberia, 2003;
- Compliance with the National Environment Policy, 2002;
- Outline of waste characteristics and sufficient capacity for managing different waste streams and waste quantities; and

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- Compliance with AfDB's ISS.

Furthermore, it will contribute to ensuring that the capacity and the nature of waste collection and treatment systems are in line with the waste to be managed. The overall objective is to minimize the impact of waste generated during the project implementation through the following:

- minimize the amount of waste that is generated;
- maximize the amount of waste that is recovered for recycling – including segregation of recyclable wastes at source;
- ensure any hazardous wastes (e.g., used oils) are securely stored and transferred to appropriate facilities;
- avoid dust impacts from handling of construction wastes;
- ensure all wastes are properly contained, labelled, and disposed of in accordance with local regulations; and
- ensure waste is disposed of in accordance with the waste management hierarchy.

ii. **Emergency Response Plan (ERP)**

The ERP will assemble and describe in one document the site-specific actions and procedures to be taken in emergency situations occurring during construction and operational phases. The objective of the ERP is to be prepared to respond to process upset, accidental, and emergency situations in a manner appropriate to the operational risks and to prevent their potential negative consequences.

The ERP will clearly make a distinction between all the project phases, since the actions to be undertaken will be different during the construction and decommissioning phases. The content of the Contractor ERP can be summarized as follows: Liberian legal provisions on civil emergencies.

The identification of the potential hazards (i.e. natural disasters, civil disturbances, fire or explosions, malfunctioning of the devices during the processes, pressure issues, etc.) related to Project "Roads and its construction and operations" and the possible impact to the environment and health;

- Identification of the line ministries and agencies, the media and other relevant stakeholders to be notified and description of the procedures for communicating with them;
- The necessary measures to limit human and environmental consequences associated with project-related accidents;
- Safety technical measures to be described and appropriate measures to protect the public safety or property from potential hazards;
- Preliminary description of the organization structure, and explain interactions with the Project and operational procedures;
- Preliminary identification of the system and procedures for providing personnel refuge, evacuation, rescue, medical treatment, and repatriation; and

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- Preliminary description of training activities and the arrangement for training response teams and for testing emergency systems and procedures.

Finally, the Plans shall include provisions for the training of all workers on the emergency response procedures, and will include procedures related to communication to stakeholders and community improvement opportunities.

iii. Water Management Plan

Project construction activities will generate a demand for water resources and the production of wastewater, which may have the potential to result in negative impacts. The Water Management Plan will have the following objectives:

- Monitor water use: the Plan will set procedures for estimating water used by the Project, identifying activities that use this resource and following a reporting procedure for registering used volumes of water;
- Minimize water use: the Plan will provide a series of measures to be considered for minimizing the use of water;
- Document water sources and extraction locations: water sources to be used will be agreed in advance with the relevant local authorities.
- Sources of water will be identified and registered in the Plan, together with the GPS coordinates and the maximum water volumes allowed from the source; and
- Record all communications with the LWSC and other relevant water authorities.

The Water Management Plan will be developed following relevant Liberian laws and policies and will consider all the relevant guidelines. Finally, the Plan will include provisions for the training of all workers on how to minimize the use of water.

iv. Traffic Management Plan

A Traffic Management Plan (TMP) will be developed to manage traffic attributed to the Project, minimize traffic disruption and road user delay, and provide for the ongoing safety of road users, including pedestrians and cyclists. All of the traffic-related impacts described previously can be mitigated very effectively by the implementation of standard best practices in terms of environmental controls and management practices during construction. These measures will be detailed in the TMP, which will describe in detail the measures that the Contractor will implement during the construction of the Project.

The key issues that will be addressed by the TMP in terms of mitigation measures will include:

- Access to construction areas;
- Routing of construction traffic;
- Prevention of road user delay;
- Temporary traffic control and management;

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- Reducing the probability of traffic accidents and improving safety for road users and others;
- Preventing and remedying road degradation; Road crossings; and Parking facilities.

The Contractor shall regularly update their TMP as their construction methods are developed and vehicle movement requirements are identified in detail. The Contractor will consult with the principal representative of any communities that will suffer a significant increase in traffic in order to develop awareness of the mitigation measures within the TMP. A TMP is important both in ensuring the safety of construction personnel and local communities. The TMP is intended to be a 'live' document, and its traffic management principles will form the basis for subsequent detailed construction traffic management arrangements between the appointed Contractor and the road authorities.

The TMP will include the following minimum requirements:

- Levels of development related to traffic that will use this road network;
- Identification of key sensitivities along proposed access routes;
- Identification, demarcation and construction of access routes;
- Measures to provide for the ongoing safety of road users, including pedestrians and cyclists;
- Project driver training requirements with respect to road safety and environment;
- Project Schedule;
- Roles and responsibilities for implementation of the TMP;
- Measures to prohibit "off-route" driving;
- Speed limits and methods of enforcement;
- Means to inform the community of traffic risks;
- Vehicle equipment;
- Vehicle maintenance and refueling locations;
- Inspection, auditing, and reporting; and
  Driver competency.

v. Borrow Pits and Quarry Sites Operation and Reinstatement Plan

The Contractor will prepare and implement the Borrow Pits and Quarry Sites Operation and Reinstatement Plan to manage all impacts associated with borrow pits and quarries. The Plan will ensure that all borrow pits and quarry sites are 500 meters from the following elements:

- Public or private buildings;
- Trunk or regional roads;
- Railroads;
- Water pipelines;
- Cemeteries;
- Cultural sites; and

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- Mangrove ecosystem and wetland.

The following aspects will be considered during the selection of borrow pits and quarry areas to minimize residual environmental and social impacts as appropriate:

- Selected sites will avoid such areas as flood plains, marshes, sites characterized by unstable ground, and protected sites.
- Selected borrow pit sites will be based on the characteristics of the fill required to minimize disturbance to vegetation and nearby areas and also located away from significant fauna habitats.
- Selection will be done based on the strip and stockpile vegetation and topsoil for use during restoration. Likewise, selection will be based on the limits of volumes or tonnages of material able to be removed, the depth of borrow pits, and limits on the area that is able to be disturbed to construct and operate a borrow pit.
- The borrow pits will be suitably located away from the areas where surface water drainage patterns will not be adversely affected.
- Selection for borrow pits will avoid sensitive areas such as heritage or cultural sites, etc.

In line with the Environmental Protection and Management Laws of Liberia (2003), the Contractor shall take all necessary measures to ensure that the borrow pit and quarry sites are restored to a state that is safe to humans and animals and to a state that will allow regeneration of vegetation.

Borrow pit and quarry sites must be rehabilitated by selecting one of the following options:

- Level the ground and restore the vegetation cover (i.e., trees, grasses, and shrubs);
- Fill the holes (i.e., with sand, earth or stones) and restore the vegetation cover;
- Adjust the water level for local communities or animals;
- Convert or rehabilitate the area as a leisure zone;
- Restore the site to another project.

Levelling of the sites must be done to the extent that it fits well with the surrounding landscape and is sufficiently drained. To ensure vegetation is well restored at the site, manure must be applied or cover the entire ground surface with topsoil. Thereafter, the site must be cared for and maintained for 1 year after the end of the exploitation.

After the rehabilitation works are complete, the Contractor will ensure that the surface of the extraction surface is free of all scRP s, waste, stumps, unstable material, machinery parts, or other similar obstructions.

vi. Health and Safety Management Plan

The Health and Safety (H&S) Management Plan will be a tool that will provide a framework for the following:

- Planning for Health and Safety; Accident and Incident Investigation; and

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- Health and Safety Reporting.

The H&S Management Plan will be developed following all the relevant guidelines. The H&S Management Plan will include, at a minimum, the following elements:

- The Contractor's HSE Policy.
- H&S Organization: detailed organization chart and description of roles and responsibilities associated with managing H&S. The organization proposed in the Plan will consider the competency of the proposed professionals and will provide mechanisms to ensure cooperation and communication between the H&S management team members.
- H&S Standards, including: site safety inductions; hazards identification and risk assessment, including task analysis and construction hazards; H&S targets, and a procedure for safety performance evaluation and review; emergency procedures; toolbox meeting procedure; site visit registers; and MSDS sheet register.
- Accidents and Incidents, including: definitions; reporting and registering procedures; root cause analysis
- H&S Reporting, including the following: reporting plan; objectives and measuring H&S performance; site safety inspection checklists and first-aid equipment checklist.

The Plan will include provisions for the training of all workers and will include procedures related to communication to stakeholders and community improvement opportunities.

vii. Materials Management Plan (HMMP)

This plan is aimed at reducing the risk of spills or other accidental exposure to hazardous materials. The Contractor shall thus develop a Hazardous Materials Management Plan (HMMP) whose aim is to:

- Ensure safe and proper use of hazardous chemicals.
- Provide personnel with a program to reduce the risk of accidents involving hazardous chemicals and/or wastes; and

  Describe the process of how the contractor will provide and maintain a safe and supportive environment for workers and those providing services for the project.

The Contractor is also required to commit to maintaining programs designed to prevent and reduce the risks to workers, visitors, and the community by ensuring proper handling and disposal of hazardous materials and wastes.

viii. Labor Influx Management Plan

The contractor will ensure that labor standards are respected during the project, as set out in the contractor ToR. Under the contractor LMP, the contractor will consider the capacity of subcontractors to achieve sound Labor management.

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The contractor will ensure a contractual commitment on the part of Labor providers to comply with all relevant aspects of Liberian national labor law, including the establishment of formal employment relationships with laborers, ensuring legal protection on form and frequency of pay, and working hours.

Under the Contractor's LMP, the contractor will:

- Commit, where requested, to provide a copy of employment registers and records, including details of hours/overtime worked, wages paid and the employment status of workers, both those employed directly and indirectly;
- Assume primary responsibility for day-to-day monitoring of the implementation of labor standards requirements placed by project financiers on the Project Proposer and thereby designate a manager who is responsible for ensuring labor and health and safety legislation is complied with, both in the direct and indirectly-employed workforce (namely, subcontracted labor);
- Provide or ensure that training is carried out on health and safety issues concerning all workers, direct and indirectly employed;
- Put in place a mechanism for checking the age of workers (prevention of child labor);
- Carry out risk assessments in relation to all employees who are under the age of 18;
- Put in place a worker grievance mechanism and details of any complaints lodged under the procedure.
- Undertake to inform MPW– and thereafter the project financiers – of all serious accidents that take place in relation to the project; and,
- Provide MPW– and thereafter the project financiers – with sample copies of pays lips for direct and sub-contracted workers, indicating payment of wages and social security contributions.

The LMP will also include a Code of Conduct as discussed below in Section 6.4.9. It will also include a grievance mechanism, which will allow the affected communities to express concerns about the conduct of personnel. The grievance mechanism will include a mechanism for assessing the credibility of allegations, investigation of credible allegations of unlawful behavior, corrective actions, and documentation and (where appropriate) reporting of such incidents.

ix. Workers' Code of Conduct

The Workers' Code of Conduct will set out the Contractor's expectations of the workers' behavior, consistent with the national labor laws and international good practice standards. Specifically, the Workers Code of Conduct will be explicit on the following:

- The scope of the "Workers Code of Conduct";
- A requirement for all the Project employees to comply with all the Contractor's rules and regulations;
- Prohibited and restricted activities at the workplace, such as drug abuse;

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- Respect at the workplace, including respect for other Project workers as well as the local community members; protection of project property; and professionalism:
    - Working hours,
    - Personal appearance,
    - Leave policy,
    - Absenteeism and tardiness,
    - Conflict of Interest,
    - Pronouncement on giving and receiving gifts,
    - Confidentiality, and - Communication.
    - Prohibit hunting, tRP ping, capturing or harming wildlife.
    - Avoid unnecessary vegetation clearance and disturbance to wildlife habitats.
    - Prohibit wildlife trade, possession or transportation of wild animals and their parts.
    - Enforce speed limits to prevent wildlife-vehicle collisions.
    - Report injured or encountered wildlife to the Environmental Officer and relevant wildlife authorities.
    - Minimize noise, vibration and artificial lighting near sensitive habitats.
    - Prevent waste disposal and chemical spills in wildlife habitats and watercourses.
- Maintain records of wildlife encounters, incidents and corrective actions.Contractor's pronouncement on all forms of harassment;
- Grievance management; and
- Discipline of workers who breach the requirements of the Contractor's Code of Conduct
- Zero tolerance: Prohibit all forms of sexual exploitation, sexual abuse, sexual harassment and inappropriate sexual conduct.
- Child protection: Strictly prohibit sexual activity with persons under 18 years of age.
- Prohibition of transactional sex: Prohibit exchanging money, employment, goods, services or project benefits for sexual favours.
- Confidential reporting: Require reporting through designated confidential channels while protecting survivors' privacy.
- Disciplinary action: Specify consequences for violations, including termination and referral to relevant authorities, where appropriate.

x. **Work Method Statement**

The Contractor shall complete a Work Method Statement for all works. This document will be used to describe the job to be carried out; the steps involved, the hazards associated, and the controls to be implemented to ensure that the work is completed safely. Permits will be given for

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hot work and confined work, fire equipment impairment notices, and hazardous work referred to as “Permit for Work”.

xi. Project Training Program

The Contracting Entity will provide resources and HSE training needs to all employees and any third party who carries out all or part of the Contracting Entity’s obligations under the Contract. Every employee will have an induction presentation on environmental awareness as part of the recruitment process. The presentation needs to be conducted in a language understood by employees and other site personnel.

The training by the Contracting Entity should, as a minimum, include the following:

General environmental, health and safety awareness training describing the importance of policies, standards, key environmental and social sensitivities or requirements of the Project;

- Conformance to Standard Operating Procedures (SOP) as a means to avoid or reduce environmental and social impacts;
- Requirements of the ESMMP and how it will be implemented and monitored on site;
- Prevention and handling of fire and other incidents, including procedures to be followed in the event of non-compliance with the environmental, social and health requirements;
- Training and awareness on HIV/AIDS, Gender-Based Violence (GBV), and violence against children;
- The significant environmental and social impacts, actual or potential, as a result of their work activities;
- The environmental and social benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- PPEs and orientation and support on the use of PPEs to all employees and visitors so that they can act appropriately and safely;
- The mitigation measures that need to be implemented when carrying out their work activities;
- Water and waste management;
- The procedures that should be followed should a graveyard/cemetery be encountered or unearthed during the construction phase.

Training should be provided at the pre-construction and construction phase and where necessary, the operation phase, as needed. The training can be in different forms, namely:

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- Induction training for staff, including modules on: health and safety, environmental and social awareness, accommodation rules, worker code of conduct, stakeholder engagement, grievance mechanisms and cultural heritage awareness;
- Toolbox training for specific tasks;
- Training for individuals involved in tasks with specific responsibilities; and
- Refresher training programs to facilitate continual improvement in environmental and social awareness for Project personnel.

In view of the above, specific attention should be given to the following:

- The Contracting Entity will also implement an HIV/AIDS and GBV awareness program at the campsite.
- A training needs assessment will also be conducted by the HSE Manager to identify appropriate HSE training programs, and the appropriate target groups amongst the employees of the Contracting Entity. The HSE awareness training programs should be targeted at three distinct levels of employment, i.e., the executive, supervisor, and department workforce.

The training programs should contain the following information:

- The names, positions and responsibilities of personnel to be trained.
- The framework for appropriate training plans.
- The summarized content of each training course.
- A schedule for the presentation of the training courses.

The Contracting Entity should ensure that records of training interventions are kept in accordance with the record-keeping and documentation control requirements as set out in the ESMMP. The training records should verify each of the targeted personnel's training experience. Assessment of the effectiveness of the training programs should be included as part of the internal audit procedures.

A provisional training program is presented in the table below:

Table 58: Training Program for Contracting Entity

Training Program	Courses
General Awareness, Health, Safety and Environment	HSE Induction/Orientation Course (site safety rules, PPE requirements, Emergency Preparedness and Response); Daily toolbox talk for workers at the start of each day's job; Refresher HSE Courses as required.
Project Specific Occupational Health and Safety	Manual Handling Techniques; First Aid Training (for Site First Aiders); Safe Driving Techniques (for drivers)
Code of Conduct	Sensitization and awareness raising on HIV/AIDS, STIs, harassment, sexual behavior, Gender Based Violence, etc.

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The Contracting Entity will be required to submit in-house HSE training and procedures to the Environmental and Social Safeguards Team for approval before commencement of civil works. The Contracting Entity should keep auditable records of training given. Assessment of the effectiveness of the training program will be included as part of the ESMMP audit procedures.

xii. Document Control, Record Keeping and Reporting

The Contracting Entity will have the responsibility of identifying, documenting, and reporting to the MPW / AfDB (in weekly or monthly reports) on issues relating to the environmental, social, and health performance of the Project. In order to provide evidence of ongoing mitigation activities, the Contracting Entity is obliged to keep records.

Such records may consist of site monitoring plan, HSE Policy, Site Specific HSE Plan, Waste Management Plan, Traffic Control Plan, Emergency Response and Preparedness procedures, site instructions, training records, complaints records, incident reports, inspection, maintenance, and equipment calibration records, etc. Further details on reporting are expanded upon in subsequent sections below.

The Contracting Entity will have responsibility for establishing procedures for HSE document control. The HSE document control procedure will comply with the following requirements:

- Documents should be identifiable by organization, division, function, activity and contact person;
- Documents should identify the personnel and their positions, who drafted and compiled the document, who reviewed and recommended approval, and who finally approved the document for distribution; and
- Documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a specified period.

The Contracting Entity will oversee that documents are periodically reviewed and revised, where necessary, and that current versions are available at all locations where operations essential to the functioning of the ESMMP are performed. Documents should be made available to the third-party EPA Certified Consultant auditor, MPW and/or Supervision Consultant upon request.

In addition, the HSE Manager will develop a system and procedures for document filing related to the ESMMP.

A list of reports (documentation) likely to be generated during the Project is set out below:

- Contractor Environmental and Social Management Plan updates.
- Relevant communications detailing changes of design/scope that may have environmental implications.
- Daily, weekly and monthly site monitoring reports.
- Occupational Health and Safety reports.
- Complaints register.

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- Training manual and attendance registers.
- Incident and accident reports.
- Emergency preparedness and response plans.
- Permits and legal documents, including letters authorizing specific personnel to perform their duties as Occupational Health and Safety representatives, or as part of emergency preparedness teams, e.g. fire teams, etc.
- Disciplinary procedures.
- Monthly site meeting minutes during construction.
- Method statements from the Contracting Entity for various phases of the project.
- Weekly report from HSE Manager (regardless of whether there has been an incident).

These documents should be presented to the E&S Safeguards Team of the Monitoring and Supervision Consultant upon request. In addition, all significant communications with EPA and other relevant authorities should be documented and preserved. These documents are necessary for tracking performance to attain and establish compliance with the monitoring plan and appropriate regulatory requirements.

The HSE Manager will prepare a monthly internal monitoring report and copies thereof should similarly be filed at any subcontractor's representative's office and should be furnished to the Supervision Consultant simultaneously with such filing.

9.6 CHANCE FINDS PROCEDURE

The CFP applies to previously unidentified cultural heritage encountered during Project activities. Known graves, cemeteries and other cultural heritage identified during the ESIA/RP are subject to the specific avoidance, consultation and management measures established for those assets and are not treated as chance finds.

The CFP has been strengthened to establish a clear hierarchy of avoidance, consultation, protection, and response in accordance with applicable national legislation and relevant World Bank ESF requirements, particularly ESS8 where applicable. The procedure requires pre-construction screening of culturally sensitive locations, consultation with relevant heritage authorities and affected communities, and avoidance or redesign where feasible.

If potential cultural heritage is encountered during construction, work in the affected area must cease immediately, the site must be secured, and the designated authorities and relevant community representatives must be notified for assessment and guidance. Work shall resume only after formal clearance and implementation of agreed protection measures. The procedure should also define responsibilities, reporting timelines, worker training and documentation requirements.

The Buchanan–Cestos Junction Road corridor traverses areas that may contain unknown or unrecorded cultural, historical, archaeological, or paleontological resources. In recognition of this potential, a CFP shall be implemented throughout all phases of project construction to ensure that

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any such discoveries are properly managed, protected, and reported in accordance with national regulations and international best practices.

1. Objective

The objective of the CFP is to:

- Ensure the protection and preservation of cultural heritage resources encountered during construction.
- Provide clear guidance to contractors and workers on the steps to take in the event of a chance discovery.
- Ensure compliance with relevant national heritage laws and E&S safeguard standards.

2. Definition of Chance Finds

Chance finds refer to any unexpected discovery of cultural heritage significance during project activities. These may include, but are not limited to:

- Archaeological remains (pottery, tools, ruins, burial sites)
- Historical artifacts or structures
- Fossils or paleontological remains
- Sacred sites or objects of cultural or spiritual importance to local communities

3. Responsibilities

- Contractor: Responsible for the immediate implementation of the Chance Finds Procedure upon discovery and for ensuring all workers are trained on the procedure.
- Supervising Engineer: Ensures compliance with the procedure and coordinates communication between relevant authorities.
- (IU: Liaises with national authorities and ensures appropriate actions are taken.
- Relevant Government Authority: Provides technical guidance and authorization for further action (e.g., Ministry responsible for culture/heritage in Liberia).
- Local Communities: May provide information regarding the cultural significance of discovered items or sites.

4. Procedure in the Event of a Chance Find

If any worker encounters a potential cultural heritage resource, the following steps shall be strictly followed:

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Step 1: Work (Immediate Suspension of Activities)

- All construction activities in the immediate vicinity of the find shall be stopped immediately.

Step 2: Secure the Site

- The area shall be clearly marked and secured to prevent damage, theft, or disturbance.
- Access shall be restricted to authorized personnel only.

Step 3: Notify Relevant Authorities

- The site supervisor shall immediately notify the Supervising Engineer and the Project Implementation Unit.
- The PIU shall inform the appropriate national authority responsible for cultural heritage.

Step 4: Documentation

- The find shall be documented with photogRP hs, GPS coordinates, and a brief description.
- No object shall be removed or disturbed unless authorized.

Step 5: Evaluation by Experts

- Qualified experts (e.g., archaeologists or cultural heritage specialists) shall assess the significance of the find.
- Recommendations shall be made regarding preservation, excavation, or relocation.

Step 6: Decision and Action

- Based on expert advice, the relevant authority will determine the appropriate course of action, which may include:
    - Preservation in situ (preferred option where feasible)
    - Controlled excavation and removal
    - Modification of the project design to avoid the site

Resumption of Work

- Construction activities shall only resume upon receiving written clearance from the relevant authority.

5. Training and Awareness

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- All workers, supervisors, and contractors shall receive training on the Chance Finds Procedure prior to commencement of construction.
- Awareness materials (posters, brief guides) shall be displayed at construction sites.

6. Reporting

- All chance finds and subsequent actions shall be recorded in the project environmental and social monitoring reports.
- Incidents shall be reported promptly to the PIU and included in regular project updates.

7. Legal Compliance

This procedure shall comply with:

- National cultural heritage laws and regulations of Liberia
- Applicable environmental and social safeguard standards (e.g., World Bank Environmental and Social Framework, if applicable)

8. Penalties for non-compliance

Failure to follow the Chance Finds Procedure may result in:

- Disciplinary action against responsible personnel
- Suspension of work
- Legal penalties under national law

Implementation of the ESMMP shall comply with the legal, institutional and lender requirements identified in Chapter

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9.8 MONITORING, REPORTING AND CORRECTIVE ACTION

ESMMP performance will be monitored in accordance with Tables 57A and 57B, the detailed monitoring Programme in Appendix 3, the approved C-ESMMP and applicable requirements of the ESCP, EPA permit and financing agreements.

The Contractor will undertake routine self-monitoring, inspections and reporting for activities under its control and will maintain the records required by the C-ESMMP. The Supervision Consultant will independently verify Contractor compliance, undertake inspections, review monitoring results, identify non-compliances and verify completion of corrective actions. The PIU will maintain overall oversight of Project E&S performance, consolidate monitoring information and report to MPW, EPA, WB and AfDB at the frequencies required under the applicable Project commitments.

Material incidents and accidents will be notified and investigated in accordance with the applicable incident-reporting procedures and agreed notification timelines. Where monitoring identifies ineffective mitigation, recurring non-compliance or changes in Project risks, the Contractor and PIU will implement corrective action and revise the relevant management measures or C-ESMMP provisions as required.

Independent audits or monitoring will be undertaken where required by the applicable legal, ESCP or financing arrangements. Monitoring will continue through pre-construction, construction, the defects-liability period and operation/maintenance, as applicable to the relevant risk and responsible party.

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9.9 ESMMP Budget and Financing

The implementation of the ESMMP for the paving of the Buchanan (including the link to the Buchanan Port) to Cestos Junction (60.9km) Road requires a well-structured and comprehensive budget that captures all critical components necessary for environmental protection and social well-being. Adequate financial allocation to these components will enable the project to effectively mitigate potential adverse impacts while maximizing its positive contributions to local communities and surrounding ecosystems. Early consideration of these budgetary requirements during the project planning phase will also support smooth implementation and ensure compliance with regulatory and institutional requirements.

The ESMMP implementation budget comprises all costs associated with executing the requirements and recommendations outlined in the Environmental and Social Management Plan. These requirements are designed to ensure that environmental and social considerations are fully integrated into the project lifecycle, thereby promoting sustainability across the project, its components, and sub-components.

Key areas covered under the ESMMP include but not limited to: overall ESMMP coordination and management; implementation of the SEP; GBV prevention and response measures; establishment and operation of the GM; the Biodiversity Action Plan implementation, public awareness and sensitization campaigns; training and capacity building; environmental and social safeguard officers, screening and review processes; as well as monitoring, evaluation, and reporting systems.

The estimated budget also incorporates costs related to the RP , including compensation payments, acquisition of necessary permits and licenses, and the implementation of ESMMP, GBV, BAP, and GM activities, among others.

Presented below is the consolidated budget structure for implementation of the environmental and social instruments for the Buchanan–Cestos Junction (60.9 km) Road Project. The quantified total comprises the cleared RP and PIU-managed ESMMP/SEP/GM/GBV/BAP allocations. Contractor site-level C-ESMMP measures shall be financed through the priced civil-works BOQ and accepted bid and are shown separately as BOQ-embedded obligations rather than added again to the PIU/RP total. The contractor will be paid on actual action/mitigation measure completion basis and not on lump-sum basis.

Before mobilization, the Contractor shall submit an itemized C-ESMMP cost schedule with quantities, units, unit rates, total amounts, implementation schedules, responsible parties, monitoring indicators, payment-certification evidence, and BOQ/contract references. The consolidated PIU/RP total excludes the USD 100,000 RP monitoring provision already included in the cleared RP budget, thereby preventing double counting across instruments.

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Table 59: Detailed ESMMP Implementation Budget

No.	Activity	Timeframe	Cost $ (USD)	Responsibility / Source of Funds
ESMMP				
1	EPA's Permitting Acquisition and PIU's EO site visit, along with the EPA/MME Team as requirement per every permit/license renewal.	Before the start of construction works, after project approval, and annual renewal	24,250.00	PIU/MPW; project funds and counterpart resources, as applicable
2	Capacity building of technical E&S Staff (for two officers only: Env. Safeguard Officer and Social Safeguard Officer) of the PIU for effective ESMMP/Safeguards compliance monitoring and on use of monitoring tools in environmental and social management.	Before construction commencement and 3rd Quarter of project implementation	60,000.00	PIU/MPW; project capacity-building allocation
3	Monthly Project site visits for ESMMP monitoring by eight PIU personnel (two drivers, four E&S staff, one Climate Change Officer and one Project Engineer). Cost basis: fuel of 150 gallons × USD 5.00 × 10 field days = USD 7,500.00 per month, plus USD 2,000.00 per month for DSA, vehicle servicing and field logistics; total USD 9,500.00 per month × 48 months = USD 456,000.00.	Monthly throughout the four-year Project implementation period, including the defects-liability period.	456,000.00	PIU/MPW; project implementation and monitoring allocation
4	RP monitoring (included in cleared RP Budget Item B.2; no additional ESMMP cost)	As required and when required after RP compensation	0.00	PIU/MPW/PFMU; included in cleared RP Budget Item B.2
5	Implementation of ROW clearance	After RP compensation	35,000.00	PIU/MPW; project implementation allocation
6	HIV/AIDS, COVID-19 and other communicable-disease awareness and prevention: six campaigns in total at USD 12,500.00 per campaign (USD 75,000.00).	Two campaigns annually over three years; the first campaign shall be completed before Contractor mobilization.	75,000.00	PIU/MPW through qualified public-health service provider; project funds
7	Annual independent Environmental and Social Performance Audit (ESPA) at	Annually throughout the four-year Project implementation period; each report shall be	50,000.00	PIU/MPW through an independent, qualified and EPA-certified

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No.	Activity	Timeframe	Cost $ (USD)	Responsibility / Source of Funds
ESMMP				
	USD 12,500.00 per year for four years.	submitted within ninety (90) days after the end of the reporting year or by another date agreed with the Bank.		evaluator/auditor; project funds
7A	RP Implementation Completion Audit: one-time independent audit after completion of compensation, livelihood-restoration and related resettlement activities and before project closure.	After completion of RP implementation and before project closure	0.00 (included within the cleared USD 100,000 RP monitoring allocation under RP Budget Item B.2)	PIU/MPW/PFMU through an independent qualified auditor; cleared RP budget
8	GBV Implementation	Throughout Project Implementation	120,000.00	PIU/MPW/MoGCSP; GBV/SEA/SH Action Plan allocation
9	Consolidated SEP and Project-wide GM	Throughout Project Implementation	173,750.00	PIU/MPW; consolidated SEP and project-wide GM allocation
10	BAP	Quarterly throughout Project Implementation	210,375.00	PIU/MPW/independent biodiversity specialist; BAP allocation
11	RP	Prior to the start of Construction	5,047,158.69	Bank/MPW/MFDP/Government of Liberia, as applicable; cleared RP budget
Total quantified PIU/RP safeguards allocation (excluding contractor BOQ-embedded C-ESMMP costs)			**6,251,533.69**	Bank/MPW/MFDP

Budget control note: the USD 6,251,533.69 total is the quantified PIU/RP safeguards allocation. It shall not be interpreted as excluding or waiving the Contractor's contractual E&S obligations. C-ESMMP costs remain enforceable and payable only through verified priced BOQ items or accepted civil-works rates. The Engineer shall reject payment for non-compliant E&S measures and may recommend suspension of the affected work until corrective action is completed.

Table 60: Summary ESMMP Budget

Summary ESMMP Budget		
No.	**Instruments**	**Total (USD)**
1	ESMMP Implementation	700,250.00
2	Consolidated SEP and Project-wide GM Implementation	173,750.00
3	GBV Implementation	120,000.00
4	BAP Implementation	210,375.00

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Summary ESMMP Budget		
5	Contractor C-ESMMP and Site-Level Mitigation Measures	Included in priced civil-works BOQ/accepted bid; not added separately
6	RP Implementation	5,047,158.69
Total quantified PIU/RP safeguards allocation		***6,251,533.69***

The quantified PIU/RP safeguards allocation is Six Million Two Hundred Fifty-One Thousand Five Hundred Thirty-Three United States Dollars and Sixty-Nine Cents (USD 6,251,533.69), comprising the cleared RP and PIU-managed ESMMP/SEP/GM/GBV/BAP allocations.

Contractor site-level C-ESMMP costs are included in the priced civil-works BOQ and accepted bid and are not added again to this total. The complete project E&S financing envelope therefore consists of the USD 6,251,533.69 PIU/RP allocation plus the verified C-ESMMP amounts embedded in the civil-works contract.

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10.0 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

Project activities associated with road widening, drainage improvements, localized realignments and associated works will result in land acquisition, loss of structures and assets, physical displacement in some locations and economic displacement affecting businesses, farms and other livelihood activities. These impacts trigger ESS5.

A standalone RP has been prepared for the 60.9 km Buchanan–Cestos Junction corridor. The RP contains the detailed census and asset inventory, eligibility and cut-off arrangements, valuation methodology, entitlement framework, livelihood restoration measures, consultation and GM arrangements, implementation responsibilities, budget and monitoring provisions. This chapter summarizes the principal resettlement impacts and ESS5 commitments relevant to the ESIA and should be read together with the standalone RP .

The Project will apply the mitigation hierarchy to land acquisition and displacement, with priority given to avoiding and minimizing displacement through design and construction planning. Where displacement cannot be avoided, compensation, resettlement assistance and livelihood restoration will be provided in accordance with ESS5 and the RP .

10.1 Nature and Scale of Resettlement Impacts

The RP census and asset inventory were undertaken in January 2025 and provide the Project-specific basis for assessing displacement impacts. The census identified 1,093 PAPs and a substantial number of affected structures, businesses, farms, tenants, landlords and community assets. Approximately 49% of PAPs depend primarily on farming and approximately 46% on petty trade or business activities, indicating that economic displacement and livelihood restoration are material components of the resettlement process.

Impact category	RP findings
PAPs	1,093
Private structures	1,643, comprising 1,591 fully affected and 52 partially affected
Affected businesses	500
Farms	61
Economic trees	5,656
Tenants	160
Landlords	127
Public/community assets	14
Cultural heritage assets	21 individual graves and one cemetery
PAPs identified for additional vulnerability assistance	731

The cemetery is included within the public/community asset inventory and should not be counted again when presenting the aggregate number of affected assets.

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For ESS5 purposes, the total number of PAPs should not be interpreted as the number of physically displaced persons. Physical displacement applies to PAPs who are required to relocate from affected residential structures or shelter. Economic displacement applies to persons experiencing loss of land, productive assets, businesses, income, access to livelihood resources or other means of livelihood. The RP implementation records should distinguish these categories so that the appropriate relocation, compensation and livelihood measures can be applied.

The cut-off date for eligibility is 14 January 2025, which the RP records as having been communicated through community meetings, public notices and radio announcements.

10.2 ESS5 Principles, Eligibility and Entitlements

Eligibility and assistance will be based on the RP census, asset inventory, cut-off date and verification procedures. Consistent with ESS5, the Project recognizes affected persons with formal legal rights to land or assets, persons with customary or other claims recognizable under national law, and persons without recognizable legal rights or claims who occupied or used the affected area before the cut-off date. The standalone RP already applies these three eligibility categories.

Compensation for affected land and assets will be provided at replacement cost without deduction for depreciation, salvage value, taxes or transaction costs. Persons without recognizable rights to affected land remain eligible for compensation for affected non-land assets and for resettlement and livelihood assistance as applicable. Persons required to relocate will receive appropriate relocation assistance and, where relevant, access to replacement housing or land with security of tenure.

Land acquisition, demolition and displacement will not occur before compensation and applicable resettlement assistance have been made available. Livelihood restoration measures will commence sufficiently early to allow economically displaced PAPs to re-establish affected income sources and livelihood activities.

The detailed entitlement matrix, valuation methodology and compensation rates are provided in the standalone RP and are not repeated in this ESIA.

10.3 Livelihood Restoration and Differentiated Assistance

Livelihood restoration is a material component of the RP because a large proportion of the affected population depends on farming, petty trade, roadside commerce and other small-scale livelihood activities. The objective is to improve, or at minimum restore, affected income-earning capacity, production levels and standards of living rather than treating compensation payments as the sole measure of restoration.

The RP provides transitional compensation for 500 affected businesses, rental-related assistance for affected tenants and landlords, support for affected farms and economic trees and additional assistance for PAPs identified as vulnerable. The RP also provides for follow-up livelihood support where monitoring demonstrates that compensation and transitional assistance alone are insufficient to restore livelihoods.

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Differentiated assistance will be based on the circumstances of individual PAPs and their exposure to displacement impacts. The RP identifies 731 PAPs for additional vulnerability assistance. Particular attention will be given to circumstances that may constrain a PAP's ability to access compensation, relocate, re-establish livelihoods or participate in the resettlement process.

Livelihood restoration outcomes will be monitored against the RP baseline and corrective or additional measures implemented where restoration objectives are not being achieved.

10.4 RP Implementation, Sequencing, Budget and GM

MPW, through the designated IIU/PIU arrangements, will retain overall accountability for RP implementation. Financial management and compensation payments will be undertaken through the applicable Project financial management arrangements, while the Contractor and Supervision Consultant will coordinate construction sequencing to prevent works from proceeding in areas where applicable RP requirements have not been completed.

No demolition, land entry or civil works will commence in an affected section until compensation and required resettlement assistance for that section have been completed and documented. Cases involving absentee PAPs, competing claims or other unresolved eligibility matters will be managed in accordance with the RP and ESS5 requirements and will not be used to bypass the requirement for prior compensation and assistance.

The standalone RP provides a total implementation budget of **USD 5,047,158.69**, covering compensation and assistance, RP implementation support, GM activities, monitoring, the completion audit and contingency. Detailed line items and financial arrangements remain in the RP and are not reproduced in this ESIA.

Resettlement-related grievances will be managed through the Project GM described in Chapter 8 and the RP . This will include grievances relating to eligibility, asset verification, valuation, compensation, relocation, access, livelihood restoration and implementation of differentiated assistance. The GM will be operational and accessible during RP implementation, with unresolved complaints subject to escalation in accordance with the approved procedures and without restricting access to administrative or judicial remedies.

10.5 Monitoring, Corrective Action and RP Completion

RP monitoring will assess both implementation progress and resettlement outcomes. Monitoring will cover compensation and assistance, physical relocation where applicable, livelihood restoration, support to vulnerable or disadvantaged PAPs, affected community assets, grievances, outstanding cases and compliance with the requirement for compensation before displacement.

The PIU will undertake internal monitoring and reporting, supplemented by independent monitoring where required. Monitoring findings will be used to identify implementation problems and trigger corrective measures where compensation, relocation or livelihood restoration outcomes are not being achieved.

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RP implementation will not be considered complete solely because compensation has been paid. Completion will depend on whether the adverse impacts of displacement have been addressed and affected livelihoods and living standards have been restored or improved. ESS5 requires an external completion audit for projects with significant resettlement impacts, including assessment of whether livelihood and living-standard objectives have been achieved and identification of additional corrective actions where necessary.

1-0.6 Implementation Arrangements, Schedule and Budget

i. Institutional arrangements

MPW, through the designated IIU/PIU arrangements, will retain overall responsibility for RP implementation, including compensation, relocation assistance, livelihood restoration, GM oversight, monitoring and reporting. Compensation payments and related RP expenditures will be processed through the applicable Project financial management arrangements. The Contractor and Supervision Consultant will coordinate construction sequencing with the PIU to ensure that no works proceed in affected areas before applicable RP requirements have been completed. Other government, county, community and technical institutions will support implementation according to their statutory mandates and as required. Detailed institutional responsibilities are provided in the standalone RP

ii. Implementation schedule

RP implementation will be coordinated with the civil works programme. Compensation and applicable resettlement assistance will be completed and documented before displacement, demolition, land entry or commencement of civil works in the relevant affected section. Livelihood restoration measures will commence sufficiently early to support affected PAPs in re-establishing their livelihoods and will continue until the required restoration outcomes have been achieved. Unresolved cases will be managed in accordance with the RP and applicable ESS5 requirements.

iii. Budget

The standalone RP provides a total implementation budget of USD 5,047,158.69, covering compensation and assistance, RP implementation support, GM activities, monitoring, independent completion audit and contingency. Detailed cost estimates, financing arrangements and payment procedures are provided in the RP and are not repeated in the ESIA.

11.6 Grievance Redress for Resettlement-Related Issues

Resettlement-related grievances. Grievances relating to eligibility, asset verification, valuation, compensation, relocation, livelihood restoration and other RP implementation matters will be managed through the Project GM and the RP -specific procedures described in the standalone RP . The mechanism will provide accessible intake and escalation channels, confidential referral for SEA/SH cases and access to administrative or judicial remedies without requiring complainants to exhaust the Project GM. The operational status of the GM and GRC arrangements will be confirmed before RP implementation relies on them.

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10.7 MONITORING AND EVALUATION OF RP OUTCOMES

Monitoring and evaluation (M&E) is integral to ensuring that the objectives of OS5 and national requirements are met and that PAPs are not worse off – and preferably better off – because of the project. Monitoring will be coordinated with the overall ESMMP monitoring system.

Types of monitoring

- **Process monitoring** – tracks whether RP inputs and activities (compensation payments, relocation, livelihood programmes) are implemented as planned and within agreed timeframes.
- **Output and outcome monitoring** – assesses whether PAPs are actually restoring or improving their livelihood and living standards (income, housing, access to services, food security, etc.).
- **External evaluation** – an independent evaluation will be conducted at mid-term and post-implementation to assess overall effectiveness and recommend corrective actions.

RP monitoring will track compensation and assistance, physical relocation where applicable, livelihood restoration outcomes, support to vulnerable or disadvantaged PAPs, grievances, unresolved cases and compliance with the requirement for compensation before displacement. Monitoring will assess both implementation progress and outcomes against the RP baseline and will identify corrective measures where restoration objectives are not being achieved.

The PIU will undertake internal monitoring, supplemented by independent monitoring where required. RP implementation will not be considered complete solely because compensation has been paid. An independent completion audit will verify that RP commitments have been implemented and that affected livelihoods and living standards have been restored or improved, and will identify any outstanding corrective actions.

Results of monitoring and evaluation will be discussed with PAPs and other stakeholders through regular consultations and will inform **adaptive management**, including additional measures or corrective actions where needed.

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11.0 STAKEHOLDER ENGAGEMENT, PUBLIC PARTICIPATION AND INFORMATION DISCLOSURE

12.1 OBJECTIVES AND PRINCIPLES

Stakeholder engagement for the Project is designed as an integral, continuous part of project preparation, construction and operation, in line with:

- The (EPML and the Liberia EPA ESIA Procedural Guidelines, which define public participation as a process that gives affected persons timely information, effective notice, and a genuine opportunity to comment on major decisions, with their views considered in decision-making.

- WB ESS10 and FDB ISS specifically requires systematic stakeholder identification and engagement throughout the project life cycle and preparation and implementation of a Stakeholder Engagement Plan proportionate to the project's risks and impacts.

Overall objectives of stakeholder engagement are to:

- Ensure that PAPs and other stakeholders are informed in a timely and accessible manner about project objectives, design options, risks, and opportunities.
- Provide meaningful opportunities for stakeholders to express their views, concerns and preferences, and for these to be taken into account in technical design, mitigation measures and project decision-making.
- Identify and manage environmental and social risks and impacts early, including those affecting disadvantaged or vulnerable groups, women, youth and persons with disabilities.
- Build and maintain constructive, trust-based relationships among MPW/IIU/PIU, contractors, local authorities, communities, civil society and other stakeholders throughout the project cycle.
- Establish effective, accessible and culturally appropriate grievance mechanisms so that concerns can be raised and resolved promptly and fairly.
- Comply with all applicable national legal and World Bank and AFDB ESS requirements for stakeholder engagement, public participation and information disclosure.

Guiding principles include:

- **Early and continuous engagement:** Stakeholders are engaged from project identification and scoping through design, construction, operation and closure.
- **Inclusiveness and non-discrimination:** Special attention is given to women, youth, elderly persons, persons with disabilities and other vulnerable groups so that they can participate meaningfully.
- **Transparency and access to information:** Information is shared in local languages using appropriate formats (public meetings, radio, posters, leaflets) and clear, non-technical language.
- **Two-way communication: Engagement focuses on dialogue and joint problem solving, not one-way information dissemination.**

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- **Cultural appropriateness and respect:** Engagement respects local customs, traditional authorities and religious practices, while upholding human rights and gender equality.
- **Free from coercion and retaliation:** Stakeholders can express views freely, without intimidation, coercion or risk of reprisals.
- **Documented and responsive:** All key consultations and grievances are documented; feedback is provided, and stakeholder inputs are reflected in project adjustments where feasible.

11.2 Regulatory Context for Public Participation

Stakeholder engagement for the Project is governed by applicable Liberian requirements, and WB ESS10. These requirements provide for early and ongoing stakeholder identification and engagement, meaningful consultation, timely and accessible disclosure of Project information, differentiated measures for disadvantaged or vulnerable groups, documentation of stakeholder feedback and establishment of accessible project GM. The detailed legal and policy framework is presented in “Chapter

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2.0 POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK" while the Project-specific implementation arrangements are provided in the standalone SEP.

11.3 Stakeholder Identification and Analysis

Stakeholder identification distinguishes between project-affected parties, other interested parties and project-affected persons or groups who may be disadvantaged or vulnerable and therefore require differentiated engagement measures. Stakeholders include all individuals, groups and institutions who:

- Are directly or indirectly affected by the road project (positively or negatively);
- Have interests or functions relevant to the project; or
- Have influence over project decisions and performance.

Key stakeholder categories include:

- **Government institutions:** MPW/IIU/PIU, EPA, Ministry of Finance and Development Planning, Ministry of Agriculture, Ministry of Gender, Children and Social Protection, Ministry of Health, Ministry of Internal Affairs, Liberia National Police (traffic), county and district administrations in Grand Bassa and Rivercess.
- **Local government and traditional authorities:** County Superintendents, District Commissioners, Clan Chiefs, Town Chiefs, elders, and religious leaders.
- **Project-affected communities and PAPs:** households, businesses and communities directly or indirectly affected by the road works, associated facilities, access changes or other Project-related impact pathways.
- **Vulnerable and marginalized groups:** Women-headed households, youth, elderly persons, persons with disabilities, very poor households, socially marginalized groups, people with limited literacy, and others identified during RP and ESIA surveys.
- **Road users and transport operators:** Transport unions, taxi and bus operators, truck drivers, motorcycle taxi unions, traders transporting goods, pedestrians.
- **Civil society and community-based organizations (CBOs):** Local NGOs working on environment, human rights, gender, GBV/SEAH, public health and WASH; community associations, savings groups and producer groups.
- **Private sector actors:** Roadside businesses, fuel stations, service providers, contractors and suppliers.
- **Development partners:** AfDB and other financiers, NGOs and agencies supporting complementary interventions (livelihoods, road safety, community health).

Table 68: Stakeholder Analysis and Engagement Strategy

Stakeholder group	Main interests/concerns	Influence/power	Potential impact level	Engagement strategy
MPW/IIU/PIU	Project delivery on time, within budget, in compliance with safeguards; quality infrastructure.	High	High	Regular technical meetings; review of ESIA/ESMMP and monitoring reports; joint field missions.

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Stakeholder group	Main interests/concerns	Influence/power	Potential impact level	Engagement strategy
EPA	Compliance with EPML and ESIA Guidelines; effective mitigation; public participation and monitoring.	High (regulator)	High	Submission of ESIA and NOI; participation in hearings; periodic reporting; joint inspections.
County & District Authorities	Local development, employment, reduced accidents, and limited social conflict.	Medium–High	High	Courtesy visits, joint community meetings, participation in GRCs, and regular coordination.
Town chiefs, elders & traditional leaders	Respect for customs, fair compensation, protection of sacred sites and graves, and jobs for youth.	Medium	High	Culturally appropriate community meetings; individual meetings; involvement in grievance handling and land discussions.
PAP households & businesses	Compensation for lost assets, livelihood support, access and mobility, safety, noise/dust, and GBV risks.	Low–Medium	High	Household visits; community meetings; RP consultations; targeted meetings for women and vulnerable groups; GM.
Women, youth & vulnerable groups	Safety, access to services, employment opportunities, GBV/SEA/SH protection, voice in decisions.	Low–Medium	High	Separate FGDs; meetings at convenient times/locations; presence of female facilitators; confidential GBV reporting channels.
Transport operators & traders	Travel time and cost, road safety, parking and loading points, and disruption during construction.	Medium	Medium–High	Meetings with transport unions; roadside trader consultations; disclosure of traffic management plans.
CSOs & CBOs	Environmental protection, community rights, GBV, labour rights, governance and accountability.	Medium	Medium	Thematic meetings; information sharing; involvement in monitoring and awareness campaigns.
Contractor & sub-contractors	Clear ESMMP requirements, a predictable environment for construction, and labour stability.	High (on-site)	High	Contractual obligations; induction training; monthly E&S meetings; GM for workers.
AfDB OSSs & WB ESSs	Compliance with ISS; effective E&S risk management; robust stakeholder engagement and GM.	High (financier)	High	Periodic supervision missions; review of ESIA/ESMMP and SEP; reporting on engagement and grievances.

11.4 Stakeholder Engagement during ESIA Preparation

During ESIA preparation, a structured programme of engagement was undertaken along the Buchanan–Cestos Junction corridor and in key administrative centres. Activities included:

- **Key informant interviews (KIIs):** With representatives of MPW/IIU/PIU, EPA, county and district administrations, line ministries, traditional leaders, health and education officers.
- **Community meetings / public forums:** In major settlements along the corridor, including Buchanan, Big Joe Town and other roadside communities, to introduce the project, discuss potential impacts and mitigation measures, and gather local knowledge.

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- **Focus group discussions (FGDs):** With women's groups, youth, traders, motorcycle taxi riders and vulnerable groups, using gender-sensitive facilitation.
- **RP census, socioeconomic survey and asset inventory:** Conducted as part of the RP /ARP process to profile PAPs and identify specific concerns linked to land acquisition and livelihoods.
- **Informal discussions and transect walks:** Along sections of the existing laterite road to identify sensitive locations (schools, clinics, water points, markets, sacred sites).

Table 69: Summary of Stakeholder Engagement Undertaken During ESIA and RP Preparation[10]

Location/area	Type of meeting	Main stakeholder groups	Key issues/concerns raised	How issues are addressed in the ESIA/ESMMP design
Buchanan City	Introductory and scoping meetings	County authorities, line ministries, CSOs, transport unions	Need for improved road safety; enforcement of traffic regulations; opportunities for local employment; minimizing disruption to port traffic and markets.	Integration of road safety features (signage, markings, crossings); coordination with traffic police; local labour provisions in contracts; traffic management plan for construction.
Big Joe Town and neighboring settlements	Community meetings & FGDs	Town chiefs, elders, women, youth, farmers, traders	Concerns about dust, noise and safety during construction; fear of loss of roadside stalls; need for safe crossings for children; drainage to prevent flooding of farms.	ESMMP measures on dust suppression, noise control, and construction scheduling; roadside business access management; pedestrian crossings near schools/markets; and detailed drainage design to avoid flooding.
Other roadside communities along the 60.9 km corridor	Community meetings, transect walks	PAP households and businesses, farmers, and traditional leaders	Possible relocation of structures; compensation for crops; protection of community water points; employment for local youth; GBV risks linked to influx of workers.	Development of RP /ARP ; asset survey and compensation framework; protection and replacement of water sources; local recruitment procedures; GBV/SEAH Action Plan and codes of conduct.
County and district headquarters	KIIs and small group meetings	Superintendents, Commissioners, sector heads (health, education, agriculture)	Land availability and customary tenure; coordination of services; management of public expectations; need for continuous communication during works.	Inclusion of local authorities in stakeholder engagement and GRC structures; clear communication protocols; information disclosure schedule; coordination on land issues and service continuity.
Sectoral agencies and CSOs	KIIs / technical meetings	Environmental NGOs, gender and GBV service	Cumulative impacts on environment, biodiversity and water resources; GBV/SEAH	Biodiversity and water management measures; involvement of CSOs in awareness campaigns and monitoring; design of survivor-

[10] Appendix 7: Public Consultation and Stakeholder Engagement Meeting Records

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Location/area	Type of meeting	Main stakeholder groups	Key issues/concerns raised	How issues are addressed in the ESIA/ESMMP design
		providers, and road safety NGOs	prevention; need for independent monitoring; consideration of vulnerable groups.	centred SEA/SH grievance pathways; targeted engagement of vulnerable groups.

12.5 How stakeholder inputs influenced project design and mitigation

Stakeholder inputs have informed several aspects of project design and the ESMMP, including:

- **Road safety features:** Additional pedestrian crossings, speed calming measures and signage near schools, markets and densely populated settlements along the corridor.
- **Drainage and flood protection:** Adjustment of drainage design in areas where communities reported historical flooding of farms and homesteads.
- **Access and livelihoods:** Design of access points, lay-bys and roadside market areas to minimize disruption of businesses, with provisions in the RP for temporary relocation or compensation.
- **GBV/SEA/SH mitigation: Inclusion of a GBV/SEA/SH Action Plan, codes of conduct for workers, specialized grievance pathways and collaboration with local service providers.**
- **Communication and grievance handling:** Agreement with local authorities on the establishment of Grievance Redress Committees (GRCs) and regular community information meetings during construction.

12.6 Future Stakeholder Engagement Plan

Stakeholder engagement will continue throughout project implementation and operation. The plan is proportionate to project risks and is aligned with OS10, EPA requirements and GIIP.

Table 70: Forward-Looking Stakeholder Engagement Plan

Project phase	Key objectives	Priority stakeholders	Planned engagement activities	Frequency/timing	Responsibility
Pre-construction	Communicate final design, ESIA/ESMMP, RP ; explain land acquisition and compensation; set up GM.	PAPs, local communities, traditional leaders, county/district authorities, CSOs	Public meetings in corridor communities; RP disclosure and agreement meetings; establishment and training of GRCs; radio announcements.	Several rounds before mobilization and prior to the start of land acquisition.	MPW/IIU/PIU with Contractor and local authorities.
Construction	Inform communities about construction schedule; manage expectations; address grievances; monitor GBV,	PAPs, local residents, workers, transport unions, CSOs, vulnerable groups	Monthly or quarterly community meetings; toolbox talks and worker briefings; focused meetings on road safety and GBV; regular GRC meetings; ongoing operation of GM (multiple entry points).	Continuous during construction; GRC meetings at least monthly or as needed.	(CESIAunder the supervision of the Supervision Consultant and PIU.

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Project phase	Key objectives	Priority stakeholders	Planned engagement activities	Frequency/timing	Responsibility
	labour and safety issues.				
Operation and maintenance	Maintain dialogue on road safety, access, noise and maintenance; monitor long-term impacts and effectiveness of mitigation.	Corridor communities, road users, local authorities, transport unions	Periodic stakeholder forums; road safety campaigns; dissemination of maintenance plans; continued operation of community GM or integration into local structures.	At least annually or in line with maintenance cycles.	MPW/IIU/PIU and county authorities.
Decommissioning / major rehabilitation (if any)	Inform communities about significant works affecting road use; manage temporary impacts.	Local communities, road users, businesses, and authorities	Public notices; meetings; updates through radio and local leaders; GM for complaints.	As required by the scope and duration of works.	MPW/IIU/PIU and contractors.

Engagement activities will:

- Be held at times and locations convenient for community members, especially women and vulnerable groups.
- Use local languages and simple visual materials.
- Ensure transportation or mobility support where needed (e.g., for people with disabilities or distant communities).

The initial stakeholder consultations identified lower participation among women, reflecting prevailing gender norms and barriers associated with household responsibilities, meeting arrangements and opportunities to participate in mixed-group discussions. To address these constraints, subsequent engagement under the SEP will include targeted consultations with women, including women-only focus group discussions where appropriate. Meeting times and venues will be selected in consultation with women to accommodate caregiving and livelihood responsibilities and ensure accessibility, safety and privacy. Female facilitators will be engaged where appropriate, and targeted outreach will be undertaken through women's groups and community representatives to encourage participation, particularly among vulnerable and marginalized women. Participation will be monitored using gender-disaggregated records, and engagement approaches adjusted based on feedback and identified barriers.

12.7 Grievance Mechanism (GM)

The Project will maintain an accessible, inclusive and culturally appropriate GM for project-affected parties throughout implementation. The GM will receive concerns relating to environmental and social impacts, land and resettlement, access disruption, community health and safety, worker conduct and other community-facing Project impacts. It will permit multiple entry points and anonymous complaints, provide timely acknowledgement and resolution, protect complainants from retaliation and maintain access to administrative and judicial remedies.

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SEA/SH complaints will be handled through a confidential survivor-centred referral pathway and will not be investigated or discussed by ordinary GRCs.

Workplace grievances raised by direct and contracted workers will be handled separately through the worker GM established under ESS2 and the LMP.

Detailed GM governance, intake, escalation, timelines, monitoring and reporting arrangements are provided in Chapter 8 and the standalone SEP.

12.8 INFORMATION DISCLOSURE

Information disclosure is both a legal requirement and a core component of ESS10.

Objectives of disclosure are to:

- Provide timely, accessible and understandable information about the project and its environmental and social risks, impacts and mitigation measures.
- Enable informed participation of stakeholders in decision-making.
- Ensure transparency and accountability in accordance with national law,AfDB and World Bank disclosure requirements.

National disclosure arrangements

In line with EPA ESIA Guidelines and the EPA Act:

- The ESIA (including ESMMP), RP /ARP and non-technical summary will be made available at:
  - EPA headquarters and relevant county EPA offices.
  - MPW/IIU/PIU offices in Monrovia and relevant counties.
  - County and district administration offices in Grand Bassa and Rivercess.
  - Selected community venues (e.g., town halls, schools, palaver huts) along the corridor.
- Notices of availability will be posted in English and local languages, using posters and local radio announcements.
- EPA-organized or supervised public hearings will be conducted as required, with participation of affected communities and stakeholders.

WB disclosure requirements

In line with the WB ESF/ESSs and information disclosure policy:

- The ESIA/ESMMP and RP , Stakeholder Engagement Plan, LMP and BAP will be submitted to World Bank and disclosed on the Bank's website prior to project appraisal/Board approval.
- Summaries may be prepared in languages and formats accessible to key stakeholders.

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Table 72: Information Disclosure Plan

Document	Content	Target stakeholders	Format and language	Disclosure locations/channels	Timing
Non-technical ESIA summary	Plain-language summary of project, risks, impacts, mitigation and GM.	All communities along the corridor, PAPs, general public	Leaflets, posters, summary brochure; English and main local languages; visual aids.	Distribution via town chiefs; posting in schools, markets, clinics; community meetings; local radio messages.	Prior to the EPA public hearing and before construction.
Full ESIA report and ESMMP	Detailed technical assessment and management measures.	EPA, AfDB, line ministries, CSOs, researchers	Electronic and printed copies (English).	EPA and MPW/IIU offices; county/district offices; AfDB website.	Following EPA review acceptance and prior to Board consideration.
RP	Land acquisition, entitlements, livelihood restoration measures, RP GM.	PAPs, local authorities, CSOs	Summary in simple language plus full report; English and local languages for summaries.	Household consultations; community meetings; county/district offices; EPA and MPW/IIU offices.	Prior to the start of land acquisition and compensation payments.
ESMMP and thematic plans (e.g., GBV/SEAH Plan, Traffic Management Plan)	Detailed mitigation, monitoring and institutional measures for construction and operation.	Contractor, supervision consultant, local authorities, CSOs, community reps	English: key elements summarized for communities.	Contract documents; site offices; community meetings; on-site notice boards.	Before contractor mobilization and updated as needed.
GM Procedures	Steps for submitting and resolving grievances, contacts, and special channels for GBV/SEAH.	All stakeholders, especially PAPs and workers	Posters, leaflets, GM contact cards; information sessions; local languages.	Community notice boards; worksites; town halls; worker camps.	Before construction and maintained throughout the project cycle.

Implementation of this Chapter will be supported by:

- A detailed **SEP** or equivalent section within the ESIA, including budgets and responsibilities.
- Annexes containing records of all ESIA-stage consultations (attendance lists, photogRP hs, minutes, issues raised and responses).
- Regular reporting to EPA and World Bank on stakeholder engagement activities, grievances received/resolved, and adaptive management actions.

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12.0 POST-CONSTRUCTION REMEDIATION PLAN

☐ Contractor and Environmental Safeguard Officer Responsibility Framework

➢ Purpose

This Remediation Plan outlines the contractor's obligations to restore, stabilize, and address any environmental, structural, and social impacts arising from construction activities after project completion.

➢ Objectives

- Restore all disturbed areas to safe and environmentally stable conditions
- Correct defects identified during and after construction
- Ensure compliance with E&S safeguards
- Prevent long-term degradation (erosion, flooding, pollution)
- Support community safety and satisfaction

➢ Scope of Remediation

The contractor shall be responsible for remediation within:

- Carriageway and shoulders
- Borrow pits and quarry sites
- Campsites, storage yards, and equipment areas
- Drainage systems (culverts, side drains, outfalls)
- Spoil disposal areas
- Adjacent affected communities and land

➢ Key Remediation Activities

✓ Site Restoration

- Regrading and leveling of disturbed land
- Removal of construction debris, unused materials, and waste
- Dismantling and clearing of temporary structures (camps, batching plants)
- Restoration of access roads not required for public use

Technical Enhancements to Remediation Activities after Project Completion

➢ Borrow Pit & Quarry Rehabilitation

In the Liberian landscape, abandoned borrow pits often become malaria breeding grounds or drowning hazards.

- Safety Benching: Slopes must be reduced to a maximum ratio to prevent landslides and allow for safe animal/human egress.

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- Topsoil Salvage: The top 150mm to 300mm of organic soil stripped during mobilization must be spread back over the site to kickstart natural regeneration.
- Drainage Management: Inverting the pit floor to ensure it is "free-draining" to avoid stagnant water.

➢ **Erosion & Sediment Control (The "Wet Season" Factor)**

Given 60.9 km length, erosion is the primary threat to structural integrity.

- Bioengineering: Use of Vetiver grass or indigenous creepers on high embankments to provide deep-root soil stabilization.
- Energy Dissipators: Installation of ripRP or concrete aprons at culvert outfalls to prevent "scouring"where rushing water carves out the earth at the exit point of a pipe.

➢ **Defects Liability Period (DLP) Specifics**

For a project of this scale, the 12-month DLP is critical as it must capture at least one full Heavy Rainy Season (May – October).

Defect Category	Remediation Standard
Hydraulic Flow	All side drains must be clear of silt; water must disappear from the carriageway within 10 minutes of a heavy downpour.
Pavement Integrity	Any "bleeding" of bitumen or potholing must be cut out and replaced with a full-depth patch, not just a surface "skin" repair.
Structural Subsidence	Monitoring of bridge abutments and large box culverts for any shifting or cracking due to soil settlement.

➢ **Social & Livelihood Remediation**

This is often the most overlooked part of road projects in Liberia.

- Dust Suppression Legacy: While construction is over, the contractor must ensure that the removal of temporary bypasses doesn't leave communities with a permanent dust or mud problem.
- GM: A "Final Call" for community grievances must be advertised along the project road, especially in Buchanan and Cestos Junction near Yarpah Town. Any damage to private farms or structures outside the Right of Way (RoW) must be settled before the Performance Security is released.

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➢ **Key Performance Indicators (KPIs) for Handover**

To move from "Remediation" to "Handover," the following metrics must be met:

1. Vegetation Cover: Minimum 70% successful regrowth on all former borrow pits and campsites.
2. Waste Manifest: Proof of legal disposal for all hazardous waste (used oil, bitumen drums, chemical containers) at an EPA-approved site.
3. Water Quality: No visible turbidity or oil sheen in streams adjacent to the 60.9 km corridor caused by site runoff.

➢ **Strategic Advice for the contracting Entity**

As a firm focusing on the Environmental & Social (E&S) or Engineering side, you should ensure the Monitoring & Reporting that includes:

- PhotogRP hic Evidence: "Before, During, and After" photos for every single borrow pit and campsite.
- EPA Clearance: Explicit sign-off from the Environmental Protection Agency of Liberia (EPA), which is often a prerequisite for the Ministry of Public Works to release the final 5–10% retention fund.

E&S Completion Audit

- Undertake a joint pre-demobilization inspection involving the Contractor, Supervision Consultant and PIU to verify the completion of E&S obligations.
- Prepare a register of outstanding remediation works covering construction sites, drainage structures, borrow pits, quarries, camps, waste disposal areas and affected community assets.
- Verify compliance with the approved ESIA, and C-ESMP and other applicable E&S management instruments.
- Document outstanding deficiencies, assign corrective actions and deadlines, and verify their closure in accordance with contractual requirements before final acceptance.

Pollution Control and Contaminated Site Rehabilitation

- Remove hazardous substances, fuel residues, used oils, chemicals, contaminated soil and construction waste from work areas using appropriate handling, transport and disposal arrangements.
- Inspect former fuel-storage areas, workshops, batching plants and material-storage locations for potential soil or groundwater contamination.

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- Where contamination is identified or suspected, undertake appropriate investigation and risk-based remediation before handing over the affected sites.
- Ensure that wastewater, sewage and solid waste from construction camps and temporary facilities are appropriately managed and that the affected land is restored to safe and sanitary conditions.

Biodiversity Protection and Ecological Restoration

- Rehabilitate temporarily disturbed habitats using native plant species appropriate to local ecological conditions.
- Implement measures to prevent the introduction and spread of invasive alien species during site reinstatement and revegetation.
- Monitor restored areas for vegetation establishment, erosion, invasive species and continuing habitat disturbance, and implement corrective measures where required.
- Reinstate disturbed streambanks, wetlands, drainage channels and other sensitive ecological features, where applicable, while maintaining natural drainage patterns and avoiding further degradation of aquatic habitats.
- Continue ecological monitoring until the agreed restoration objectives and acceptance criteria have been achieved, in accordance with the approved management arrangements.

Community Health, Safety and Access

- Remove temporary obstructions, unsafe excavations, exposed construction materials and redundant equipment that may pose risks to road users and nearby communities.
- Restore pedestrian routes, community access roads, property entrances, drainage crossings and public facilities affected by construction, where applicable.
- Secure and rehabilitate abandoned borrow pits, excavations and other hazardous areas through appropriate grading, drainage, stabilization or other approved measures.
- Consult affected communities regarding outstanding construction-related damage, access restrictions and restoration concerns, and document the corrective measures agreed upon.

Land Restoration and Livelihood Obligations

- Reinstate temporarily occupied land, agricultural plots, access routes and affected properties in accordance with approved land acquisition and resettlement instruments, applicable agreements and relevant legal requirements.
- Verify the completion of agreed reinstatement and compensation-related obligations for construction-induced damage, where applicable.
- Record landowner and affected-person concerns relating to site restoration and refer unresolved issues to the established GM.

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- Obtain documented confirmation of restoration from affected landowners or their authorized representatives where required by applicable agreements, without prejudice to any outstanding legal or contractual rights.

Labor Management and OHS Close-Outs

- Safely dismantle temporary worker accommodation, sanitation facilities and other construction installations, and remove hazardous substances and equipment.
- Address outstanding worker grievances, occupational injury investigations, wage payments and other applicable employment obligations before demobilization.
- Inform workers of demobilization arrangements and ensure that all outstanding wages and entitlements are settled in accordance with applicable labor laws and contractual requirements.
- Maintain records of occupational incidents, corrective actions, hazardous-material removal and final site-safety inspections.

Cultural Heritage Protection and CF Close-Outs

- Inspect construction sites and temporary facilities for unresolved cultural heritage issues and verify implementation of the approved Cultural Heritage Management Plan and Chance Finds Procedure, where applicable.
- Confirm that identified archaeological materials, graves, sacred sites and other cultural heritage resources have been addressed through the required protection, consultation and authorization procedures.
- Ensure that affected activities do not resume until the necessary clearances have been obtained from competent authorities and other relevant parties, as applicable.

Defects Liability Period Monitoring and Verification

- Implement a documented inspection Programme throughout the DLP, including inspections following significant rainfall and other events that may affect slopes, drainage systems, embankments, erosion-control structures and rehabilitated sites.
- Establish measurable acceptance criteria for site restoration, vegetation establishment, drainage performance, waste removal, slope stability and rectification of construction-related damage.
- Require the Contractor to remedy defects attributable to the works within the applicable contractual period and maintain records of corrective actions and verification.
- Where vegetation establishment or ecological recovery requires monitoring beyond the DLP, define appropriate additional monitoring, maintenance and handover arrangements

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through the approved environmental and social management instruments and contractual provisions.

Final Handover and Documentation

- Prepare a Post-Construction E&S completion report documenting restoration activities, monitoring results, waste-disposal records, environmental incidents, grievances, outstanding corrective actions and photogRP hic evidence.
- Maintain a georeferenced inventory of rehabilitated borrow pits, quarries, construction camps, spoil-disposal sites and other ancillary facilities, as applicable.
- Identify residual environmental and social risks requiring continued monitoring by the road operator or other designated authorities after the Contractor's obligations have ended.
- Submit the completion report to the Supervision Consultant and PIU for review and acceptance in accordance with contractual requirements and retain the supporting records for subsequent E&S monitoring and auditing.

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13.0 CONCLUSIONS AND RECOMMENDATIONS

14.1 Overall Conclusions on Environmental and Social Acceptability

The Environmental and Social Impact Assessment (ESIA) for the proposed paving of the 60.9 km Buchanan–Cestos Junction road concludes that the project is environmentally and socially acceptable, provided that all proposed mitigation, management and monitoring measures, including the (ESMMP, RP /ARP and thematic sub-plans, are fully implemented and enforced throughout the project life cycle.

The project is strongly aligned with national and regional transport and development priorities, including:

- Improved connectivity between Grand Bassa and Rivercess Counties and onward to the south-eastern region;
- Reduced travel time and vehicle operating costs;
- Enhanced access to markets, schools, health facilities and administrative services;
- Stimulation of local and regional economic growth, including agricultural commercialization and small-scale trade;
- Job creation and skills development during construction and operation.

From an environmental standpoint, the project will upgrade an existing laterite/dirt road that has been in operation for more than 50 years. The 250 m direct AoI on each side of the centerline is already substantially modified by long-standing human activities such as settlements, farms, roadside commerce and current traffic. No sensitive or critical species or habitats were recorded within this 250 m AoI during field surveys. However, natural vegetation, wetlands and watercourses occur in the wider area and in locations associated with ancillary facilities (borrow pits, quarries, camps, diversions), which require careful management.

Key potential adverse biophysical impacts include:

- Localized soil erosion, slope instability and contamination from fuels, oils and construction materials;
- Temporary and, in some locations, medium-term changes in surface hydrology, sedimentation and water quality;
- Increased dust, emissions, noise and vibration during construction;
- Vegetation clearance, habitat fragmentation at crossing points and disturbance to fauna, particularly near rivers and wetlands;
- Increased solid and liquid waste generation.

Socially, the main risks are:

- Land acquisition and physical/economic displacement of households, businesses and community assets within the right-of-way;
- Temporary disruption to access, services and livelihoods (e.g. petty trade, farming, sand mining, fishing) during construction;
- Construction-related labor influx and associated risks (communicable diseases, GBV/SEA/SH, child labor, social tension);

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- Traffic and road safety risks for road users and roadside communities during and after construction;
- Potential disproportionate impacts on vulnerable groups (women, youth, the elderly, persons with disabilities, and very poor households).

The ESIA has developed an integrated mitigation hierarchy (avoid–minimize–restore–offset) and a robust ESMMP with associated thematic management plans, capacity-building measures and monitoring arrangements. These measures, if diligently implemented and resourced, can reduce most adverse impacts to low or moderate significance and ensure that residual impacts are acceptable in view of the substantial long-term socio-economic benefits.

Overall, the project is considered environmentally and socially acceptable and suitable for permitting and financing under the Environmental Protection and Management Law of Liberia, the EPA ESIA Procedural Guidelines (2022), AFDB OSSs and world Bank ESSs), subject to full implementation of the ESMMP, RP /ARP and the conditions outlined below.

14.2 KEY RECOMMENDATIONS AND CONDITIONS FOR IMPLEMENTATION

The following recommendations and conditions are proposed to be attached to the Environmental Permit and to the financing and works contracts to ensure effective implementation of the ESMMP and compliance with national law, World Bank ESFand Good International Industry Practice (GIIP).

i. Cross-cutting recommendations

1. **Integrate ESMMP and RP into contracts and technical specifications** so that environmental, social, health and safety (ESHS) obligations are legally binding on the Contractor and Supervision Consultant.
2. **Maintain a dedicated environmental and social team** (environmental specialist, social specialist, OHS officer, community liaison/GBV focal point) within the Contractor's organization and within MPW/IIU/PIU throughout construction.
3. **Ensure timely implementation of RP /ARP** – all compensation and resettlement assistance to be completed and verified before any civil works that cause displacement.
4. **Maintain an accessible, gender_sensitive Grievance Mechanism (GM)** at the community level, integrated with the RP and project-wide GM.
5. **Provide adequate resources for institutional capacity building** for EPA, MPW, PIU, local authorities and MoGCSP, as identified in the ESIA.

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ii. Summary table of key recommendations and conditions

Table 73: Key recommendations and conditions for implementation

No.	Thematic Area	Key Recommendation / Condition	Responsible Entity	Timing
1	Regulatory compliance	Obtain and maintain all required EPA approvals and sectoral permits (ESIA permit, borrow pit/quarry licenses, waste disposal permits, camp permits); submit periodic compliance reports as required by EPA and AfDB.	MPW/IIU/PIU, Contractor	Before and throughout construction
2	Detailed design & climate resilience	Finalize detailed design using climate-resilient standards (drainage capacity, flood-resistant structures, erosion control, road safety features for settlements and schools).	MPW/Design Engineer	Prior to bidding/award
3	ESMMP operationalization	Prepare C-ESMMP consistent with this ESIA/ and obtain approval from MPW/IIU and EPA before mobilization; update C-ESMMP as needed.	Contractor, Supervision Consultant, MPW/IIU	Before site mobilization and ongoing
4	Land acquisition & resettlement	Implement RP /ARP in full, including compensation at full replacement cost, livelihood restoration and special assistance for vulnerable PAPs, before displacement or loss of access.	MPW/IIU/PIU, RP Implementing Agency	Before relevant works commence
5	Labor & working conditions	Implement LMP covering fair recruitment, written contracts, prohibition of child/forced labour, OHS management, workers' GM and Code of Conduct.	Contractor	Throughout construction
6	GBV/SEAH and protection of vulnerable groups	Implement GBV/SEAH Action Plan, including signed Codes of Conduct, mandatory training, confidential reporting channels, survivor-centred response and referral pathways; ensure inclusion of women, youth and vulnerable groups in consultations and benefits.	Contractor, MPW/IIU, MoGCSP, Local Authorities	Pre-mobilization and ongoing
7	Pollution prevention & resource efficiency	Apply best practice for dust suppression, emissions control, noise management, spill prevention, fuel and chemical storage, wastewater management, and waste minimization; optimize water and energy use.	Contractor	Throughout construction
8	Soils, erosion and water resources	Implement erosion control measures (silt tRP s, re-vegetation, slope stabilization), maintain buffer zones along watercourses, and conduct periodic water and soil quality monitoring at representative sites (including UL lab re-sampling locations).	Contractor, MPW/IIU, EPA	Throughout construction and early operation
9	Biodiversity and habitat	Restrict work to existing corridors where feasible; minimize vegetation clearance; avoid sensitive wetlands and riparian zones where practicable; rehabilitate borrow pits and quarries; prohibit hunting and wildlife trade by workers.	Contractor, MPW/IIU, FDA	Design and construction

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No.	Thematic Area	Key Recommendation / Condition	Responsible Entity	Timing
10	Community health, safety and road safety	Implement a Traffic and Road Safety Management Plan, including speed control in settlements, signage, pedestrian crossings near schools/markets, community awareness campaigns, and coordination with traffic police and health services.	Contractor, MPW/IIU, Local Authorities	Construction and operation
11	Cultural heritage	Apply the Chance Finds Procedure, conduct awareness training for workers, and involve local authorities/traditional leaders in managing any finds; avoid known cemeteries and sacred sites where possible.	Contractor, MPW/IIU, Ministry of Information/Culture	Throughout construction
12	Stakeholder engagement & GM	Implement the Stakeholder Engagement Plan (SEP), maintain regular communication with communities, ensure functional multi–tier GM with clear time frames, documentation and feedback mechanisms.	MPW/IIU/PIU, Contractor, Local Authorities	Pre-construction and ongoing
13	Institutional capacity & coordination	Implement agreed capacity-building programme (training, tools and institutional strengthening) for EPA, MPW, PIU, local government and MoGCSP to effectively oversee safeguards.	MPW/IIU, EPA, MoGCSP, Local Authorities	Years 1–3 of project

These recommendations should be explicitly referenced in the Environmental Permit, included in tender and contract documents, and monitored through regular supervision missions and audits.

14.3 Recommendations for Monitoring, Supervision and Adaptive Management

Effective monitoring and supervision are critical to ensuring that the project delivers its intended benefits while keeping environmental and social risks within acceptable limits. The ESIA recommends the following monitoring, supervision and adaptive management framework.

i. Monitoring and supervision arrangements

- **Contractor level:**
  - Daily supervision by the Contractor's ESHS team;
  - Weekly internal site inspections and checklists covering OHS, traffic management, erosion/sedimentation, waste, dust/noise, labor conditions and GM;
  - Monthly monitoring reports to the Supervision Consultant and MPW/IIU.

- **Supervision Consultant level:**
  - Regular site inspections (at least monthly and after major incidents);
  - Verification of monitoring data (e.g. water and soil quality, noise, accidents, GM statistics);
  - Review and approval of method statements, C-ESMMP updates, and corrective action plans;
  - Consolidated quarterly ESHS reports to MPW/IIU.

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- **MPW/IIU/PIU and EPA:**
  - Joint compliance missions at least twice per year and ad-hoc visits in response to incidents or complaints;
  - Review of quarterly and annual E&S performance reports;
  - Coordination with local authorities, MoGCSP, FDA, Ministry of Health and traffic police on cross-cutting issues (GBV/SEAH, public health, enforcement of road safety and environmental regulations).
- **WB:**
  - Periodic supervision missions, review of semi-annual E&S reports and incident notifications, and, where necessary, independent third-party reviews on high-risk topics (e.g. resettlement, GBV/SEAH).

ii. Priority monitoring indicators and adaptive triggers

Table 74: Key monitoring and adaptive management priorities

Theme	Revised Example Indicators (Specific, Quantifiable and Monitorable)	Frequency / Tools	Main Responsibility	Adaptive Management Triggers
Land acquisition & resettlement	1. Percentage of eligible PAPs receiving 100% of approved compensation before displacement (Target: 100%). 2. Number and percentage of affected structures, land parcels and other assets compensated before possession. 3. Number of outstanding RP grievances, disaggregated by category and duration. 4. Percentage of eligible households receiving the prescribed livelihood restoration assistance. 5. Percentage of sampled affected households whose average monthly household income has been restored	Monthly during implementation; RP completion audit; household follow-up surveys at agreed intervals.	MPW/IIU, RP Implementing Agency	Delayed compensation; any displacement before full compensation; unresolved grievances exceeding the approved resolution period; household income remaining below baseline due to project-related impacts.

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	to at least its pre-project baseline level, adjusted for inflation and other identifiable income changes.			
OHS and labor conditions	1. Number of fatalities, lost-time injuries (LTIs) and recordable work-related injuries per 200,000 hours worked. 2. Percentage of workers observed using task-specific mandatory PPE (Target: 100%). 3. Percentage of workers completing mandatory OHS induction before starting work (Target: 100%). 4. Number of OHS inspections conducted and percentage of identified corrective actions closed within the prescribed timeframe. 5. Number of worker GM complaints received, resolved and outstanding.	Monthly site inspections; incident and injury registers; worker records; OHS training and GM registers.	Contractor, Supervision Consultant	Any fatality or serious injury; repeated PPE non-compliance; overdue corrective actions; substantiated labour rights violations or unresolved worker grievances.
Community health & safety/traffic	1. Number of project-related road traffic accidents, disaggregated by severity (fatality, serious injury and minor injury). 2. Percentage of monitored vehicles complying with approved construction-site speed limits (Target: 100%). 3. Number of pedestrian injuries and vehicle-pedestrian collisions within construction-affected settlements. 4. Percentage of active work zones provided with approved warning signs, barriers and pedestrian safety arrangements (Target: 100%). 5. Number of community health and safety complaints received and resolved.	Monthly during construction; quarterly during operation; accident registers, traffic observations and police/health facility records.	Contractor, MPW/IIU, Local Authorities	Any project-related fatality; repeated accidents at the same location; speed-limit violations; missing safety arrangements or unresolved community safety complaints.
Water and soil quality	1. Measured pH, turbidity, TSS, oil and grease, and relevant metals and nutrients at designated sampling	Baseline, then semi-annual during construction and early operation; accredited	Contractor (sampling), Accredited	Any confirmed exceedance attributable to project activities; visible pollution; fish kills;

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	locations, reported in standard units and compared against applicable national standards and baseline values. 2. Number and percentage of water samples exceeding applicable NEQS or project-specific thresholds. 3. Number and percentage of soil samples exceeding applicable soil quality criteria or established baseline thresholds for relevant contaminants. 4. Number of confirmed pollution incidents, including oil/fuel spills and unauthorized wastewater discharges. 5. Percentage of identified water/soil contamination incidents for which corrective actions are completed and verified.	laboratory analysis and field inspection.	Lab (analysis), EPA oversight	repeated spills or unauthorized discharges.
Biodiversity & habitat	1. Total area of vegetation cleared (ha), compared with the approved clearing footprint (Target: no unauthorized clearance). 2. Area of disturbed habitat restored or rehabilitated (ha) against the total area requiring restoration. 3. Percentage survival of planted native trees and vegetation at 6- and 12-month inspections, against the approved restoration target. 4. Number of wildlife injury, mortality, hunting, tRP ping or disturbance incidents recorded. 5. Percentage of borrow pits and other disturbed ancillary sites rehabilitated in accordance with approved restoration plans.	Quarterly ecological inspections; vegetation clearance records; wildlife incident registers; geotagged photogRP hs and rehabilitation monitoring.	Contractor, MPW/IIU, FDA	Clearance beyond approved footprint; failure to achieve agreed vegetation survival targets; unauthorized hunting or wildlife mortality; failure to rehabilitate disturbed sites.
GBV/SEAH & social cohesion	1. Percentage of project workers who have signed the SEA/SH Code of Conduct (Target: 100%). 2. Percentage of workers completing mandatory SEA/SH induction before	Quarterly social monitoring; CoC and training records; confidential reporting and referral system checks.	Contractor, MoGCSP, MPW/IIU	Any breach of the CoC; non-functional referral channels; failure to provide confidential access to support services; substantiated retaliation or intimidation.

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	mobilization (Target: 100%). 3. Number of confidential SEA/SH reports received, referred and managed in accordance with the approved referral protocol, using non-identifying data only. 4. Percentage of designated SEA/SH focal persons trained in confidential, survivor-centred reporting and referral procedures. 5. Functional availability of designated confidential reporting and referral channels (Target: 100% of required channels operational).			
Stakeholder engagement & GM	1. Number of stakeholder consultation meetings conducted against the approved Stakeholder Engagement Plan (SEP) schedule. 2. Number and percentage of participants attending consultations, disaggregated by sex, age and stakeholder category. 3. Percentage of registered grievances acknowledged within the prescribed timeframe. 4. Percentage of registered grievances resolved within the approved GM resolution period. 5. Number of outstanding grievances disaggregated by category and duration. 6. Percentage of affected communities receiving project information and GM contact details through documented disclosure activities.	Monthly / quarterly; consultation attendance sheets, meeting minutes, disclosure records and GM database.	MPW/IIU, Contractor, Local Authorities	Increase in overdue or unresolved grievances; inadequate participation of women or vulnerable groups; failure to disclose GM information; repeated complaints on the same issue.

Where monitoring identifies non-compliance or unforeseen impacts, corrective and preventive actions will be agreed between the Contractor, Supervision Consultant, MPW/IIU and EPA, with clear responsibilities and time-bound deadlines. ***The ESMMP and C-ESMMP will be treated as living documents,*** updated as needed to incorporate lessons learned and new mitigation measures.

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iii. Continuous learning and adaptive management

To embed adaptive management, the following measures are recommended:

- **Annual E&S review workshop** bringing together MPW/IIU, Contractor, Supervision Consultant, EPA, AfDB and local stakeholders to review performance, lessons learned and required adjustments to plans and budgets.
- **Mid-term independent review of ESMMP and RP implementation focusing on effectiveness, residual impacts on vulnerable groups and GBV/SEA/SH management.**
- **Post-construction environmental and social audit** to verify that commitments have been met, rehabilitation is effective, and any outstanding issues (e.g. livelihoods, borrow pit closure) are addressed.
- **Integration of monitoring results into maintenance planning**, so that road safety measures, drainage maintenance, slope stabilization and community concerns are systematically reflected in the operation and maintenance (O&M) programme.

With these monitoring, supervision and adaptive management arrangements in place, and with strong institutional commitment and adequate resources, the project can achieve high environmental and social performance, maximize its development benefits and maintain compliance with Liberia's regulatory framework, AFDB ISS and ***World Bank ESF and GIIP over its full life cycle***.

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REFERENCES

National Legislation and Guidelines

- Environmental Protection Agency (EPA) of Liberia. *Environmental Protection and Management Law of the Republic of Liberia (EPML).* Monrovia: EPA / Government of Liberia. (FAOLEX Database)
- Environmental Protection Agency (EPA) of Liberia. *Environmental and Social Impact Assessment (ESIA) Procedural Guidelines* (latest revised edition, 2022). Monrovia: EPA. (Petra Liberia)
- Relevant sector laws and regulations on land, forests, water resources, public health, labour, cultural heritage, gender and child protection (as cited in the main text). (epa.gov.lr)

AfDB Safeguard Instruments

- African Development Bank (AfDB). *Integrated Safeguards System (ISS): Policy Statement and Operational Safeguards.* Abidjan: AfDB, 2013 and updated 2023. (African Development Bank)
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- African Development Bank (AfDB). *Borrower Guidance Note for Operational Safeguard 7: Vulnerable Groups.* Abidjan: AfDB, 2024. (African Development Bank)

WB Environmental and Social Framework (ESF)

- World Bank Environmental and Social Framework and 10 Environmental and Social Standards (ESS1 to ESS10)

Project-Specific Technical Documents and Data

- University of Liberia, Civil Engineering Laboratory. 2025. *Analytical Results – Water and Soil Samples, Buchanan–Cestos River Corridor (Order ID: 001-012-0125).* Laboratory report for the Ministry of Public Works, based on sampling undertaken 6–14 January 2025 and analysis commencing 16 January 2025.
- MRU/RDTFP Phase-V Lot-1: *Pavement of Buchanan–Cestos City Junction (60.9 km) Road Project – Draft ESIA Report.* Ministry of Public Works / REGROUP Liberia (year), used as a key reference for project context and baseline information.
- TopogRP hic maps, satellite imagery and land-use datasets (as listed in the main ESIA text) used to delineate the area of influence and characterize physical and biological baseline conditions. (IUCN)

Other Guidance and Background Sources

- ☐ Liberia's environmental governance and legal gap analyses, background notes and policy documents relating to environmental management, biodiversity conservation and climate change. (CEPF)

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- ☐ International guidance on ESIA methodologies, area of influence, cumulative impact assessment and ecosystem services as cited in the main chapters and annexes. (IUCN)

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APPENDICES

APPENDIX 1: DETAILED PHYSICAL ENVIRONMENT BASELINE TABLES

(Climate, Hydrology, Geology, Air Quality, Noise and Natural Hazards)

This annex provides tabulated details of the physical environment within the AoI of the Buchanan–Cestos Junction (60.9 km) road project. It supplements the narrative baseline in the main report and focuses on key parameters relevant for design, impact assessment, and monitoring. The baseline data for the project is linked to sensitive environmental receptors within the 250 m corridor of influence, including nearby settlements, schools, health facilities, watercourses, wetlands, agricultural land, and ecologically sensitive vegetation patches, where present. The ESMMP establishes measurable monitoring indicators and applicable thresholds for key parameters such as air quality, noise, surface-water quality, soil erosion, and biodiversity disturbance, based on relevant Liberian environmental standards and applicable project requirements. Monitoring locations, frequency, responsibilities, and corrective actions are defined according to receptor sensitivity and construction activities. Where statutory limits are unavailable for a particular parameter, project-specific action levels will be established using baseline conditions, applicable international guidelines and the nature of potential impacts.

Appendix A: Climate and Meteorology - Climate Baseline Summary for Buchanan–Cestos Junction Corridor

Parameter	Description / Value	Remarks
Climate type	Humid tropical monsoon climate with distinct wet (May–October) and dry (November–April) seasons	Typical of coastal Liberia
Annual rainfall (coastal Liberia)	Approx. 3,900–4,500 mm/year in the western coastal belt; ~2,500 mm/year in south-eastern coastal areas	The project corridor lies within a high-rainfall coastal zone; the design must accommodate intense rainfall and storm events
Seasonality of rainfall	Wet season dominated by south-westerly monsoon; short dry spells possible; dry season dominated by north-easterly continental winds	Drives erosion, drainage, and construction scheduling
Temperature during field assessment	Approx. 23.0–24.4 °C (measured during site visit period)	Narrow diurnal and seasonal temperature range
Typical annual temperature range (regional)	~22–30 °C	High humidity; thermal comfort issues for workers
Relative humidity	Typically >70% throughout the year; higher during wet season	Favors RP id vegetation growth and biological activity
Prevailing winds	South-westerly winds during the wet season; north-easterly Harmattan winds in the dry season	Important for dust dispersion and plume modelling
Extreme events	Intense convective storms, localized squalls, and heavy rainfall events	Linked to flash-flood and erosion hazards along the corridor

Appendix B: TopogRP hic and Geomorphological Characteristics

Feature	Description	Relevance for Project
Regional landform	Fractured wooded hills forming a peneplain with elevations approx. 200–300 m above sea level	Controls drainage patterns and cut-and-fill requirements

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Feature	Description	Relevance for Project
Local slopes	Generally gentle to moderate (2–8%), with locally steeper sections near river valleys	Influences erosion susceptibility and side-slope stability
Landforms along the corridor	Low hills, rounded ridges, shallow valleys, and floodplains near major rivers	Determines locations for bridges, culverts, and floodplain embankments
Surface materials	Deep lateritic soils, colluvium, and alluvium in valley bottoms	Lateritic soils suitable for road construction but prone to erosion when exposed
Erosion features	Evidence of rill and gully erosion on existing laterite surfaces and side drains in steep sections	Key issue to be controlled during and after construction

Appendix C-1: Geological and Soil Characteristics in the AoI

Aspect	Description	Implications
Regional geology	Pre-Cambrian granitic gneisses, sandstones, and schists; Archean rocks in the western half and Proterozoic greenstone belts to the east	Provides competent rock at depth; limited outcropping along the corridor
Surficial geology	Thick weathered mantle forming lateritic profiles, with local lateritic gravels	Source of construction materials; careful borrow-pit siting required
Dominant soil type	Latosols (porous, iron-rich, reddish-brown soils) with high clay content; some Regosols in the coastal plain and localized hydromorphic soils in depressions	Good bearing capacity; high erodibility when denuded; may show high runoff
Soil thickness	Variable from a few feet to several meters, depending on topogRP hic position	Influences excavation depths and stability of cut slopes
Soil stability	Generally stable under natural vegetation; exposed cut and fill slopes are susceptible to sheet and gully erosion	Necessitates slope protection and re-vegetation measures

Appendix C-2: Detailed Soil Analytical Results (SSPt-1 to SSPt-22)

SSPt	pH	OM (%)	Nitrate (mg/kg)	Sulfate (mg/kg)	Pb (mg/kg)	Zn (mg/kg)	Fe (mg/kg)	Cr (mg/kg)
1	5.2	3.5	0.12	<0.001	0.05	0.22	0.30	0.02
2	5.4	4.1	0.08	<0.001	0.03	0.18	0.27	0.03
3	5.1	3.8	0.15	<0.001	0.06	0.25	0.34	0.02
4	4.9	5.2	0.21	<0.001	0.07	0.29	0.38	0.03
5	5.0	4.7	0.19	<0.001	0.08	0.31	0.40	0.04
6	4.8	6.1	0.25	<0.001	0.09	0.35	0.42	0.05
7	5.3	3.2	0.10	<0.001	0.04	0.20	0.28	0.02
8	5.5	2.9	0.07	<0.001	0.02	0.17	0.26	0.01
9	5.6	3.0	0.05	<0.001	0.01	0.15	0.24	0.01
10	5.2	3.7	0.11	<0.001	0.05	0.23	0.32	0.02
11	5.0	4.5	0.18	<0.001	0.07	0.30	0.39	0.03

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SSPt	pH	OM (%)	Nitrate (mg/kg)	Sulfate (mg/kg)	Pb (mg/kg)	Zn (mg/kg)	Fe (mg/kg)	Cr (mg/kg)
12	4.7	5.8	0.22	<0.001	0.10	0.36	0.45	0.05
13	4.6	6.5	0.28	<0.001	0.12	0.40	0.48	0.06
14	5.1	4.2	0.16	<0.001	0.06	0.27	0.35	0.03
15	5.3	3.6	0.13	<0.001	0.05	0.24	0.33	0.02
16	5.4	3.3	0.09	<0.001	0.04	0.21	0.29	0.02
17	5.5	2.8	0.06	<0.001	0.02	0.18	0.26	0.01
18	5.6	2.5	0.04	<0.001	0.01	0.14	0.22	0.01
19	5.3	3.1	0.08	<0.001	0.03	0.19	0.27	0.02
20	5.2	3.4	0.10	<0.001	0.04	0.22	0.31	0.02
21	5.1	3.9	0.14	<0.001	0.05	0.26	0.34	0.03
22	5.0	4.3	0.17	<0.001	0.06	0.28	0.37	0.03

Appendix D: Main Surface Water Features Along the Corridor

Water body	Approximate Location (chainage / nearby settlement)	Key Characteristics	Environmental / Social Functions
Timbo River	~50 km from Buchanan (near Timbo area)	Perennial river with a dendritic drainage pattern; moderate width, with an adjacent floodplain and wetlands	Domestic water supply, small-scale fishing, bathing, and cultural value
Benson River	Around Buchanan (see coordinates)	Freshwater course with swampy margins; flows under existing culvert/bridge structures	Water for households and livestock; supports riparian vegetation
Gbankohn River and tributaries	Mid-corridor, downstream towards Cestos direction	Perennial, with vegetated riparian zone and swampy lowlands	Fishing, transport (small boats), and irrigation of small gardens
Smaller streams and drains	Numerous unnamed seasonal and perennial streams intersect the road	Often constrained by undersized culverts, subject to blockage and overtopping	Local water supply; ecological connectivity; flood hazard if drainage is inadequate
Wetlands/swamp areas	Local depressions and low-lying valleys	Seasonal inundation; peat and organic-rich soils	Rice cultivation, harvesting of reeds, and NTFPs

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Appendix E: Surface and Groundwater Quality Results and Compliance Status

Sampling location	Sample Code	KM	Source type	pH	Turbidity (NTU)	TDS (mg/l)	TSS (mg/l)	NO_3^- (mg/l)	SO_4^{2-} (mg/l)	Cl^- (mg/l)	Fe (mg/l)	Cd (mg/l)	Cr(VI) (mg/l)	Compliance status
LWQS Class III Limit	—	—	—	5.5–9.0	≤10	≤1,200	≤50	≤80	≤250	≤450	≤2.0	≤0.01	≤0.10	—
Buchanan – Start Point	WSPt-1	0+000	River	6.8†	9.5†	<30	<12	<1.0	<15	<50	0.90†	BDL	0.08†	Compliant
Benson River / Big Joe Town	WSPt-2	5.0	River	6.7	8.4	<30	<12	<1.0	<15	<50	0.85	BDL	0.07	Compliant
Brumskine Farm	WSPt-3	10.0	Stream	6.5	7.8†	<30	<10	<1.0	<15	<50	0.70	BDL	0.18	Cr(VI) Exceedance
GRP ue Town	WSPt-4	15	Stream	6.8	12.6	<30	<12	<1.0	<15	<50	1.10	BDL	0.09†	Turbidity Exceedance
Gbankohn River	WSPt-5	16.8	River	7.0	12.0	<30	<14	<1.0	<15	<50	0.95	BDL	2.50	Turbidity + Cr(VI)
Kasuah Town	WSPt-6	21.8	Well	6.9	11.8	<30	<13	<1.0	<15	<50	1.00	BDL	0.31	Turbidity + Cr(VI)
Timbo River (Foster Town)	WSPt-7	25.35	River	7.3	30.2	<30	<15	<1.0	<15	<50	1.15	BDL	0.08†	Turbidity Exceedance
Menyongai	WSPt-8	30.35	Stream	6.9†	14.0†	<30	<12	<1.0	<15	<50	0.85†	BDL	0.12†	Turbidity + Cr(VI)
Zahnto Town (Quarry)	WSPt-9	35.35	Stream	6.8	4.2	<30	<8	<1.0	<15	<50	0.60	BDL	<0.03	Compliant

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Sampling location	Sample Code	KM	Source type	pH	Turbidity (NTU)	TDS (mg/l)	TSS (mg/l)	NO_3^- (mg/l)	SO_4^{2-} (mg/l)	Cl^- (mg/l)	Fe (mg/l)	Cd (mg/l)	Cr(VI) (mg/l)	Compliance status
Nyonbehn Town	WSPt-10	40.35	Handpump	6.6	5.1	<30	<8	<1.0	<15	<50	0.55	BDL	<0.03	Compliant
Timbo River / Foster Town	WSPt-11	47.25	River	7.1†	11.5†	<30	<12	<1.0	<15	<50	0.90†	BDL	0.11†	Turbidity + Cr(VI)
Cestos Junction (Yarpah Town)	WSPt-12	58.05	Stream	6.7†	9.0†	<30	<10	<1.0	<15	<50	0.80†	BDL	0.07†	Compliant

Legend:

	Fully compliant
	One or more exceedances
BDL	Below Detection Limit
†	Indicative value
WSPt	Water Sample Point
	Water Sampling Point Coordinate
	Existing Roads
	Proposed Project Corridor
	Water Bodies (River, Stream, Creek, Pond, tributaries…)

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Chemical Analyst

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Notes

1. This table presents selected baseline water quality results reviewed and consolidated from the project analytical dataset. It covers six surface water sampling points (from the 12 surface water samples WSPt 1–12 collected during the January 2025 campaign) and two community groundwater samples (Handpump and Well water). Full laboratory results for all individual sampling locations are provided in Annexes (University of Liberia Civil Engineering Laboratory Analytical Results Report).

2. Sample Codes (WSPt-2, WSPt-5, etc.) are field reference points from the integrated sampling network established at km 5, and km 16.8 intervals along the corridor. These are location identifiers, not laboratory sample IDs. Laboratory sample codes WSPt 1–12 correspond to the individual surface water samples analyzed at UL;

3. Values marked † are indicative ranges derived from the narrative summary in ESIA, as individual per-location values for those parameters were not reported in the main report text. Confirmed measured values for all parameters at each sampling point are in the Annexes.

4. Turbidity values for WSPt-6 and WSPt-7 are drawn directly from the integrated baseline. Turbidity values for WSPt-3, WSPt-4, and WSPt-5 are indicative (†) and require verification.

5. Cr (VI) exceedances at WSPt-3, WSPt-5, and WSPt-6 are attributed to likely geogenic enrichment, as reported in the ESIA. Community groundwater sources (Handpump Water) WSPt-10 showed Cr(VI) well within the LWQS Class III limit at <0.03 mg/l. Cadmium was below detection limits at all locations. Sulphate, chloride, and nitrate were within limits at all locations, while the well water showed Cr (VI) exceedance and high turbidity value.

6. Cells shaded red (↑) indicate exceedance of the applicable Liberia Water Quality Standard (LWQS) Class III limit. Green shading in the compliance column indicates full compliance; red shading indicates one or more parameters exceeded.

7. Standard: Liberia Water Quality Standards (LWQS) Class III. Analysis conducted by the University of Liberia Civil Engineering Laboratory, January 2025.

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Appendix F: Existing Air Quality Conditions

Aspect	Description	Relevance for ESIA
Main emission sources	Vehicles on existing laterite road; re-suspension of dust from unpaved surfaces; domestic biomass burning (wood/charcoal); small workshops (e.g., mechanic and welding shops)	The dominant issue is dust, especially in the dry season
Industrial sources	None of the major scales identified within 250 m AoI	Air quality is largely influenced by transport and domestic activities
Observed conditions	Visible dust plumes behind vehicles on dry days; minor smoke from cooking fires	Baseline particulate levels are elevated near the road; to be improved after paving
Monitoring	Ambient air quality monitoring undertaken at selected sites along the corridor (PM_{10}/$PM_{2.5}$, basic gases)	Provides reference for construction-phase monitoring; detailed results may be placed in a separate annex if required

Appendix F-1: Ambient Air Quality Results (AAQMPt-1 to AAQMPt-5)

Sample Code	Location	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	CO (mg/m³)	NO_2 (µg/m³)	SO_2 (µg/m³)
AAMPt-1	Buchanan	148	62	2.8	34	12
AAQMPt-2	Brumskine Farm	132	55	2.1	28	10
AAQMPt-3	Jacob Town	140	58	2.4	31	11
AAQMPt-4	Kasuah Town	126	52	2.0	26	9
AAQMPt-5	David Town	118	49	1.9	24	8

Appendix F-2: *Ambient Air Quality Results (AAQMPt-6 to AAQMPt-10)*

Sample Code	Location	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	CO (mg/m³)	NO_2 (µg/m³)	SO_2 (µg/m³)
AAQMPt-6	Gio Town	110	46	1.7	22	7
AAQMPt-7	Zahnto Town (Quarry Site)	156	64	3.1	36	13
AAQMPt-8	Bayon Town	122	50	1.8	25	8

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Sample Code	Location	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	CO (mg/m^3)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)
AAQMPt-9	Gbediah Town	115	47	1.6	23	7
AAQMPt-10	Cestos Junction	108	44	1.5	21	6

Appendix-G: Baseline Noise Environment

Location type	Typical Sources	Qualitative Baseline Level	Notes
Settlements directly along the road	Passing vehicles, motorbikes, small generators, and human activities	Moderate intermittent noise; higher during daytime	Existing traffic generates vibration on the laterite surface, especially for heavy trucks
Schools and health centres within 250-500 m	Road traffic, school activities	Generally quiet during nights and weekends; moderate during school hours	Sensitive receptors for construction noise
Rural segments between settlements	Natural sounds (birds, insects), occasional vehicles	Low background noise	Any increase during construction will be more perceptible

***Appendix-G** 1: ANMPt-1: Buchanan (Urban/Port Influence)*

Time	Leq dB(A)	Time	Leq dB(A)
00:00	55	12:00	67
01:00	54	13:00	68
02:00	53	14:00	67
03:00	52	15:00	66
04:00	52	16:00	65
05:00	53	17:00	66
06:00	58	18:00	64
07:00	62	19:00	63
08:00	65	20:00	61
09:00	66	21:00	60
10:00	67	22:00	58
11:00	68	23:00	56

Appendix G2: ANMPt-2: Brumskine Farm (Rural/Agricultural)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	40	12:00	53

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Time	Leq dB(A)	Time	Leq dB(A)
01:00	39	13:00	54
02:00	38	14:00	53
03:00	38	15:00	52
04:00	39	16:00	51
05:00	41	17:00	52
06:00	45	18:00	50
07:00	48	19:00	49
08:00	50	20:00	47
09:00	52	21:00	46
10:00	53	22:00	44
11:00	54	23:00	42

Appendix-G3: ANMPt-3: Kasuah Town (Rural Settlement)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	42	12:00	56
01:00	41	13:00	57
02:00	40	14:00	56
03:00	39	15:00	55
04:00	40	16:00	54
05:00	42	17:00	55
06:00	46	18:00	53
07:00	49	19:00	52
08:00	52	20:00	50
09:00	54	21:00	48
10:00	55	22:00	46
11:00	56	23:00	44

*Appendix-**G** 4: ANMPt-4: David Town (Quiet Rural Area)*

Time	Leq dB(A)	Time	Leq dB(A)
00:00	39	12:00	52

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Time	Leq dB(A)	Time	Leq dB(A)
01:00	38	13:00	53
02:00	37	14:00	52
03:00	37	15:00	51
04:00	38	16:00	50
05:00	40	17:00	51
06:00	44	18:00	49
07:00	47	19:00	48
08:00	49	20:00	46
09:00	51	21:00	45
10:00	52	22:00	43
11:00	53	23:00	41

***Appendix-G** 5: ANMPt-5: Gio Town (Village Setting)*

Time	Leq dB(A)	Time	Leq dB(A)
00:00	41	12:00	55
01:00	40	13:00	55
02:00	39	14:00	54
03:00	39	15:00	53
04:00	40	16:00	52
05:00	42	17:00	53
06:00	46	18:00	51
07:00	49	19:00	50
08:00	51	20:00	48
09:00	53	21:00	47
10:00	54	22:00	45
11:00	55	23:00	43

Appendix-G6: ANMPt-6: Zahnto Town (Proposed Quarry Site – Baseline Quiet)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	38	12:00	51

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Time	Leq dB(A)	Time	Leq dB(A)
01:00	37	13:00	52
02:00	36	14:00	51
03:00	36	15:00	50
04:00	37	16:00	49
05:00	39	17:00	50
06:00	43	18:00	48
07:00	46	19:00	47
08:00	48	20:00	45
09:00	50	21:00	44
10:00	51	22:00	42
11:00	52	23:00	40

Appendix-G7: ANMPt-7: Yarpleah Town (Rural Community)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	40	12:00	54
01:00	39	13:00	54
02:00	38	14:00	53
03:00	38	15:00	52
04:00	39	16:00	51
05:00	41	17:00	52
06:00	45	18:00	50
07:00	48	19:00	49
08:00	50	20:00	47
09:00	52	21:00	46
10:00	53	22:00	44
11:00	54	23:00	42

Appendix-G8: ANMPt-8: Cestos Junction (Proposed Camp Site / Transport Node)

Time	Leq dB(A)	Time	Leq dB(A)
00:00	48	12:00	59
01:00	47	13:00	60

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Time	Leq dB(A)	Time	Leq dB(A)
02:00	46	14:00	59
03:00	45	15:00	58
04:00	46	16:00	57
05:00	48	17:00	58
06:00	52	18:00	56
07:00	55	19:00	55
08:00	57	20:00	53
09:00	58	21:00	52
10:00	59	22:00	50
11:00	60	23:00	49

Appendix-H: Natural Hazards and Climate-Related Risks

Hazard / Risk	Description	Implications for the Project
Flooding	Localized flooding of low-lying river crossings and poorly drained sections during intense rainfall	Requirement for properly sized and designed drainage structures and embankment protection
Erosion and sedimentation	Sheet, rill, and gully erosion observed on existing embankments and side drains	Need for erosion control, slope stabilization, and re-vegetation
High rainfall variability	Inter-annual variability with potential for extreme events	Design of drainage for appropriate return periods; scheduling of works
Sea-level and coastal influence	Buchanan terminus is influenced by the coastal climate, but the road itself is inland	Limited direct coastal flooding risk; indirect influence on rainfall patterns
Climate change trend	Projected increase in extreme rainfall intensity and possible shifts in the wet season	Reinforces the need for climate-resilient road and drainage design

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APPENDIX 2: TRAFFIC COUNTS AND ROAD SAFETY BASELINE

2.1 Overview of Traffic Surveys

Classified traffic counts were conducted at representative sections of the Buchanan–Cestos Junction road to estimate current traffic demand and inform economic and safety analyses. The existing road is a laterite/dirt surface in operation for more than 50 years, with low design standards, limited traffic control and poor drainage. Traffic levels vary significantly along the corridor, with higher flows near Buchanan and lower volumes towards the remote Cestos end.

2.1: Summary of Traffic Volumes- Indicative Average Annual Daily Traffic (AADT) by Corridor Zone

Corridor Zone	Approximate Chainage / Key Settlements	Qualitative AADT Range	Dominant Vehicle Types	Comments
Zone 1 – Buchanan peri-urban section	Buchanan City to ~10–15 km (e.g. Big Joe Town, Edina area)	High traffic; up to approx. **8,400 vehicles/day** near the urban interface	Taxis, minibuses, private cars, light and medium trucks, motorbikes	Mixed urban and inter-urban traffic, frequent stopping and pedestrian movements
Zone 2 – Intermediate rural section	~15–45 km, mixed villages and agricultural areas	Medium traffic; typically several hundred to a few thousand vehicles/day	Motorbikes, light trucks, shared taxis, occasional heavy trucks	Agricultural and local trade traffic, school and market trips
Zone 3 – Remote rural / Cestos section	~45–60.9 km approaching Cestos Junction and beyond	Low traffic; **around 300 vehicles/day** in the least trafficked sections	Motorbikes, light trucks, and very limited heavy vehicles	Sparse settlements; road condition and season strongly influence volumes

Note: Exact counts by vehicle class, hour and direction are contained in the project's traffic study; this annex summarizes the key patterns for ESIA purposes.

2.3 Traffic Composition (Qualitative)

Vehicle Category	Approximate Importance	Typical Role
Two-wheelers (motorbikes)	High share in rural sections	Passenger transport (okadas), small goods, access to markets and services
Light vehicles and minibuses	Significant in all sections, especially near Buchanan	Passenger transport, informal taxis, small trade
Light and medium trucks	Present throughout	Distribution of goods, agricultural produce, and construction materials
Heavy trucks and articulated vehicles	Less frequent but important	Regional freight, timber and bulk commodities
Non-motorized transport (handcarts, pedestrians)	Very important near settlements and markets	Local mobility; high exposure to traffic risk

2.4 Existing Road Safety Conditions

Stakeholder consultations and field observations indicate that the existing unpaved road has several safety concerns:

- Poor surface condition with potholes, corrugations and rutting, especially in the rainy season.
- Inadequate or absent road markings and signage.
- Narrow platform with limited shoulders and frequent roadside encroachment by stalls and informal activities.

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- Numerous at-grade accesses, including tracks, paths and driveways with limited sight distance.
- Lack of designated pedestrian facilities, particularly near schools, markets and health centres.
- Limited speed management and enforcement.

2.3: Summary of Key Road Safety Risk Factors

Risk Factor	Typical Locations Along Corridor	Observed Issues	Safety Implications
Poor pavement and surface defects	Throughout, more severe in low-lying and poorly drained sections	Potholes, rutting, and slippery surfaces in the wet season	Vehicle loss of control, rollovers, and increased braking distances
Inadequate horizontal/vertical alignment	Curved sections near river crossings and in hilly terrain	Limited sight distance, sharp curves, crest vertical curves	Head-on and run-off-road crashes
Lack of roadside protection	Embankments, culvert headwalls and bridge approaches	Unprotected drops, steep side slopes, and fixed hazards close to the carriageway	Severe consequences of run-off-road incidents
Pedestrian exposure	Villages, schools, markets and health facilities along the road	Pedestrians walking on the carriageway, informal crossing points, and school children	Pedestrian–vehicle collisions, especially involving children and women
Mixed traffic composition	All zones, especially near Buchanan	Interaction of fast motorized traffic with slow vehicles, motorbikes and pedestrians	Side-swipes, rear-end crashes, conflicts at access points
Limited enforcement and safety culture	Corridor-wide	Low helmet and seat-belt usage; occasional over-loading and speeding	Increased severity and frequency of crashes

2.5 Crash Data and Community Perceptions

Formal, geo-referenced police crash statistics are limited for the corridor. However:

- Local authorities, health facilities, and community members reported frequent non-fatal accidents involving motorbikes and taxis, particularly near market areas and in sections with poor drainage and deep ruts.
- Fatal accidents are reported anecdotally, often linked to speeding, poor visibility during heavy rain, and vehicle mechanical failure.

Qualitative Road Safety Feedback from Key Stakeholders

Stakeholder Group	Main Concerns Raised	Locations Highlighted
Community members and leaders	Dust, speeding vehicles, risk to children going to school, accidents at river crossings, and curves	Big Joe Town, Debay Town, Garpu Town, Cestos Junction and other villages along the corridor
Health facility staff	Injuries from motorbike and vehicle crashes, and a limited emergency response capacity	Clinics along the corridor (where available)
Transport operators (drivers, motorbike riders)	Poor road surface leading to vehicle damage and accidents; lack of signage; conflict with pedestrians and animals	The entire corridor, particularly in the rainy season
Local government/traffic police	Limited resources for enforcement, need for speed calming, and signage	High-traffic locations near Buchanan and larger settlements

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2.6 Implications for Project Design and ESMMP

The traffic and road safety baseline indicates that:

- Upgrading and paving the road surface will significantly improve vehicle control, reduce dust and improve travel time and reliability.
- Without adequate safety design (signage, markings, pedestrian facilities, speed management), higher speeds after paving could lead to more severe crashes.
- The ESMMP and dedicated Traffic and Road Safety Management Plan must therefore prioritize:
    - Safe geometric design and visibility at junctions and river crossings;
    - Road safety furniture (signage, guardrails, markings, rumble strips, speed calming at settlements);
    - Pedestrian safety measures around schools, markets and health facilities; and
    - Ongoing data collection and collaboration with police and health services to monitor and manage road safety outcomes

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APPENDIX 3: DETAILED ESMMP MITIGATION AND MONITORING MATRICES

This Annex presents the detailed Environmental and Social Management Plan (ESMMP) mitigation and monitoring matrices for the Paving of the 60.9 km Buchanan–Cestos Junction road project. The matrices operationalize the commitments in the main ESMMP chapter and are designed to comply with:

- Environmental Protection and Management Law of Liberia (EPML, 2023) and subsidiary regulations;
- EPA 2022 ESIA Procedural Guidelines;
- AFDB ISS (OSS1-OSS10) and WB ESS (ESS1-10)
- Good International Industry Practice (GIIP), including the World Bank Group EHS Guidelines for Roads.

Mitigation and monitoring requirements are organized by project phase and environmental/social component. Costs are indicative and will be refined during detailed design and contractor mobilization.

3.1: Construction Phase E&S Mitigation Matrix

Code	Impact / Risk	Objective	Key Mitigation / Management Measures	Location / Scope	Timing	Responsible Parties*	Performance Indicators	Safeguard / Legal Reference
SE-1	Soil erosion, gullying and sedimentation of watercourses	Minimize soil loss and off-site sedimentation	• Limit clearance to demarcated ROW and work sites. • Install silt fences, check dams, sediment tRP s and diversion drains. • RP idly re-vegetate exposed slopes with grass/appropriate species. • Avoid earthworks in peak rainfall where practicable.	All earthwork sites, cut/fill slopes, culverts, and bridge approaches	Pre-constructio n & throughout construction	Contractor; Supervision Consultant; MPW/IIU PIU	• No significant gully formation. • No visible sediment plumes downstream of works. • % of slopes stabilized within 2–4 weeks of final grading.	EPML (soil & erosion control), EPA ESIA Guidelines, WB ESSs and WBG EHS for Roads
WQ-1	Pollution of surface and groundwater by sediments, fuel, oils and chemicals	Protect surface and groundwater quality	• Store fuels/chemicals on impermeable bunded pads (>110% largest container). • Maintain spill kits and train staff. • Prohibit refueling within 50 m of watercourses. • Designate and line	Construction camps, fueling areas, plant yards, near rivers/streams	Throughout construction	Contractor; Supervision Consultant; MPW/IIU; EPA	• No major reportable spills. • All fuel storage areas are bunded and inspected monthly. • Water quality monitoring	EPML, LWQS Class III, EPA Pollution Control Regulations, and WB ESS3

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Code	Impact / Risk	Objective	Key Mitigation / Management Measures	Location / Scope	Timing	Responsible Parties*	Performance Indicators	Safeguard / Legal Reference
			vehicle washing areas. • Immediate clean-up of spills and contaminated soil.				within LWQS Class III limits at control points.	
AQ-1	Dust generation from earthworks, unpaved haul roads and material stockpiles	Maintain acceptable air quality and minimize nuisance	• Water spraying of exposed surfaces and haul roads, especially near communities. • Cover truck loads or maintain minimum freeboard. • Set and enforce speed limits (≤30 km/h) near settlements. • Use pre-mixed bitumen/asphalt where possible; maintain plant filters.	Haul roads, borrow pits, crusher/asphalt plants, settlements along the corridor	Throughout construction, especially during the dry season	Contractor; Supervision Consultant	• Complaints about dust minimized. • PM10/PM2.5 within national / WBG guideline values at representative receptors.	EPML Air Quality Regulations, WBG EHS (Air Emissions), and WB ESSs
NV-1	Construction noise and vibration	Limit noise/vibration disturbance to communities and sensitive receptors	• Restrict high-noise activities to daytime (e.g. 07:00–19:00). • Locate fixed plants away from schools/clinics (>200 m where feasible). • Use well-maintained equipment with silencers. • Provide advance notice of particularly noisy works.	Construction sites, along the corridor, near schools, health centers, churches	Throughout construction	Contractor; Supervision Consultant; MPW/IIU	• Measured noise levels comply with national limits / WBG EHS guidelines. • No sustained noise complaints.	National Noise Regulations, WBG EHS (Noise), WB ESS1, ESS2;
BIO-1	Loss of roadside vegetation, disturbance of fauna and habitat fragmentation	Avoid unnecessary vegetation loss and maintain ecological function	• Limit clearing to the designed ROW and work sites. • Mark and protect trees to be retained. • Prohibit hunting, tRPping, and collection of NTFPs by workers. • Re-instatement planting with native species along	250 m AoI and work sites, borrow areas, and camp surroundings	Site preparation & construction; reinstatement	Contractor; Forestry Development Authority (FDA); Supervision Consultant	• Area cleared is limited to that required by design. • Re-planting completed and survival of planted trees/shrubs	EPML, Forestry Law, WB ESS6, WBG EHS (Biodiversity)

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Code	Impact / Risk	Objective	Key Mitigation / Management Measures	Location / Scope	Timing	Responsible Parties*	Performance Indicators	Safeguard / Legal Reference
			embankments and in work areas.				>80% after 1 year.	
BIO-2	Disturbance to aquatic habitats at river and stream crossings	Protect aquatic ecology and fish habitat	• Minimize in-stream works; install cofferdams where necessary. • Maintain flow and provide fish passage. • Prohibit dumping of spoil and concrete wash-out into channels. • Restore banks and riparian vegetation after works.	All bridge/culvert sites and adjacent river reaches	Construction at crossings & reinstatement	Contractor; Supervision Consultant; EPA; FDA	• No deliberate disposal of waste in watercourses. • Stable, vegetated banks post-construction.	EPML, Fisheries Regulations, WB ESS6
WST-1	Poor management of solid and hazardous waste	Ensure proper segregation, storage and disposal	• Prepare and implement Waste Management Plan. • Segregate recyclables, general and hazardous wastes. • Provide labelled, covered bins at camps and work fronts. • Contract EPA-authorized waste handlers / approved disposal sites. • Maintain waste register.	Camps, work sites, plant yards, laydown areas	Throughout construction	Contractor; Supervision Consultant; MPW/IIU; EPA	• No uncontrolled dumping. • All wastes are recorded and disposed at approved facilities.	EPML, EPA Solid & Hazardous Waste Regulations, WB ESS3
OHS-1	Occupational accidents, injuries and exposure to hazards	Protect workers' health and safety	• Implement OHS Plan aligned with WBG EHS and Liberian Labour Law. • Job-specific risk assessments and method statements. • Mandatory PPE (helmets, vests, boots, ear/eye protection, fall arrest, etc.). • Toolbox talks and induction. • Emergency response procedures, first-aid posts and trained first-aiders.	All work sites, camps and quarries	Throughout construction	Contractor; Supervision Consultant; MPW/IIU; MoL	• LTIFR trending downward. • 100% workers trained on OHS and PPE use.	Labour Law, WB ESS2, WBG EHS (OHS)

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Code	Impact / Risk	Objective	Key Mitigation / Management Measures	Location / Scope	Timing	Responsible Parties*	Performance Indicators	Safeguard / Legal Reference
LBR-1	Non-compliance with labour standards, child labour, and discrimination	Ensure fair and safe labour and working conditions	• Implement Labour Management Procedures (LMP). • Written contracts and clear terms of employment. • Prohibit child labour and forced labour. • Non-discrimination in recruitment and pay. • Workers' GM established and functional.	Entire workforce, including subcontractors	Pre-construction & throughout construction	Contractor; MPW/IIU; MoL	• Zero verified cases of child or forced labour. • Number and resolution of workers' grievances.	WB ESS2, Liberian Labour Code, ILO conventions
CHS-1	Community health and safety, including traffic safety	Protect community health, minimize road safety risks	• Implement the Traffic and Road Safety Management Plan. • Signage, flagmen, and speed control around settlements and schools. • Safe pedestrian crossings where appropriate. • Community awareness on road safety and HIV/STIs. • Control standing water at camps to reduce vector breeding.	Communities along the corridor, access roads, detours	Throughout construction	Contractor; MPW/IIU; MoH; Traffic Police	• Reduction in traffic accidents related to work. • Outreach sessions held; participant records.	WB ESS4, , WBG EHS (Community Health and Safety)
GBV-1	GBV/SEA/SH risks and child protection concerns	Prevent and respond to GBV/SEA/SH	• Implement GBV/SEAH Action Plan and Code of Conduct. • Mandatory training for all workers on GBV and acceptable behavior. • Contracting clauses on zero tolerance. • Confidential reporting channels and	Work sites, camps, neighboring communities	Pre-construction & throughout construction	Contractor; MPW/IIU; MoGCSP; local NGOs	• All workers sign and are trained on CoC. • Cases reported/resolved through GM, with survivor support.	WB ESF/ESSs; national GBV and Child Rights laws

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Code	Impact / Risk	Objective	Key Mitigation / Management Measures	Location / Scope	Timing	Responsible Parties*	Performance Indicators	Safeguard / Legal Reference
			survivor-centered referral pathway.					
SOC-1	Land acquisition, economic/physical displacement	Avoid, minimize and compensate for displacement	• Implement approved RP /ARP before civil works. • Pay compensation prior to displacement. • Provide livelihood restoration support as in RP . • Avoid informal land take beyond the surveyed ROW.	All affected parcels and structures along the ROW and ancillary facilities	Pre-construction & early construction	MPW/IIU; County Authorities; Contractor (support)	• 100% of eligible PAPs compensated prior to work. • Livelihood indicators at least restored to pre-project levels.	EPA ESIA Guidelines (RP), WB ESS5, Land Rights Act
CH-1	Damage to cultural heritage / sacred sites	Protect cultural heritage and intangible values	• Apply Chance Finds Procedure. • Avoid known cultural sites during design, or implement agreed relocation/mitigation. • Consult traditional authorities if finds occur.	Known/unknown sites along the corridor	Throughout construction	Contractor; MPW/IIU; Ministry of Information, Culture & Tourism; Traditional authorities	• No unmitigated damage to known sites. • Chance finds documented and managed per procedure.	WB ESS8, national cultural heritage legislation

*Supervision Consultant includes environmental and social specialists engaged by MPW/IIU.

2.3 Operation and Maintenance Phase Mitigation Matrix - Operation & Maintenance Environmental and Social Mitigation Matrix

Code	Impact / Risk	Objective	Key Measures	Responsible Parties	Monitoring Indicators	Frequency	Reference
OM-1	Road safety risks (speeding, accidents, vulnerable road users)	Reduce traffic accidents and fatalities	• Maintain road markings, signage and guardrails. • Speed calming (humps, rumble strips) in towns/schools. • Periodic road safety campaigns with the police and communities.	MPW/IIU; Liberia National Police; Local authorities	• Crash & fatality statistics along the corridor. • Number of road safety campaigns per year.	Semi-annual review	WB ESS1,ESS2, ESS3,, National Road Safety Policy
OM-2	Drainage blockage and local flooding	Maintain drainage performance and	• Routine maintenance of side drains, culverts and outlets.	MPW maintenance	• Functionality of culverts and drains.	Quarterly and before/after	WB ESS1, ESS3

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Code	Impact / Risk	Objective	Key Measures	Responsible Parties	Monitoring Indicators	Frequency	Reference
		minimize flooding/erosion	• Community awareness on solid waste disposal.	units; Local authorities	• Reports of local flooding.	the rainy season	
OM-3	Roadside erosion and slope instability	Avoid long-term geotechnical failures	• Regular inspection of cut/fill slopes and retaining structures. • Prompt repair and re-vegetation.	MPW maintenance units	• Number of unstable slope sections.	Annual or after extreme events	WB ESSs
OM-4	Noise and air emissions from increased traffic	Manage air and noise nuisance	• Enforce traffic regulations and vehicle inspection. • Promote public transport and ride sharing. • Maintain smooth pavement surface.	MPW; Transport authorities; Police	• Ambient air and noise monitoring at representative locations.	Every 2–3 years or as required	WB ESS1, ESS2, WBG EHS (Air & Noise)
OM-5	Encroachment into the road reserve	Preserve safety and asset integrity	• Enforce right-of-way (ROW) regulations. • Sensitize communities against informal structures within the reserve.	MPW; County & local authorities	• Number of encroachment cases and enforcement actions.	Annual	WB ESS1, ESS2,ESS5
OM-6	GBV, road-side social risks around new traffic hubs	Monitor and mitigate social risks	• Continued support to community-based GBV prevention and reporting. • Coordinate with MoGCSP and local CSOs.	MPW; MoGCSP; Local authorities	• GBV incident reports and referrals along the corridor.	Annual	WB ESSs

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2.3 E&S Monitoring Matrix

This monitoring plan aligns with the EPA ESIA Guidelines and WB ESF/ESSs requirements for ongoing monitoring of key environmental and social parameters. It also incorporates periodic re-sampling of soils and waters at the University of Liberia Civil Engineering Laboratory sampling points (SS-001–SS-020 and WS-001–WS-022).

E&S Monitoring Plan

No.	Parameter / Indicator	Objective	Locations	Method / Equipment	Frequency	Responsibility	Estimated Cost (USD)*	Notes / Standard
1	Ambient particulate matter (PM_{10}, $PM_{2.5}$)	Track dust and combustion emissions during works	Representative communities along the corridor; near quarries, asphalt plants and major work fronts	Portable dust meters/air quality stations; comparison with baseline & WBG EHS values	Quarterly, during active construction and in the peak dry season	Contractor (Env. Officer); Supervision Consultant; MPW/IIU; EPA	~5,000/yr	Compare with national air standards and WBG EHS guidelines.
2	Total suspended solids (TSS), turbidity, pH, EC, BOD, COD, nutrients, and key metals in surface water	Assess construction impact on rivers/streams; verify compliance with LWQS Class III	Upstream and downstream of key crossings and near camps (including existing UL sampling points WS-001–WS-022)	Grab sampling; accredited laboratory analysis (UL Civil Engineering Lab) using standard methods	Semi-annual during construction; once during the first year of operation	Contractor; Supervision Consultant; MPW/IIU; EPA	~7,000/yr	Liberia Water Quality Standards Class III; locations harmonized with ESIA baseline.
3	Soil quality (pH, organic matter, hydrocarbons, selected metals)	Detect contamination and changes relative to baseline	Work yards, fuel storage areas, selected borrow pits and UL baseline soil sampling sites (SS-001–SS-020)	Composite soil sampling; laboratory analysis at UL; visual inspection	Once per year during construction, once at the end of construction	Contractor; Supervision Consultant; MPW/IIU; EPA	~4,000/yr	Compared against baseline values and relevant soil screening levels.
4	Noise levels (dB(A)) at sensitive receptors	Verify compliance with noise standards and the effectiveness of mitigation	At schools, health centres, dense residential clusters, near plant sites	Hand-held sound level meter; spot measurements during representative periods	Quarterly, during construction, additional measurements upon complaint	Contractor; Supervision Consultant; MPW/IIU; EPA	~3,000/yr	Compare with national limits and WBG EHS noise guidelines.

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No.	Parameter / Indicator	Objective	Locations	Method / Equipment	Frequency	Responsibility	Estimated Cost (USD)*	Notes / Standard
5	Visual evidence of erosion and sediment control performance	Ensure erosion control measures remain effective	Cut/fill slopes, culverts, drainage channels, spoil disposal sites	Routine site inspections using a checklist, photo records	Monthly, during the rainy season, after heavy storms	Contractor; Supervision Consultant	~2,000/yr	Corrective actions documented in site inspection reports.
6	Biodiversity: disturbance and reinstatement of vegetation	Confirm no significant residual biodiversity impacts	Roadside vegetation within AoI; reinstated areas; key aquatic crossings	Transect walks; species presence/absence; photo monitoring	Once per dry and wet season during construction, once after final reinstatement	Contractor; Supervision Consultant; FDA; MPW/IIU	~8,000 total	Focus on confirming the absence of sensitive species in the 250 m AoI and the success of re-vegetation.
7	Community health indicators (project-related disease trends, e.g., STDs/HIV, diarrheal diseases)	Monitor community health risks associated with labour influx and traffic	Health facilities serving corridor communities	Use routine health data; KAP surveys where feasible; coordination with MoH	Annual during construction and the first two years of operation	MPW/IIU; MoH; Contractor (support)	~4,000/yr	Data used to refine community health interventions.
8	Occupational health and safety statistics (LTIFR, near misses, PPE compliance)	Track worker safety performance	All work sites and camps	Incident registers; OHS inspections; training records	Monthly, consolidated quarterly	Contractor; Supervision Consultant; MPW/IIU	Included in contractor OHS budget	Used to adjust OHS measures and training focus.
9	Traffic safety (number/severity of road accidents linked to works)	Assess the effectiveness of traffic management	Along the corridor, particularly at diversions and town sections	Collate Police records, contractor records, and GM logs	Quarterly during construction; annually in operation	Contractor; Traffic Police; MPW/IIU	Included in the traffic management budget	Disaggregated by location, cause, and severity.
10	Social indicators (GM cases, GBV/SEA allegations, RP implementation status, employment of local labour)	Monitor social performance and inclusion	Project corridor and associated communities	GM database; RP monitoring; HR records; community surveys	Quarterly during construction; annual RP completion audit	MPW/IIU; Contractor; Independent RP monitor	Included in RP and ESMMP budgets	Disaggregated by gender, age and vulnerability category.

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*Monitoring costs shown in Appendix 3 are planning estimates. Before mobilization, each monitoring activity shall be assigned either to the PIU-managed ESMMP allocation or to a priced Contractor BOQ/C-ESMMP item, with the applicable unit, quantity, frequency, responsible party, contract reference and verification record stated. No monitoring cost shall be charged to both funding sources.

Reporting

- **Contractor**: monthly internal E&S reports to the Supervision Consultant and MPW/IIU.
- **Supervision Consultant**: quarterly ESMMP implementation reports to MPW/IIU, EPA and WB.
- **MPW/IIU**: consolidated semi_annual safeguards performance reports to EPA and WB, including results of UL laboratory re_sampling, ESMMP compliance, and GM status.
- **Independent audits**: periodic external audits as required by EPA permit conditions and WB ESSs

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APPENDIX 4: STAKEHOLDER ENGAGEMENT PLAN (SEP) AND CONSULTATION RECORDS

4.1 Introduction and Objectives

This Annex presents the Stakeholder Engagement Plan (SEP) and the documented results of public participation activities undertaken during preparation of the ESIA and RP /ARP for the Paving of the Buchanan–Cestos Junction road project. The SEP is designed to:

- Comply with AFDB OSS10 and WB ESS10 – Stakeholder Engagement & Information Disclosure and other relevant ESSs;
- Meet the public participation requirements of the EPA ESIA Procedural Guidelines; and
- Ensure inclusive, culturally appropriate, and continuous engagement with and other stakeholders throughout the project life cycle.

Specific objectives are to:

1. Identify and analyses all relevant stakeholders and their interests, influence, vulnerabilities, and preferred engagement methods;
2. Provide timely, understandable, and accessible information about the project, its risks, impacts, and mitigation;
3. Obtain and incorporate stakeholder views into project design, ESMMP, RP , and other management plans;
4. Establish mechanisms for grievance redress and two-way communication; and
5. Support long-term relationships of trust between project proponents, communities, and authorities.

4.2 Stakeholder Identification and Analysis

Stakeholder identification was undertaken through scoping meetings with national and local institutions, field reconnaissance, and socio-economic baseline work. Key groups identified include national regulatory agencies, line ministries, county and district authorities, community and traditional leaders, PAPs, vulnerable groups, and civil society organizations.

Stakeholder Mapping and Analysis

Stakeholder Group	Examples	Interest / Expectations	Influence	Key Issues / Concerns	Preferred Engagement Methods
National regulatory agencies and line ministries	EPA, MPW/IIU, Ministry of Mines & Energy, Liberia Land Authority, Forestry Development Authority, Ministry of Agriculture, MoGCSP, MoH, MoL, Ministry of Internal Affairs, Ministry of Finance & Development Planning	Compliance with laws and standards; timely information; effective mitigation and monitoring; sectoral development	High	Legal compliance; institutional roles; resource allocation; capacity for monitoring; coordination mechanisms	Formal letters, technical meetings, workshops, email/phone
County and district authorities	Superintendents, District Commissioners,	Local development, road accidents, orderly resettlement, and employment	High	Land acquisition and compensation; local employment;	Courtesy visits, joint planning meetings, public forums

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Stakeholder Group	Examples	Interest / Expectations	Influence	Key Issues / Concerns	Preferred Engagement Methods
	County Environmental Officers, City Mayors	opportunities for residents		security; conflict resolution; GBV risks	
Project Affected Communities (PACs) and PAPs	Residents of communities along the corridor (e.g., Buchanan, Big Joe Town, Yarpah Town, Gbediah Town, others), roadside businesses, land and structure owners	Improved access, markets, services, and livelihoods; fair compensation; minimized negative impacts	Medium	Resettlement and livelihood impacts; dust, noise, safety; access to social services; transparency of RP ; job opportunities	Community assemblies, focus group discussions (FGDs), household interviews, posters/leaflets, radio
Vulnerable and marginalized groups	Women, youth, elderly, persons with disabilities, female-headed households, highly vulnerable rural minorities	Protection from disproportionate impacts; safe access to GM; targeted benefits and livelihood support	Low–Medium	Exclusion from decision-making; GBV/SEA/SH risks; child protection; barriers to employment; accessibility to project benefits	Separate FGDs, use of women/youth leaders, engagement through MoGCSP and NGOs, confidential channels
Local NGOs/CBOs, faith-based organizations	Community development groups, women's associations, savings groups, churches/mosques	Support for community mobilization, awareness raising, GBV and health campaigns	Medium	Coordination with the project, support for grievance resolution, and funding for community initiatives	Partnership meetings, workshops, and MoUs
Private sector and road users	Transport unions, truck drivers, traders, market associations	Reduced travel time and costs; predictable transport conditions	Medium	Safety at loading points, parking, and enforcement of axle load and traffic rules	Meetings with unions, corridor forums, surveys
Media	Local radio stations, community information centres	Accurate dissemination of information	Medium	Timely access to project information	Briefings, press releases, media tours

4.3 Stakeholder Engagement Plan by Project Phase

Phase	Stakeholder Group	Objectives of Engagement	Information to be Shared	Methods / Tools	Frequency / Timing	Responsible Parties
Pre-construction (detailed design, ESIA & RP disclosure)	National agencies; MPsW/IIU; EPA; county authorities	Obtain approvals and permits; agree on roles; present ESIA & RP results	ESIA, ESMMP, RP /ARP , design drawings, permit conditions	Technical workshops, formal submissions, and bilateral meetings	At key milestones and prior to permit issuance	MPW/IIU; ESIA Consultant
Pre-construction	Communities , PAPs, vulnerable groups	Present final design, ESIA & RP ; confirm entitlements and schedule	Final alignment and ROW width; impact zones; RP eligibility and rates; GM contacts	Community meetings, FGDs (incl. women/youth), door-to-door visits, leaflets, local radio	At least 2 rounds before civil works in each section	MPW/IIU; RP team; Local authorities

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Phase	Stakeholder Group	Objectives of Engagement	Information to be Shared	Methods / Tools	Frequency / Timing	Responsible Parties
Construction	Communities along active work fronts	Inform of construction schedule and risks; collect feedback	Work programme; traffic diversions; safety precautions; recruitment procedures	Monthly community meetings; site notice boards; SMS/radio alerts; suggestion boxes	Monthly, more frequent when high-risk activities occur	Contractor (CLO); Supervision Consultant; MPW/IIU
Construction	Workers	Build awareness of OHS, GBV/SEA/SH, CoC and GM	OHS rules; workers' rights; worker GM, GBV CoC	Induction, toolbox talks, periodic trainings	Induction + weekly toolbox talks; refresher quarterly	Contractor; Supervision Consultant
Construction & Operation	Vulnerable groups	Ensure inclusive engagement and access to project benefits	Tailored information on impacts, entitlements, and grievance channels	Separate FGDs; home visits; use of women's/youth groups	At least semi-annually and prior to key decisions	MPW/IIU; MoGCSP; CSOs
Operation & Maintenance	Road users and communities	Feedback on performance, safety and maintenance needs	Road condition, accident data, and planned works	Corridor forums, surveys, and continued GM	Annual / as needed	MPW maintenance units; Local authorities

4.4 Summary of Consultations Conducted During ESIA Preparation

Public consultations have been carried out at national, county, and community levels. Methods included open community meetings, FGDs, KIIs, and household surveys.

- **Public meetings**: held along the project corridor from **6 January to 6 February 2025**, with *over 200 participants* in total; female participation was lower than male due to prevailing gender norms.
- **Stakeholder engagement meetings**: consultations with about **150 participants** in Big Joe Town, Buchanan City, and Yarpah Town between 13–15 January 2025, including community leaders, PAPs, women's groups, and youth.
- **Key Informant Interviews (KIIs)**: with city authorities and land administration officials in Buchanan, Yarpah Town, Big Joe Town, and Gbediah Town.
- **Formation of a Grievance Redress Committee (GRC)**: during community meetings in Buchanan City (documented in the project annex of pictorial records).

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Summary of ESIA-Stage Consultation Events

No.	Date	Location	Type of Event	Approx. No. of Participants (M/F)	Stakeholder Categories	Main Issues Raised	Project Responses / Follow-up
1	13 Jan 2025	Big Joe Town, Grand Bassa County	Community meeting & ESIA scoping	~50 (majority male; limited female attendance)	Town leadership, PAPs, women & youth reps	Benefits of improved road; fears of property loss; need for local employment; concerns about dust and noise	Explained project scope & mitigation; commitment to RP , local employment preference, dust control measures; GRC concept introduced.
2	14 Jan 2025	Buchanan City	Corridor-level public meeting & GRC formation	~60	City officials, County authorities, PAPs, traders, transporters	Compensation processes; cultural sites protection; need for road safety measures; traffic congestion in town	Agreed on RP process, screening of cultural sites, inclusion of speed calming and pedestrian safety features; GRC established with community representation.
3	15 Jan 2025	Yarpah Town	Community meeting	~40	Community leaders, PAPs, women's groups, youth	Concerns over resettlement in dense town centre; livelihoods during construction; GBV and youth employment	Clarified eligibility criteria, livelihood restoration support, GBV prevention measures and opportunities for youth as unskilled labour.
4	6 Jan – 6 Feb 2025 (multiple dates)	Various communities along the corridor	Corridor-wide public meetings	>200 (combined)	Residents of PACs, traders, transporters	Perceived benefits and negative impacts, including access to services, costs, accidents, dust and noise, employment discrimination and social values.	Issues reflected in the impact assessment; ESMMP includes measures on safety, dust/noise, equal employment, and social cohesion; further meetings planned before works.
5	Jan–Jun 2025	Buchanan, Yarpah Town, Big Joe Town, Gbediah Town	KIIs with key informants	1–3 per interview	City mayors, land administrators, and traditional leaders	Land tenure, resettlement thresholds, community dynamics, preferred engagement channels	Information used to design the RP survey strategy, communication channels, and to select GRC members.

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APPENDIX 5: BIOLOGICAL SURVEY REPORTS AND SPECIES LISTS

5.1 Introduction and Objectives

This annex presents the detailed methods and results of the biological surveys undertaken along the Buchanan–Cestos Junction (60.9 km) road corridor, with a focus on the direct Area of Influence (AoI) defined as 250 m on either side of the existing road centerline. The annex supports the requirements of WB ESS6 and AFDB OSS6 and the Liberia EPA ESIA Procedural Guidelines by:

- Describing survey design and methods for flora, fauna and aquatic ecology.
- Providing complete species lists for all taxa recorded in the field.
- Summarizing IUCN Red List status and identifying any species or habitats of conservation concern.
- Informing the assessment of biodiversity impacts and the design of appropriate mitigation and monitoring measures.

The existing road is a long-established laterite/dirt road (in operation for more than 50 years) passing through a landscape that is heavily modified by agriculture, settlements, rubber plantations and other anthropogenic activities. Within the direct 250 m AoI, no sensitive or threatened species were observed during the field surveys; all confirmed species are currently of Least Concern on the IUCN Red List and are typical of disturbed or human-modified habitats.

At the same time, desktop screening using the Integrated Biodiversity Assessment Tool (IBAT) identified two Key Biodiversity Areas (KBAs)—Cestos–Senkwen and Weeni Creek and its associated hydro basin—with at least 160 IUCN Red List species within a 1 km buffer of the road corridor, underscoring the biodiversity importance of the wider landscape.

5.2 Study Area and Area of Influence

- **Project corridor:** 60.9 km Buchanan–Cestos Junction road.
- **Direct AoI:** 250 m on either side of the existing road centreline, covering the road reserve, adjacent farmland, secondary forest, plantations, settlements, wetlands and watercourses directly affected by construction and operation.
- **Indirect AoI:** Catchments of rivers and streams crossed by the road (e.g. Timbo, Gbowee and New Cess Rivers), local community lands and broader KBA landscape up to at least 1 km from the corridor.

The corridor traverses fractured wooded hills and a mosaic of land uses dominated by uncultivated forests and secondary growth arising from shifting cultivation and logging, with extensive riverine forest along numerous creeks and rivers. No formal conservation reserves or national parks intersect the road, and the immediate corridor runs through modified habitat rather than natural or critical habitat, although species of conservation concern may be present in the wider area.

5.3 Survey Methodology

5.3.1 Desk-Based Review and IBAT Screening

The biological baseline combined field surveys with a review of:

- Existing literature and previous studies on Liberian biodiversity and the project region.
- National species lists and protected species information.

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- IBAT outputs for the corridor, identifying the Cestos–Senkwen and Weeni Creek KBAs and at least 160 IUCN Red List species within a 1 km buffer.

These data were used to refine field survey priorities and to flag potential critical habitats and species of concern that might require targeted verification.

5.3.2 Flora Survey

Flora surveys followed a RP id assessment approach:

- **Field maps** showing major vegetation and habitat types along the corridor were prepared prior to fieldwork, with sample points, latitude and longitude recorded on data sheets.
- **Sampling plan:** 4–6 sample plots per county were selected to represent key vegetation types: lowland secondary forest/old fallow, agricultural degraded area/low bush, inland wetland and young bush.
- **Plot layout:** For each habitat type, 10 m × 10 m plots were established along the altitudinal gradient within the corridor.
- Within each plot, all woody (trees, shrubs) and herbaceous species were recorded based on in-field identification (leaf, bark, form), supported by botanical field manuals. GPS coordinates were taken at each plot.
- Additional "recce" transects between plots were used to record common and conspicuous species outside plots.
- The IUCN Red List was used to allocate a conservation status (e.g. LC, VU) to each species recorded.

5.3.3 Fauna Survey

Faunal surveys combined direct field observation with community-based information. Methods by taxonomic group are summarized in Table 5.1, based on the project's baseline methodology.

5-1: Summary of Biological Survey Methods by Taxonomic Group

Taxonomic Group	Survey Methods	Notes
Mammals	Direct observation along transects; opportunistic sightings; identification of tracks, droppings, and other signs; habitat assessment (vegetation structure, cover, proximity to water).	Scarcity of large mammals due to fragmented forest and hunting pressure; frequent observation of domestic livestock.
Birds	Point-counts at selected stations; visual and auditory identification using binoculars; recording of species presence, abundance, and habitat use.	Focused on early morning and late afternoon; species identified by trained ornithologists.
Amphibians	Visual encounter surveys along road verges, wetlands, and streams; auditory surveys at dusk and night to identify calling frogs.	
Reptiles	Visual encounter surveys during daylight, opportunistic recording along transects and around water bodies; literature review of expected species.	Reptile diversity is expected to be low due to a lack of rocky habitats and high disturbance.
Fish	Key informant interviews (fishers, community leaders); focus group discussions; visual observation at bridge crossings where possible.	No netting or electrofishing was undertaken; fish community data are indicative.

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5.3.4 Community Engagement for Biodiversity

Community engagement and Key Informant Interviews (KIIs) were used to complement field observations, particularly for elusive fauna. Flashcards depicting Forestry Development Authority (FDA) protected species were shown to residents to test recognition of species potentially present; information on bushmeat hunting, wildlife sightings and fishing grounds was collected.

5.3.5 Limitations

- RP id survey of a long linear corridor limits detection of rare, nocturnal or cryptic species.
- Faunal data for fish and some mammals are partly based on community reporting rather than systematic tRP ping.
- Surveys were confined primarily to the direct AoI and easily accessible points; more remote forest patches outside 250 m were not comprehensively surveyed.
- Despite these limitations, the data are adequate to characterize the highly modified habitats in the direct AoI and to identify the absence of confirmed threatened species within that zone.

5.4 Habitat Types and Ecological Context

Field observations confirmed the following main habitat/land cover types within the 250 m AoI:

1. **Secondary forest and old fallow:** Patches of fragmented forest and advanced fallow vegetation, especially away from major settlements.
2. **Agricultural land and degraded low bush:** Shifting cultivation plots with cassava, rice, maize and plantain, interspersed with shrubs and grasses.
3. **Plantations and tree crops:** Rubber (Hevea brasiliensis) plantations and scattered oil palm and fruit trees along the corridor.
4. **Riverine forest and wetlands:** Denser vegetation with swamp ferns, soft grasses, and wetland species along creeks and rivers, typically richer in biodiversity than the surrounding dryland forest.
5. **Settlements and road verges:** Villages, homesteads, mixed gardens and highly disturbed verges dominated by pioneer and invasive species such as Chromolaena odorata.

No national forests, parks or conservation reserves are intersected by the road, and the immediate corridor runs through modified habitat, although the wider landscape contains significant biodiversity values, including KBAs.

Survey Results – Terrestrial Fauna

5.5.1 Mammals

Mammalian fauna in the direct AoI is dominated by small rodents and domestic livestock; large wild mammals are rare due to habitat fragmentation and hunting pressure.

5-2: Mammal Species Recorded in the Project Corridor

No.	Scientific Name	Common Name	IUCN Status*
1	Thryonomys swinderianus	Cane rat	LC
2	Sciurinae (spp.)	Squirrel	LC
3	Marmota monax	Ground hog	LC

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No.	Scientific Name	Common Name	IUCN Status*
4	Cephalophus natalensis	Common duiker	LC
5	Grammomys poensis	Shining thicket rat	LC
6	Cricetomys gambianus	Giant pouched rat/bush rat	LC
7	Capra aegagrus hircus	Goat (domestic)	LC
8	Ovis aries	Sheep (domestic)	LC

*All recorded mammals are currently listed as **Least Concern (LC)**.

No IUCN-listed threatened (CR, EN, VU) or Near Threatened mammals were recorded within the 250 m AoI, and no primates or large carnivores were observed during the survey.

5.5.2 Birds

The avifauna recorded along the road comprises primarily generalist and edge species associated with human habitation, agricultural land and disturbed forests.

5-3: Bird Species Recorded in the Project Corridor

No.	Scientific Name	Common Name	IUCN Status
1	Turtur afer	Blue-spotted Wood Dove	LC
2	Streptopelia semitorquata	Red-eyed Dove	LC
3	Centropus senegalensis	Senegal Coucal	LC
4	Merops albicollis	White-throated Bee-eater	LC
5	Pogoniulus scolopaceus	Speckled Tinkerbird	LC
6	Andropadus virens	Little Greenbul	LC
7	Andropadus gracilirostris	Slender-billed Greenbul	LC
8	Pycnonotus barbatus	Common Bulbul	LC
9	Cisticola lateralis	Whistling Cisticola	LC
10	Cisticola brachypterus	Short-winged Cisticola	LC
11	Prinia subflava	Tawny-flanked Prinia	LC
12	Loceus cucullatus	Village Weaver	LC
13	Lanius collaris	Common Fiscal	LC
14	Chalcomitra adelberti	Buff-throated Sunbird	LC
15	Cyanomitra olivacea	Olive Sunbird	LC
16	*Spilopelia* senegalensis[1]	Laughing Dove	LC

[1]Recorded in the field sheets as “Senegalensis – Laughing Dove”.

All bird species recorded are categorised as **Least Concern (LC)** on the IUCN Red List; no globally threatened or restricted-range bird species were confirmed within the direct AoI.

5.5.3 Amphibians and Reptiles

Reptile and amphibian diversity was found to be relatively low, consistent with the highly disturbed nature of many habitats and limited rocky refugia.

5-4: Amphibian and Reptile Species Recorded in the Project Corridor

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No.	Scientific Name	Common Name	Group	IUCN Status
1	Amietophrynus regularis	Common toad/frog	Amphibian	LC
2	Cynisca liberiensis	Liberian worm lizard	Reptile	LC
3	Phrynobatrachus plicatus	Spring frog	Amphibian	LC
4	Archachatina marginata	Giant land snail	Mollusc	LC

All recorded taxa are classed as **Least Concern**. No amphibians or reptiles listed in higher IUCN categories or as nationally protected species were confirmed in the direct AoI.

5.6 Survey Results – Aquatic Fauna

Fish data are based primarily on key informant interviews and local fishing knowledge, supplemented by visual observations at river and creek crossings.

5-5: Fish Species Reported from Watercourses Along the Corridor

No.	Scientific Name	Common Name	IUCN Status
1	Brycinus imberi	Spot-tail	LC
2	Chrysichthys auratus	Catfish	LC
3	Heterobranchus longifilis	Black catfish	LC
4	Mormyrops anguilloides	Cornish jack	LC
5	Tilapia zillii	Red-belly tilapia	LC

In addition, communities noted the presence of catfish, crayfish, “bonny” fish, sunfish and mudfish in rivers, ponds and creeks crossed by the road. All reported species are common, widespread and of Least Concern.

5.7 Survey Results – Flora and Vegetation

The flora is characteristic of a heavily disturbed corridor, with a mixture of native shrubs, grasses, wetland plants, invasive species and cultivated crops.

5-6: Vascular Plant Species Recorded in the Project Corridor

No.	Scientific Name	Common/Local Name	Habitat Association	IUCN Status
1	Alchornea cordifolia	Christmas bush	Secondary forest / fallow	LC
2	Bambusa vulgaris	“Reefs” (bamboo)	Homesteads / moist areas	LC
3	Chromolaena odorata	“Kill–Doe”	Disturbed road verges, farms (invasive)	LC
4	Cenchrus polystachios	Mission grass	Grassy verges, fallow	LC
5	Cocos nucifera	Coconut	Homesteads, gardens	LC
6	Elies guinesis (Elaeis guineensis)	Palm	Plantations / homesteads	LC
7	Managifera indica (Mangifera indica)	Plum/mango tree	Homesteads, farms	LC
8	Rhizophora harrisonii	White mangrove	Riverine / estuarine margins	LC
9	Acrostichum aureum	Swamp fern	Wetlands / riverbanks	LC
10	Scleria spp.	Soft grass	Wet depressions, wetlands	LC

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No.	Scientific Name	Common/Local Name	Habitat Association	IUCN Status
11	Carica papaya	Pawpaw	Homesteads, farms	LC
12	Bidens pilosa	"Farmer friend"	Croplands, disturbed soils	LC
13	Cardiospermum grandiflorum	Balloon vine	Climber; edges / hedges	LC
14	Eichhornia crassipes	Water hyacinth	Slow-moving surface waters	LC
15	Rottboellia cochinchinensis	Itchy grass	Farms, road verges	LC
16	Phymatosorus scolopendria	Breadfruit fern	Shaded moist sites	LC
17	Panicum repens	Dog-tooth grass	Wet margins, road verges	LC
18	Leucaena leucocephala	Lead tree	Fallow / homesteads (often planted)	LC
19	Imperata cylindrical	Spear grass	Degraded land, fallow	LC
20	Musa paradisiac	Plantain	Farms, homesteads	LC
21	Manihot esculenta	Cassava	Farms	LC
22	Hevea brasiliensis	Rubber	Plantations	LC

All recorded plant species are common, widespread and listed as **Least Concern** on the IUCN Red List. Many are cultivated or weedy species typical of disturbed landscapes.

5-7: Summary of Species Recorded and IUCN Conservation Status in Direct AoI

Taxonomic Group	No. of Species Recorded	Threatened (CR/EN/VU)	Near Threatened (NT)	Least Concern (LC)	Data Deficient / Not Evaluated
Mammals	8	0	0	8	0
Birds	16	0	0	16	0
Fish	5	0	0	5	0
Amphibians/Reptiles	4	0	0	4	0
Vascular plants	22	0	0	22	0

Within the **direct 250 m AoI**, no species listed as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Near Threatened (NT) were confirmed. This is consistent with the observation that the immediate corridor constitutes a **modified habitat** heavily influenced by longstanding human use.

5.9 Discussion and Implications for WB ESS6 Compliance

1. **Habitat classification:**
   - The direct AoI is best classified as **modified habitat** under WB ESS6, dominated by disturbed secondary forest, agricultural land, plantations and settlement mosaics.
   - No critical habitat features (e.g. intact primary forest, known breeding sites of globally threatened species, internationally recognised protected areas) were identified within 250 m of the existing road.
2. **Species of conservation concern:**
   - All recorded species are of Least Concern, with no confirmed occurrences of IUCN threatened species or nationally protected species in the direct AoI.
   - However, IBAT screening indicates that the broader landscape (within 1 km) supports at least 160 IUCN Red List species and overlaps with two KBAs (Cestos–Senkwen and Weeni Creek).
   - This reinforces the need for precautionary management, especially in riparian zones and residual forest patches, even though sensitive species were not detected within 250 m of the road.

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3. **Ecosystem services:**
    - Flora and fauna in the AoI contribute to provisioning (fuelwood, NTFPs, bushmeat, fish), regulating (soil stabilization, water regulation) and cultural services important to local communities.
    - Project-induced changes must therefore avoid unnecessary loss or degradation of riparian vegetation, wetlands, and community woodlots.
4. **Key risk pathways for biodiversity:**
    - Localised habitat loss and fragmentation from road widening, camps, borrow pits, and quarries.
    - Disturbance (noise, lighting, human presence) and increased hunting pressure from the workforce.
    - Sedimentation and pollution of rivers and wetlands are affecting aquatic fauna and riparian vegetation.
5. **Implications for ESMMP and monitoring:**
    - Maintain clearing strictly within the designed right-of-way; avoid encroachment into adjacent forest patches and wetlands beyond the 250 m AoI.
    - Implement strict workforce codes of conduct prohibiting hunting, tRP ping and harvesting of wildlife and protected plants.
    - Maintain and restore riparian buffers, especially at major river crossings.
    - Include targeted biodiversity monitoring (e.g. periodic bird and fish surveys; checks for invasive species such as Chromolaena odorata and water hyacinth) during construction and early operation to verify that impacts remain minor and reversible.

5.10 Conclusion

This annex demonstrates that:

- Within the direct 250 m AoI along the 60.9 km Buchanan–Cestos Junction road, no sensitive or threatened species were observed, and all recorded taxa are currently of Least Concern on the IUCN Red List.
- The immediate road corridor constitutes modified habitat with long-term anthropogenic disturbance, consistent with the presence of generalist and disturbance-tolerant species.
- The wider landscape, including identified KBAs, retains high biodiversity value, and the project must adopt a precautionary approach to avoid indirect or cumulative impacts on these values.
- The information contained in this annex underpins the project's compliance with WB ESS6 and supports the biodiversity-related commitments in the ESMMP and associated thematic management plans.

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APPENDIX 6: PICTORIAL RECORD OF STAKEHOLDER CONSULTATIONS





Public Consultation Meeting in Big Joe Town, Grand Bassa County Authority

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PIU, ESAFE/MPW, and Consultant Team



Timbo River Bridge

Timbo River



Some commercial activities along the project road

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Planting of light poles in the project Right-of-Way (ROW) by Liberia Electricity Cooperation (LEC); a called meeting was held between LEC and the Ministry of Public Works (MPW), a stop-order was issued by MPW and it was also agreed that all those light poles planted in the project ROW be relocated before the commencement of the road project.

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APPENDIX 7: PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT MEETING RECORDS

APPENDIX 7.1: PUBLIC CONSULTATION MEETING MINUTES – BUCHANAN

Date: January 13, 2025

Time: 12:00 p.m.

Meeting Agenda:
1) Opening Prayer
2) Welcome Remarks and Introduction of Local Authorities and RP & ESIA Team Members
3) Overview of the Project
4) Question and Answer Session
5) Establishment of the Grievance Redress Committee (GRC)
6) Signing of the Cut of Date's Form
7) Recap of the Key Discussion Points
8) Closing Remarks
9) Closing Prayer

1. Opening Prayer: The opening prayer was done by a volunteer. Welcome Remarks and Introduction of Local Authorities and RP & ESIA Team Members: The meeting was called to order at about 12:00 p.m. with an opening prayer followed by an introduction.

2. Overview of the Project: A brief overview of the project was done by Mr. Amando G. Paye, Director of the Environmental and Social Safeguard (ESAFE) Division of the Ministry of Public Works. Mr. Paye informed the participants about the impacts of the upcoming road project: Some of the basic information disclosed to participants included the following:
   - i) Persons/crops or farms to be affected by the project;
   - ii) ROW of 75Ft from the centerline on the left-hand side (LHS) and 75Ft on the right-hand side (RHS) for Highway and 50Ft (LHS) and 50Ft (RHS) in towns/cities sections;
   - iii) Cut-Off Date: 14 January 2025. This is the controlling RP eligibility cut-off date; the 15 January 2025 Yarpah Town meeting was a follow-up notification and GRC establishment meeting.
   - iv) Vulnerable persons above 65 years, disabled persons to benefit;
   - v) Transportation assistance;
   - vi) No payment will be made to anyone owning land in the ROW
   - vii) Person/s with business to benefit;
   - viii) Vulnerability;
   - ix) Illegibility or what qualifies you to benefit from the RP is not a land deed, but rather a system that has been put into place that will qualify project-affected persons
   - x) Structure/crop coding was discussed as CJ-CC, followed by a particular number to be assigned to the affected structure/crop/farm, followed by photo-taking, and that structure/crop/farm coding is subject to change depending on the location.

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xi) Valid ID-Cards, either Citizen/Voting ID-cards, to be given
xii) Replacement Cost

3. Questions and Answers Session

No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
1.	Palul S. Moses	077800362	I want to know whether my house will be marked before the people come to mark on Sunday	If you have a technician, measure the length 50ft from the center lane. However, it will be good if you wait for the team to come and do the assessment	
2.	Winston God Power Ga	0777854425	Will the benefit continue, or will it just be in a specific timeframe	The benefit is one out	
3.	Philip B. Morris	0777061424	Why, if the team comes to mark a house and I am a tenant, should I wait for the landlord to come, or what can be done	From the middle of the existing road, the government owned 50ft on LHS and 50ft on RHS, and if you fall in this area, and someone has been taking money from you, we are more concern about people who used their finances to build their structure, not the owner of the land; however, if you remodel the person's existing structure, you have some level of understanding to	
4.	Abraham Nimely	0770741050	About the land claim, why, if the person purchases this land from the government	Because of some lapses that the government experiences, the surveyor is right, but that's why the Ministry of Public is there to give you the right information. You cannot claim it as private land.	
5.	Lima Bah	0776614643	If you got a surveyor from the government and granted you the land behind the 50ft	People should report MPW RE…Anything beyond the 50ft, the MPW will pay for it.	

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No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
6.	Betty T. Roberts	0778320643	I am a tenant and making business, will my landlord benefit, or will I benefit	The landlord will get two types of money: money for breaking the house down, and a replacement benefit. You, the tenant, will get paid for ur business	
7.	G. Marcus Meezoe	0775783377/0888042121	Why, if I bought the land in the 80s but it was not developed until your arrival, why, if the person has a well-decent structure and the other a makeshift, will they get the same benefit? Statement: Thank God the county authority is here, we have a project before that worth 3.5m, it is time to represent us so we can get a good road for the hospital as a corporate social responsibility	If you bought the land in the 80s and it fell in the ROW and was not developed, we don't compensate for land but rather for structure/crop or farm; about decent structure and makeshift, no, the approved values vary/not the same. We only determine what is makeshift. We agreed with you that the project should have corporate social responsibility, and this can be discussed with the project implementers.	
8.	Evans G. Wleh	0776393778	Does the Ministry give the land surveyors the county map, or are they (land surveyors) aware of the ROW?	All surveyors licensed by the Ministry of Mines and Energy and the Liberia Land Authority (LLA) are aware of the ROW. Very soon, the Ministry of Public Works will be decentralizing and will be working alongside LLA, going into communities to open alleys/streets. There is an existing law that before you construct anything, you should consult MPW. Contact the RE for more information.	
9.	Yuku Clark	0775866259	Why if you are the one who gave me the land, and after 3 to 4 years, and then you come to	The Ministry of Public Works doesn't give people land in the ROW.	

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No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
			mark the place, who is at fault, me or you		
10.	Stephen Samkolo	0776182029	Some of us have front views, and some people came to us for container spots. Why, if I have collected the money from the person who has the container, will I be responsible?	No, you will not be responsible, but we will compensate the person who owns the container to relocate his/her container.	
11.	John B. Flanjay	0777	Although you said before that a person can build a house should consult MPW, but in actuality, that is not happening. I will kindly ask you to create awareness	The MPW is doing awareness, info will	
12.	Alhaji Jorgor Bah	0770673931	What happens to people who have wheelbarrows and containers beside the road	No extra land, those with wheels should be removed, but those with containers will be compensated; again, let me say this, we are not buying containers; however, we will compensate only if the container is stationed in the ROW.	
13.	Westong King	0770688020	I'm from the LFA (Liberia Football Association). I want to know if the 50ft enters the market, what will happen to the market?	Under this project, there are certain facilities that we are very careful of, such as schools, hospitals, markets, etc. If the market is highly impacted, we will try our best to compensate; if not, avoid but if there's no way, we will relocate the market.	
14.	Afred B. Dennis	0776415170	I want to know if LLA and MPW are working together because I believe LLA should be the one to notify me.	Yes, the Ministry of Public Works is working in collaboration with the Liberia Land Authority (LLA) and other line ministries/agencies for this Project.	

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No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
15.	Decontee Jones	0776969663	If the marking exercise starts on Sunday and your house falls directly within the 50-foot right-of-way, will you be asked to be removed immediately?	No, it will not be automatic. The exercise is in phases, and until we can compensate, you will be given a 90-day grace period (about 3 months) for your relocation.	

Closing Remarks: The closing remarks were made by the newly appointed GM Committee Chairman (Mr. Lincoln Togar), followed by the Environmental Social Safeguard Officer, and the Project Engineer of the Programme Implementation Unit (PIU), Ministry of Public Works.

The meeting was adjourned by 7:08 p.m. with a closing prayer by the ESAFE/RP Officer of the Ministry of Public Works.

Grievance Redress Committee (GRC)

No	Name	Position	Telephone Number
1.	J. Matthew Cooke	Chairman	0775726623
2.	Josiah M. Jacobs	Co-Chair	0775587401
3.	Pst. Hohn B. Flangai	Secretary	0777377223
4.	Betty Roberts	Women Representative	0778320643
5.	G. Marcus Meezoe	Youth Representative	0775783377
6.	Alphanso Garway	Men Representative	
7.	Peter D. Jimmy	People with Disability's Representative	

APPENDIX 7.2: PUBLIC CONSULTATION MEETING MINUTES – BIG JOE TOWN

Project Title: Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP) Phase V - Lot I: Paving of Buchanan to Cestos City Junction (60.9km) in Grand Bassa and Rivercess counties

Meeting Venue: Big Joe Town's Town Hall, Big Joe Town, Buchanan City, Grand Bassa County

Objective/Purpose of the Meeting: The Public Consultation Meeting for the Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP) Phase-V Lot-1, specifically focusing on the paving of the Buchanan to Cestos City Junction (60.9km) road project in Grand Bassa and Rivercess counties, has several key objectives and purposes:

1. Stakeholder Engagement: To engage with local stakeholders, including community members, local governments, and relevant interest groups, to ensure that their voices and concerns are heard regarding the road development project.

2. Information Dissemination: To provide accurate and comprehensive information about the project's scope, benefits, anticipated impacts, and timelines to the affected communities, allowing stakeholders to make informed contributions.

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3. Feedback Collection: To gather feedback from the public regarding their perspectives on the project, including any potential concerns or suggestions for improvement.

4. Transparency and Accountability: To promote transparency in the decision-making process related to the project planning and execution, fostering trust and cooperation between the project authorities and the communities.

5. Identifying Local Needs: To identify and discuss local needs, expectations, and challenges that may arise during the implementation of the road project, ensuring that the project aligns with the community's socio-economic goals.

6. Addressing Environmental and Social Concerns: To address any environmental or social concerns that may arise from the road construction, discuss mitigation strategies and ensure sustainable project implementation.

7. Strengthening Community Relationships: To strengthen the relationship between the project implementers and the communities, facilitate cooperation and collaboration throughout the project's duration.

8. Building Support for the Project: To build support for the road project among the local population, emphasizing the anticipated economic and social benefits that the paved road corridor will bring to the region.

By organizing such a consultation meeting, the MRU/RDTFP aims to foster a collaborative environment that prioritizes community input and enhances the project's overall effectiveness and acceptance in the targeted areas.

Date: January 14, 2025

Time: 2:50 p.m.

Meeting Agenda:
1) Opening Prayer
2) Welcome Remarks and Introduction of Local Authorities and RP & ESIA Team Members
3) Overview of the Project
4) Question and Answer Session
5) Establishment of the Grievance Redress Committee (GRC)
6) Signing of the Cut-Off Date’s Form
7) Recap of the Key Discussion Points
8) Closing Remarks
9) Closing Prayer

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4. Opening Prayer: The opening prayer was done by a volunteer. Welcome Remarks and Introduction of Local Authorities and RP & ESIA Team Members: The meeting was called to order at about 2:50 p.m. with an opening prayer followed by an introduction.

5. Overview of the Project: A brief overview of the project was done by Mr. Amando G. Paye, Director of the Environmental and Social Safeguard (ESAFE) Division of the Ministry of Public Works. Mr. Paye informed the participants about the impacts of the upcoming road project: Basic information disclosed to participants included the following:

xiii) Persons/crops or farms to be affected by the project;
xiv) ROW of 75Ft from the centerline on the left-hand side (LHS) and 75Ft on the right-hand side (RHS) for Highway and 50Ft (LHS) and 50Ft (RHS) in towns/cities sections;
xv) Cut-Off Date: 14 January 2025. This is the controlling RP eligibility cut-off date; the 15 January 2025 Yarpah Town meeting was a follow-up notification and GRC establishment meeting.
xvi) Vulnerable persons above 65 years, disabled persons to benefit;
xvii) Transportation assistance;
xviii) No payment will be made to anyone owning land in the ROW
xix) Person/s with business to benefit;
xx) Vulnerability;
xxi) Structures/crops values are determined by the Ministry of Agriculture and the Ministry of Public Works
xxii) Illegibility or what qualifies you to benefit from the RP is not a land deed, but rather a system that has been put into place that will qualify project-affected persons
xxiii) Structure/crop coding was discussed as CJ-CC, followed by a particular number to be assigned to the affected structure/crop/farm, followed by photo-taking, and that structure/crop/farm coding is subject to change depending on the location.
xxiv) Valid ID-Cards, either Citizen/Voting ID-cards, to be given
xxv) Replacement Cost

6. Questions and Answers Session

No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
16.	Joe Wadah	0779878318	I understood everything you said, but my question is, what happens to people who have a market, boots, and a kitchen	We will mark all those structures, including boots, containers, etc., that fall directly in the ROW. For public facilities such as hospitals, schools, markets, etc., we will try our best to avoid them, and if not, then we will compensate or relocate to a suitable area.	

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No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
17.	Philip Lahai	0777064053	We bought land along the road and got deeds. What will happen to us? Are these deeds not important?	The deeds are very valid, but even if you have the deed, you will still have to get the letter of attestation from the commissioner's office or the designated authority.	
18.	Stephen Da	0776828496	What happens if the house is near the light pole?	For us, we are not concerned about the light poles but the road's ROW or the measurement, because even some light poles are planted deep in the ROW.	
19.	Moses A. Dingwall	0777525300	Making sure that things go right to better inform our people. We are very happy about this project, and we pray that this road project commences soon	Thank you, and yes, we will try our best to commence the project soon. This is why we are here to first deal with the resettlement issues.	
20.	Jerry Tonteh	0770289906	What happens to deeds that are not probated?	The deeds are just extra information for us, but the requirement is for your local authority to recognize you. This is why you will be required to obtain attestation from the commissioner's office.	
21.	Ben Greece	0777089614	Will the structure/s marked be paid for before the demolition?	After this process, we will go and come back to work with the local authority, then again go and come to verify, then go back once again and come back for compensation. So we will need people with valid IDs like citizen ID, etc. After paying you, we will tell you the time you need to relocate. You have the right to take anything within that time given to you. However, after that time (about 90 days-about 3 months), and you are still there, then don't blame us. Please keep the number that we are putting on the house.	
22.	Nelson Togar	0778384495	What becomes of the land space of the house spot, and 2, what becomes of	We don't pay for land that falls in the ROW. In the past, the government had	

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No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
			the cemetery along the road that falls in the ROW?	a law in place for you not to build or construct anything in the road ROW. The government has a certain distance along the road that you don't need to build there; however, the government will compensate you as long as your house or crops/farm fall within the ROW. For the cemetery, we will try all means to avoid it, but where not possible, we will work with our environmentalists and local authority to relocate.	
23.	Manasseh S. Gbar	0776465682	We are working on different projects, and we already have the existing GRC set up. Would it be good if we continue with it?	No, this is a road project with different functions, so it's good to have its own Grievance Redress Committee (GRC) set up. Besides, if the people are not satisfied with your existing GRC, it will be a problem for us, so it's good to have our own GRC.	

Establishment of the Grievance Committee: the meeting was called to establish a Grievance Redress Committee comprising a Chair, Co-Chair, Secretary, Women Representative, Youth Representative, disabled representative, and Men Representative; 20 minutes were allotted for establishing the committee.

Closing Remarks: The closing remarks were made by the newly appointed GM Committee Chairman (Mr. Lincoln Togar), followed by the Environmental Social Safeguard Officer, and the Project Engineer of the Programme Implementation Unit (PIU), Ministry of Public Works.

The meeting was adjourned at 6:57 p.m. by a closing prayer by the ESAFE/RP Officer of the Ministry of Public Works.

Grievance Redress Committee (GRC)

No	Name	Position	Telephone Number
8.	Manasseh S. Gbar	Chair	0776465682
9.	Ciapha S. Sesay	Co-Chair	0775192913
10.	Nelson Togar	Secretary	0778384495
11.	Mary Hill	Women Representative	0776351157
12.	David Hill	Men Representative	0775051753
13.	Joe Wadah	Youth Representative	0779878318

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No	Name	Position	Telephone Number
14.		People with Disability's Representative	

APPENDIX 7.3: PUBLIC CONSULTATION MEETING MINUTES – YARPAH TOWN

.

Project Title: Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP) Phase V - Lot I: Paving of Buchanan to Cestos City Junction (60.9km) in Grand Bassa and Rivercess counties

Meeting Venue: Yarpah Town's Town Hall, Yarpah Town, Rivercess County

Objective/Purpose of the Meeting: The Public Consultation Meeting for the Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP) Phase-V Lot-1, specifically focusing on the paving of the Buchanan to Cestos City Junction (60.9km) road project in Grand Bassa and Rivercess counties, has several key objectives and purposes:

1. Stakeholder Engagement: To engage with local stakeholders, including community members, local governments, and relevant interest groups, to ensure that their voices and concerns are heard regarding the road development project.

2. Information Dissemination: To provide accurate and comprehensive information about the project's scope, benefits, anticipated impacts, and timelines to the affected communities, allowing stakeholders to make informed contributions.

3. Feedback Collection: To gather feedback from the public regarding their perspectives on the project, including any potential concerns or suggestions for improvement.

4. Transparency and Accountability: To promote transparency in the decision-making process related to the project planning and execution, fostering trust and cooperation between the project authorities and the communities.

5. Identifying Local Needs: To identify and discuss local needs, expectations, and challenges that may arise during the implementation of the road project, ensuring that the project aligns with the community's socio-economic goals.

6. Addressing Environmental and Social Concerns: To address any environmental or social concerns that may arise from the road construction, discuss mitigation strategies and ensure sustainable project implementation.

7. Strengthening Community Relationships: To strengthen the relationship between the project implementers and the communities, facilitate cooperation and collaboration throughout the project's duration.

8. Building Support for the Project: To build support for the road project among the local population, emphasizing the anticipated economic and social benefits that the paved road corridor will bring to the region.

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By organizing such a consultation meeting, the MRU/RDTFP aims to foster a collaborative environment that prioritizes community input and enhances the project's overall effectiveness and acceptance in the targeted areas.

Date: January 15, 2025

Time: 2:00 p.m.

Meeting Agenda: 1) Opening Prayer
2) Welcome Remarks and Introduction of Local Authorities and RP & ESIA Team Members
3) Overview of the Project
4) Question and Answer Session
5) Establishment of the Grievance Redress Committee (GRC)
6) Signing of the Cut-Off Date's Form
7) Recap of the Key Discussion Points
8) Closing Remarks
9) Closing Prayer

7. Opening Prayer: The opening was done by John Z. Grant. Welcome Remarks and Introduction of Local Authorities and RP & ESIA Team Members: The meeting was called to order at about 2:00 p.m. with an opening prayer followed by an introduction.

8. Overview of the Project: A brief overview of the project was done by Mr. Amando G. Paye, Director of the Environmental and Social Safeguard (ESAFE) Division of the Ministry of Public Works. Mr. Paye informed the participants about the impacts of the upcoming road project: Basic information disclosed to participants included the following:

xxvi) Persons/crops or farms to be affected by the project;
xxvii) ROW of 75Ft from the centerline on the left-hand side (LHS) and 75Ft on the right-hand side (RHS) for Highway and 50Ft (LHS) and 50Ft (RHS) in towns/cities sections;
xxviii) Cut-Off Date: 14 January 2025. This is the controlling RP eligibility cut-off date; the 15 January 2025 Yarpah Town meeting was a follow-up notification and GRC establishment meeting.
xxix) Vulnerable persons above 65 years, disabled persons to benefit;
xxx) Transportation assistance;
xxxi) No payment will be made to anyone owning land in the ROW
xxxii) Person/s with business to benefit;
xxxiii) Vulnerability;
xxxiv) Structures/crop values are determined by the Ministry of Agriculture and the Ministry of Public Works

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xxxv) Illegibility or what qualifies you to benefit from the RP is not a land deed, but rather a system that has been put into place that will qualify project-affected persons

xxxvi) Structure/crop coding was discussed as CJ-CC, followed by a particular number to be assigned to the affected structure/crop/farm, followed by photo-taking, and that structure/crop/farm coding is subject to change depending on the location;

xxxvii) Valid ID-Cards, either Citizen/Voting ID-cards, to be given

xxxviii) Replacement Cost

9. Questions and Answers Session

No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
24.	Philip Zion	0776103192	If the house owner is not around and the caretaker puts his/her name down instead of the house owner's name, will the house owner have a second choice to change the name to the rightful name?	Yes, the house owner will have the opportunity to make the necessary changes. We will come back to do re-verification, and all will be corrected. House/crop/farm owners will have to provide attestations from the commissioner's office to authenticate ownership.	
25.	Nathanel Zoktoh	0777348322	Scrutinizing of the rightful names of property will be done before you give a check for the affected property. Will the rubber farm be affected?	Yes, we will come back to do re-verification; house/crop/farm owners will have to provide attestations from the commissioner's office to authenticate ownership. Regarding rubber farms, yes, as long as the rubber farm falls directly within the ROW, we will mark the portion of those rubber trees that fall in the ROW and compensate.	
26.	Marcus Hwito	0776053451	In marking, if the house owner is not around and a different name is given, how do we correct or change it to the house owner's name?	Your question is the same as Philip Zion's. The house owner will have the opportunity to make the necessary changes. We will come back to do re-verification, and all will be corrected. House/crop/farm owners will have to provide attestations from the commissioner's office to authenticate ownership.	
27.	Abel Kolleh	0777485670	Will the light poles be removed or will they be	Yes, light poles that fall within the ROW will be relocated if there are no	

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No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
			in the middle of the road?	engineering alternatives. Realignment of the road to avoid the affected light poles will be done by the engineers.	
28.	Grace Fahgon	0770292771	In building a new structure, should I take another 75ft from the old structure?	Very good question, thank you. No, you can build anywhere behind where the 75ft or 50ft from the center lane ends. No one should be allowed to carry on development in the road ROW even after the asphalt pavement or road construction is over. The road measurement of the ROW is: In city areas, 50ft from the center lane on the left and 50ft from the center lane on the right; and on the highways, 75ft from the center lane on the left and 75ft from the center lane on the right.	
29.	Alice Joe	0775050120	What if somebody gives you land and you construct a structure on that land and you come to mark that structure? In this case, who should be compensated?	The person to be compensated will be the person who built or owned the structure. As I said earlier, the government does not pay for land that falls in the ROW.	
30.	Morriz E. Z. Bowen	0775578959	What will happen to the affected graves that were marked? Will seasonal or cash crops be paid for?	Affected graves that fall in the ROW and are marked by us will be compensated for. Cemeteries will be avoided if not compensated as well. Concerning seasonal crops, the government only pays for economic or cash crops like coffee, cocoa, rubber, sugar cane, palm, etc., and not seasonal crops.	
31.	Evelyn Cee	0775453787	After receiving my compensation, and the town chief says he deserves or wants a portion of my money for giving land, what should be done?	Do not give anything to whosoever, be it the town chief, commissioner, or any government or local authority officials; the government paying/compensating you for you to build yourself a new home or make another farm, it's not for you to	

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No.	Name of Participant	Participant's Telephone Number	Comment/Question from Participant	Response/Answer from Consultant & MPW-ESAFE Team	Remarks
				share or eat that money. In time to come, we will come back to check or see what you did with the money the government gave you because this road project is meant to improve people's lives.	
32.	Mesheda Washington	0771252368	My kitchen is old and is about to collapse. Will it still be marked and paid for?	As long as the kitchen falls in the ROW of the road, yes, it will be marked and compensated for, but as of the cut-off date (January 20, 2024), no one is allowed to build or do anything within the 50ft or 75ft ROW.	
33.	Bockai T. Junior	0771683355	Will the market stalls be compensated?	Yes, as long as the market stalls (shops/boutiques), telephone booths, gas stations, etc., fall in the project ROW, they will be compensated accordingly.	
34.	Nathaniel Doe	0777797390	What happens if you planted crops somewhere and then you relocate, and then another person who lives near those crops tries to claim said crops? Who is entitled to the compensation?	The crop owner will be entitled to the compensation regardless of where he/she lives. That is why you will be asked to provide us with the attestation from the commission's office for authentication. And if anyone is caught in any criminal behavior, fraudulent acts or cheating will be dealt with according to the law.	

Establishment of the Grievance Committee: the meeting called to establish a Grievance Redress Committee comprising a Chair, Co-Chair, Secretary, Women Representative, Youth Representative, disabled representative, and Men Representative; The GRC was separated into two (2) groups, with one group responsible for Steward Town to Yarpah, while the other group was responsible for Yarpah Town to Cestos River/ITI Bridge. 20 minutes were allotted for establishing the committee.

Closing Remarks: The closing remarks were made by the newly appointed GM Committee Chairmen (Harris Joe and Uriah Cokar) followed by the Environmental Social Safeguard Officer, and the Project Engineer of the Programme Implementation Unit (PIU), Ministry of Public Works.

The meeting was adjourned at 6:01 p.m. by a closing prayer by the ESAFE/RP Officer of the Ministry of Public Works.

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Grievance Redress Committee (GRC): Steward Town to Yarpah Town

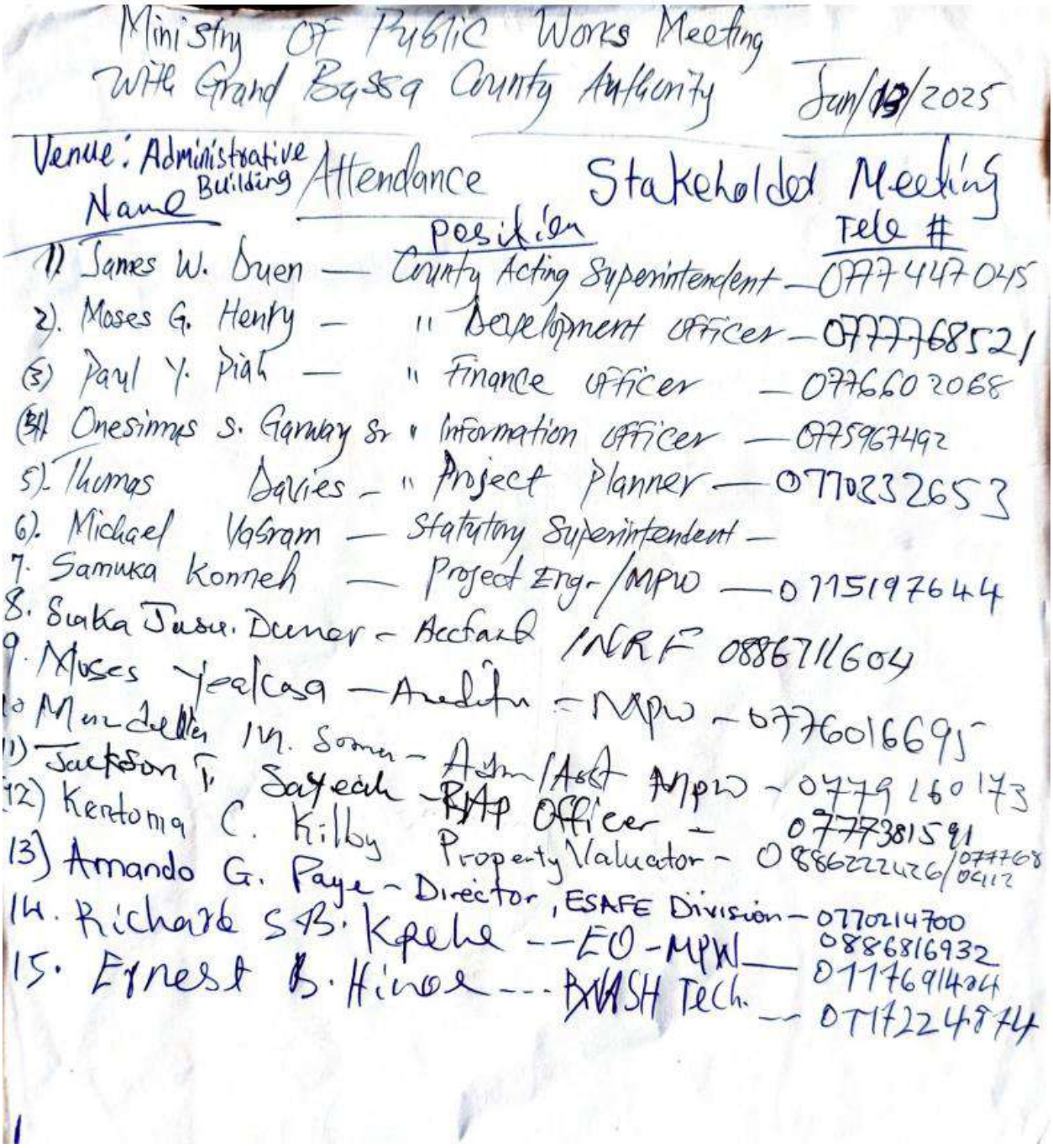
No	Name	Position	Telephone Number
15.	Harris Joe	Chairman	0779151157
16.	Matthew Karbon	Co-Chair	0778894943
17.	Junior Z. Watson	Secretary	0886467733
18.	Alice Joe	Women Representative	0775050120
19.	Junnior Kaizah	Men Representative	0770295356/0886520077
20.	Eric James	Youth Representative	0776883435
21.	Ma Manezoego	Elderly/People with Disability	0775278457
22.	Nathaniel Deed	Elderly/People with Disability	0777797390

Grievance Redress Committee (GRC): Yarpah Town to Cestos River/ITI Bridge

No	Name	Position	Telephone Number
1.	Uriah Cokar	Chairman	0770348056
2.	Marcus Hwito	Co-Chair	0776053451
3.	Hezekiah K. David	Secretary	0775174542
4.	Winee Gelgeh	Women Representative	0777510229
5.	Honthan O. Saturdaye	Men Representative	0779075998
6.	Amara M. Kuyateh	Youth Representative	0770675680
7.	Redeemer Benjones	Elderly/People with Disability	0772153932/0881883457

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APPENDIX 7.4: STAKEHOLDER ENGAGEMENT ATTENDANCE RECORD



Ministry Of Public Works Meeting
With Grand Bassa County Authority Jan/13/2025

Venue: Administrative Building Attendance Stakeholder Meeting

Name	Position	Tele #
1) James W. Duen	County Acting Superintendent	0777447045
2). Moses G. Henry	" Development Officer	0777768521
(3) Paul Y. Piah	" Finance Officer	0776602068
(4) Onesimus S. Garway Sr.	" Information Officer	0775967492
5). Thomas Davies	" Project Planner	0770233653
6). Michael Vasram	Statutory Superintendent	
7. Samuka Konneh	Project Eng./MPW	0775197644
8. Siaka Jusu. Dumar	Accfard /NRF	0886711604
9. Moses Yealcay	Auditor - MPW	0776016695
10 Mundella M. Somo	Adm/Acct MPW	0779160173
11) Jackson T. Sayeah	RAP Officer	0777381591
12) Kentoma C. Kilby	Property Valuator	0886222426/0777768 04112
13) Armando G. Paye	Director, ESAFE Division	0770214700
14. Richard S.B. Kpehe	EO-MPW	0886816932
15. Ernest B. Hinds	WASH Tech.	0777691424
		0777224874

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APPENDIX 7.5: PROJECT PROPONENT APPLICATION AND EPA APPROVAL FOR THE ESIA

REPUBLIC OF LIBERIA
MINISTRY OF PUBLIC WORKS
P.O. Box 9011
South Lynch Street
Monrovia, Liberia

Office of the Minister

Ref.: RLG-M/MPW-RL/763/'24

November 15, 2024

Hon. Dweh Siehwloh Bolay, Sr.
Acting Executive Director
Environmental Protection Agency
9th Street, Sinkor, Monrovia

REF: APPLICATION FOR EPA PERMIT: PAVING OF BUCHANAN CITY TO GREENVILLE CITY (205 KM) AND CESTOS CITY JUNCTION TO CESTOS CITY (32KM) ROAD CORRIDOR IN GRAND BASSA, RIVER CESS AND SINOE COUNTIES

Dear Hon.: Yorkoawolo:

The Government of the Republic of Liberia has received funding from the African Development Bank Group (AfDB) for the paving of Buchanan City to Greenville City Road Corridor (237 km). As part of the co-interpart support, the Government has been requested to undertake the detailed engineering design and feasibility studies, which are inclusive of the Environmental Social Impact Assessment (ESIA), and Resettlement Action Plan (RAP) studies. The Environmental Social Impact Assessment (ESIA), and Resettlement Action Plan (RAP) studies will include civil work construction of the Buchanan City to Greenville City Road Corridor (237 km). The project will be delivered in three (3) lots: Lot-1: Paving of Buchanan City to Cestos River Bridge (74Km); Lot-2: Paving of Cestos City Junction to Cestos City (32Km); and Lot-3: Paving of Cestos City to Greenville City (131Km) in Grand Bassa, River Cess and Sinoe counties.

Given the foregoing, the Ministry of Public Works (MPW), the Contracting Authority, desires to employ an EPA-certified evaluator/consulting firm to conduct ESIA and RAP Studies. The first phase of the studies will commence from Buchanan City to Cestos River Bridge (74km) and Cestos City Junction to Cestos City (32 km). The two road sections (106km) are in Grand Bassa and River Cess Counties.

With this background, the Ministry hereby submits to your honorable office the application for Environmental Authorization (EA) to conduct an Environmental Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) Studies by EPA's Certified Environmental Evaluator for the construction of the above-mentioned road corridor.

This request is in line with the Revised Environmental and Social Impact Assessment and Strategic Environmental Assessment (ESIA/SEA) Procedural Guidelines (2022), Chapter II, and to fulfill the requirements as provided in the Environment Protection and Management Law (EPML 2003); Section 6 of the EPML. These are part of the mandatory requirements for Environmental Screening and/or Environmental Impact Assessment of all investment works or projects likely to have significant adverse environmental impacts with subsequent issuance of licensing or permitting from the EPA as stipulated in the legislation.

Please do not hesitate to contact the Ministry if there are any queries relating to the above matters.

We appreciate your usual kind assistance in these processes.

Sincerely yours,

Roland Layfette Giddings
Minister

CC: Hon. Prince D. Tambah, Sr. – Deputy Minister for Technical Services/ MPW
Mr. Rawlings Baco Kessely – Programme Coordinator, AfDB Road Programme

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Suggestions:

To be placed as annexures

- Copy of officially notified GRC
- Consent forms of the participants during consultation meetings
- Notified applicable Guidelines for Water, Soil, Noise and Air Monitoring

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APPENDIX 7.6: TEMPLATE BLASTING MANAGEMENT PROTOCOL

The following template establishes the minimum technical, environmental, social, occupational health and safety requirements for controlled blasting activities associated with tunnel excavation, rock cutting and other construction works. The Contractor shall prepare a detailed, site-specific Blasting Management Plan (BMP) based on this template and obtain the required statutory authorisations and project approvals before commencing blasting operations.

No.	Thematic Area	Minimum Requirements and Implementation Measures	Required Documentation / Evidence
1	Project and Blasting Site Details	Identify blasting locations, chainages, coordinates, purpose, excavation type, geological conditions, proposed duration and proximity to settlements, infrastructure and sensitive receptors.	Site layout plan, coordinates, chainage-wise blasting schedule and site photogRP hs.
2	Regulatory Compliance and Permits	Identify and obtain all applicable statutory permits, explosives authorisations, security clearances and environmental approvals. Ensure compliance with applicable Liberian legislation and project safeguard requirements.	Valid permits, licences, approvals and regulatory correspondence.
3	Blasting Design and Methodology	Develop a site-specific controlled blasting design considering geological conditions, rock characteristics, excavation geometry, proximity to structures and vibration-sensitive receptors. Define blast sequence, design parameters and operational controls through a qualified blasting engineer.	Approved blast design, method statement, geological assessment and risk assessment.
4	Explosives Procurement, Transportation and Storage	Establish secure and legally authorised arrangements for explosives procurement, transportation, storage, inventory control, handling and disposal. Restrict access to authorised and competent personnel.	Explosives licences, inventory registers, transportation records and storage inspection records.
5	Sensitive Receptor Identification and Risk Assessment	Identify and map nearby residential structures, schools, health facilities, religious places, utilities, roads, water resources, ecological habitats and cultural heritage receptors. Establish receptor-specific protection measures.	Sensitive receptor inventory, GIS maps, risk assessment and protection measures.
6	Pre-Blasting Structural Condition Surveys	Undertake photogRP hic and condition surveys of potentially affected buildings, structures, utilities and infrastructure before blasting. Establish a documented baseline for subsequent damage assessment and grievance resolution.	Pre-blasting survey reports, geotagged photogRP hs and property condition records.
7	Ground Vibration and Air Overpressure Management	Establish baseline conditions, receptor-specific monitoring locations and project-approved vibration and air-overpressure criteria. Conduct instrumental monitoring during blasting and implement corrective measures where thresholds are approached or exceeded.	Baseline measurements, monitoring results, calibrated instrument certificates and exceedance reports.
8	Fly-rock and Blast Debris Control	Establish appropriate exclusion zones, controlled access, protective coverings and other engineered containment measures to prevent fly-rock and debris from affecting workers, communities, infrastructure and surrounding land.	Exclusion-zone plans, inspection checklists and blast safety records.
9	Noise, Dust and Air Quality Management	Implement measures to control blast-related noise, dust and particulate emissions, including appropriate timing, dust suppression and monitoring where warranted. Avoid blasting during sensitive periods and comply with applicable standards.	Noise and air-quality monitoring records, dust-control inspection reports and blasting schedules.
10	Community Health, Safety and Notification	Notify potentially affected communities in advance through appropriate communication channels. Establish warning signals, controlled access, evacuation arrangements where necessary, designated safety personnel and emergency contact mechanisms.	Community notification records, attendance sheets, warning protocols and emergency contact directory.

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11	Occupational Health and Safety	Ensure blasting is undertaken by qualified and authorised personnel under competent supervision. Provide appropriate PPE, safe working procedures, communication arrangements, exclusion-zone enforcement and emergency preparedness.	Personnel qualifications, training records, toolbox talks, PPE records and OHS inspection reports.
12	Misfire and Emergency Response Management	Establish procedures for blast misfires, suspected unexploded explosives, accidental detonation, injury, fire and other emergencies. Secure affected areas and ensure intervention is undertaken only by authorised blasting personnel.	Misfire procedure, emergency response plan, incident registers and investigation reports.
13	Environmental Protection Measures	Protect surface water, groundwater, drainage channels, riparian vegetation, wildlife habitats and adjacent land from blasting-related impacts. Prevent contamination from explosives residues, debris and associated activities.	Environmental inspection reports, water-quality monitoring where required and waste management records.
14	Blast Execution and Operational Controls	Establish pre-blast clearance inspections, personnel accountability, communication protocols, warning sequences, blast-area security and post-blast inspection requirements. No subsequent work shall proceed until the area is declared safe by the authorised blasting supervisor.	Pre-blast clearance checklist, blast execution log, post-blast inspection and safety clearance records.
15	Monitoring, Reporting and Corrective Actions	Maintain records of every blast, including date, time, location, design parameters, responsible personnel, monitoring results, complaints, incidents and corrective measures. Report significant incidents and non-compliance to the Supervising Consultant and PIU.	Daily blasting records, monitoring reports, incident reports, complaints register and corrective action tracker.
16	Community Grievance Management	Provide accessible channels for receiving and resolving complaints relating to vibration, structural damage, noise, dust, safety and other blasting-related impacts. Investigate complaints and document resolution and corrective actions.	Blasting-specific grievance register, investigation reports and resolution records.
17	Post-Blasting Inspection and Site Rehabilitation	Inspect excavation faces, slopes, adjacent structures and drainage systems following blasting. Undertake scaling, stabilisation, debris removal and reinstatement of affected areas, as necessary.	Post-blast inspection reports, slope stability records and rehabilitation documentation.
18	Institutional Responsibilities and Supervision	Clearly assign responsibilities to the Contractor, qualified blasting engineer, blasting supervisor, OHS personnel, environmental and social staff, Supervising Consultant and PIU. Establish inspection, reporting and approval arrangements.	Responsibility matrix, supervision records and approval documentation.
19	Training and Competency Requirements	Provide task-specific training to blasting personnel, safety officers, security staff and relevant workers on explosives safety, emergency response, community protection and environmental controls.	Training programme, competency certificates and training attendance records.
20	Review, Approval and Implementation	Submit the site-specific BMP, including blast designs, risk assessments, monitoring arrangements and emergency procedures, for review by the Supervising Consultant and approval/acceptance by the PIU in accordance with contractual arrangements. Update the plan whenever blasting locations, methods or risk conditions change.	Approved BMP, statutory authorisations, review comments, approval records and revised plans.

Mandatory implementation and approval requirements

1. The Contractor shall prepare a separate site-specific BMP for each blasting location or group of locations with comparable geological and receptor conditions.
2. All blasting shall be undertaken by qualified and legally authorised personnel using approved methods and equipment.
3. Baseline structural condition surveys and sensitive receptor assessments shall be completed before blasting near potentially affected properties and infrastructure.

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4. Ground vibration, air overpressure and other relevant parameters shall be monitored during blasting against applicable regulatory requirements and project-specific criteria.
5. The Contractor shall immediately report blasting-related incidents, damage, complaints and monitoring exceedances to the Supervising Consultant and PIU and implement corrective measures.
6. No blasting shall commence without the required statutory authorisations and approval of the site-specific BMP under the Project's E&S and contractual arrangements.

Note: The template establishes minimum requirements and does not replace statutory explosives licences, detailed blast engineering designs or site-specific risk assessments.

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APPENDIX 7.7: PREPLIMINARY QUARRY AND BURROW PITS REGISTER

No.	Site / Location	Owner / Operator	Licence / Permit Number and Issuing Authority	Material Type	GPS Coordinates	Licence Validity / Expiry	Operational Status	Environmental Approval / NOC	Land Ownership / Consent	Distance from Road Alignment / Chainage	Access Route / Haul Distance	Nearby Sensitive Receptors	Verification Requirements / Remarks
1	Grand Bassa County – exact site to be confirmed	Inland Investment Inc.	Class B Mining Licence; licence number to be verified with MME	Sand	To be surveyed	To be verified	To be verified	To be verified with EPA	To be verified	To be mapped against alignment	To be surveyed	To be identified during site inspection	Publicly recorded licence-holder information; confirm extraction-site location, licence validity, permitted commodity and operational status.
2	Rivercess County – exact site to be confirmed	S & K Mining Corporation Limited	Class B Mining Licence; licence number to be verified with MME	Rock / Aggregate	To be surveyed	To be verified	To be verified	To be verified with EPA	To be verified	To be mapped against alignment	To be surveyed	To be identified during site inspection	Publicly recorded licence-holder information; verify quarry location, extraction authorization, environmental approval and current operational status.
3	Buchanan / Grand Bassa County – potential	To be identified	To be verified with MME	Crushed Stone / Aggregate	To be surveyed	To be verified	To be verified	To be verified with EPA	To be verified	To be mapped against alignment	Existing access route and haul	Settlements, watercourses and other	Identify existing licensed quarries and assess their

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	aggregate source										distance to be assessed	sensitive receptors to be identified	suitability for project material supply.
4	Buchanan–Cestos corridor, Grand Bassa County – potential borrow area	To be identified	To be verified with MME, where applicable	Laterite / Selected Fill	To be surveyed	To be verified	To be verified	To be verified with EPA, where applicable	To be verified	To be mapped against alignment	Existing and potential access routes to be assessed	Settlements, agricultural land and watercourses to be identified	Identify existing borrow pits and verify extraction rights, environmental requirements and rehabilitation obligations.
5	Cestos Junction / Rivercess County – potential borrow area	To be identified	To be verified with MME, where applicable	Laterite / Selected Fill	To be surveyed	To be verified	To be verified	To be verified with EPA, where applicable	To be verified	To be mapped against alignment	Existing and potential access routes to be assessed	Settlements, watercourses and sensitive receptors to be identified	Assess availability of existing borrow areas and verify legal and environmental compliance before material sourcing.
6	Along the existing Buchanan–Cestos road corridor – additional material sources	To be identified	To be verified with MME	Sand / Gravel / Aggregate	To be surveyed	To be verified	To be verified	To be verified with EPA	To be verified	Chainage and distance to be recorded	Haul routes and approximate transport distances to be mapped	Nearby communities, drainage channels and ecological receptors to be identified	Identify existing operational sources, verify licences and assess transportation-related environmental and social risks.

Verification and mapping requirements

The following information shall be verified and incorporated into the final register:

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- Licensing: Confirm licence number, licence holder, permitted mineral/material, issuing authority, validity period and compliance with approved extraction limits through MME.
- Environmental authorization: Verify applicable EPA environmental permits, approvals or NOCs and compliance with relevant environmental requirements.
- Operational status: Confirm whether each facility is operational, temporarily inactive, proposed or closed through site inspection and consultation with the operator.
- Land ownership: Establish ownership status and obtain evidence of landowner consent or other applicable authorization for extraction and access.
- Spatial mapping: Record GPS coordinates and map each source against the proposed road alignment, including nearest chainage, distance from the alignment and location within Grand Bassa or Rivercess County.
- Accessibility and haulage: Identify existing access roads, potential access routes, approximate haul distances, road conditions and settlements along transportation routes.
- Environmental and social receptors: Identify nearby settlements, schools, health facilities, watercourses, wetlands, agricultural areas, forest patches and other sensitive receptors.
- Rehabilitation: Document existing site conditions, previous extraction activities, outstanding rehabilitation requirements and proposed restoration measures.

Implementation requirement under the C-ESMMP

The preliminary register shall be updated by the Contractor during preparation of the C-ESMMP. The Contractor shall verify the legal status, environmental approvals, operational status and extraction rights of all existing third-party quarries and borrow pits proposed for project material supply. Preference shall be given to existing legally established and operational sources, subject to their environmental and social suitability. Any new quarry or borrow pit proposed specifically for the project shall undergo the necessary environmental and social assessment, obtain applicable regulatory approvals and be covered by site-specific management and rehabilitation plans before operations commence. All required licences and authorizations shall remain valid throughout the period of material extraction or supply.

Note: The two named operators are preliminary leads from publicly available licence-holder information, not confirmed project material suppliers. Exact licence numbers, coordinates, validity and operational status remain subject to verification with the relevant authorities.

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APPENDIX 7.8: GUIDELINES FOR PREPARATION OF C-ESMMP

No.	Ancillary Facility / Environmental Component	Assessment Requirements Once Site Location Is Identified	Required Mitigation and Management Measures	Site Restoration and Rehabilitation Requirements	Monitoring / Performance Indicators	Required Documentation / Deliverables
A. SITE IDENTIFICATION, SELECTION AND APPROVAL						
1	Site identification and description	Identify GPS coordinates, site boundaries, total area, proposed activities, duration of use, access routes and surrounding land use.	Select previously disturbed or low-sensitivity land wherever practicable. Avoid environmentally and socially sensitive locations.	Establish pre-construction baseline conditions for comparison during final restoration.	Site boundaries verified; baseline photogRP hs available.	Site identification sheet, GPS coordinates, georeferenced layout and photogRP hs.
2	Environmental and social screening	Assess proximity to settlements, schools, hospitals, watercourses, wetlands, forests, protected areas, wildlife habitats and cultural heritage sites.	Avoid sites with unacceptable environmental and social risks. Establish appropriate buffers and obtain necessary clearances.	Identify restoration constraints and pre-existing environmental conditions.	Screening completed; sensitive receptors identified and mapped.	Site-specific E&S screening checklist, sensitivity map and site approval record.
3	Land ownership and land use	Determine ownership, existing land use, agricultural productivity, community use, lease requirements and potential displacement.	Obtain documented landowner consent or lease agreements. Address any economic or physical displacement under the applicable resettlement framework.	Reinstate land to its agreed original or approved alternative productive use.	Landowner consent available; land-use obligations fulfilled.	Land ownership records, lease agreement, consent and land handover agreement.
4	Permits and regulatory approvals	Identify applicable environmental permits, quarrying/mining licences, water abstraction permissions, forest clearances and local authority approvals.	Obtain all statutory approvals before establishment and comply with permit conditions.	Fulfil regulatory closure, decommissioning and rehabilitation requirements.	All applicable approvals valid and conditions complied with.	Permit and approval register; copies of licences, NOCs and clearances.
B. ANCILLARY FACILITIES AND ASSOCIATED MANAGEMENT REQUIREMENTS						
5	Construction camps and	Assess accommodation capacity, sanitation, drinking water,	Provide adequate accommodation, potable water, toilets,	Remove temporary structures, septic systems and waste; decontaminate	Sanitation and water quality; waste disposal records;	Camp Management Plan, camp layout, sanitation

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	labour accommodation	wastewater, solid waste, fire safety, drainage and proximity to communities.	wastewater treatment, waste collection, fire protection, first aid, security, workers' GRM and SEA/SH prevention measures.	affected areas, backfill excavations and reinstate vegetation or previous land use.	absence of residual contamination.	and waste management plans, camp closure plan.
6	Equipment yards and workshops	Assess machinery movement, fuel and lubricant handling, maintenance activities, noise, emissions and potential soil contamination.	Provide impermeable maintenance areas, oil-water separators, spill containment, designated refuelling areas and fire protection.	Remove machinery and structures, clean the site, remediate contaminated soil and reinstate ground conditions.	No uncontrolled spills; contaminated areas remediated; site cleared.	Equipment Yard Management Plan, workshop layout, spill prevention plan and closure report.
7	Asphalt plants	Assess prevailing wind direction, air quality receptors, nearby settlements, water requirements, noise and bitumen handling arrangements.	Install emission-control systems, dust suppression, covered conveyors, appropriate stack arrangements and bunded bitumen storage.	Dismantle plant infrastructure, remove bitumen residues, remediate contaminated soil and reinstate the site.	Air emissions, dust and noise monitoring; no residual bitumen contamination.	Asphalt Plant Management Plan, air quality monitoring plan and decommissioning plan.
8	Concrete batching plants	Assess aggregate and cement storage, water requirements, concrete washout, wastewater, drainage and dust generation.	Provide enclosed cement storage, designated washout areas, settling tanks, water recycling and dust suppression. Prevent untreated wastewater discharge.	Remove concrete residues and hardened material, dismantle equipment, remediate contaminated areas and restore drainage and ground conditions.	No uncontrolled washout discharge; wastewater managed; site cleared.	Concrete Batching Plant Management Plan, water management plan and restoration plan.
9	Crushers and aggregate processing plants	Assess land stability, dust, noise, vibration, material stockpiles, haulage routes and sensitive receptors.	Install dust suppression, noise controls, controlled material handling and designated access routes.	Remove machinery and stockpiles, reshape disturbed areas, stabilize slopes and revegetate exposed surfaces.	Dust and noise levels; slope stability; vegetation establishment.	Crusher Plant Management Plan, dust and noise monitoring plan and rehabilitation plan.
10	Quarries and borrow pits	Assess geology, extraction boundaries, excavation depth, groundwater, slope stability, drainage, vegetation, biodiversity and nearby communities.	Obtain extraction licences; define extraction limits, benches, maximum depths, safe slopes, drainage and setbacks. Prevent unauthorized extraction.	Backfill or reshape excavated areas where feasible, stabilize slopes, reinstate topsoil, restore drainage, undertake revegetation and ensure safe final landforms. Agree final land use with	Excavation within approved boundaries; stable slopes; no uncontrolled erosion; successful vegetation establishment.	Quarry/Borrow Pit Management Plan, extraction drawings, cross-sections, slope stability assessment, progressive rehabilitation and final closure plan.

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				the landowner and competent authority.		
11	Material and aggregate stockpiles	Assess soil type, drainage, wind exposure, runoff pathways and proximity to watercourses.	Store materials in designated areas, cover fine materials, segregate topsoil and prevent sediment-laden runoff.	Remove residual materials, decompact the ground, reinstate topsoil and restore vegetation.	No residual stockpiles; erosion controlled; topsoil reinstated.	Stockpile Management Plan, material storage layout and restoration checklist.
12	Temporary access roads and haul routes	Assess alignment, land requirements, vegetation clearance, drainage crossings, traffic and community access.	Utilize existing roads wherever practicable. Provide dust suppression, signage, speed limits and appropriate drainage.	Remove temporary roads where no longer required, restore natural drainage, decompact soil and reinstate previous land use.	Access routes rehabilitated; drainage functional; landowner acceptance.	Temporary Access Road Plan, Traffic Management Plan and Road Restoration Plan.
13	Explosives storage and blasting areas	Assess security, separation distances, nearby settlements, sensitive receptors, geology and potential vibration impacts.	Obtain required permissions and implement an approved Blasting Management Protocol, controlled storage, restricted access and blast monitoring.	Remove explosives and associated materials, decommission storage structures and inspect for contamination before reinstatement.	Blast monitoring records; secure closure; no residual hazardous materials.	Blasting Management Plan/Protocol, explosives storage approval, blast monitoring records and closure certificate.
14	Temporary offices and site facilities	Assess land requirements, utilities, wastewater, waste generation, drainage and potential community disturbance.	Ensure proper sanitation, waste collection, drainage, electrical safety and energy management.	Remove structures and utilities, clear debris, reinstate soil and restore the agreed land use.	All temporary infrastructure removed; site clean and safe.	Temporary Facilities Management Plan and restoration record.
15	Waste storage and disposal areas	Assess waste types, quantities, hazardous waste potential, soil permeability, drainage and nearby receptors.	Segregate waste, provide covered and bunded storage, label hazardous materials and use authorized disposal facilities.	Remove all stored waste, inspect for leakage, remediate contaminated soil and restore the site.	Waste disposal records; no residual waste or contamination.	Waste Management Plan, hazardous waste register and disposal receipts.
C. ENVIRONMENTAL AND SOCIAL COMPONENTS						
16	Air quality and dust	Establish baseline conditions, identify dust-generating activities, prevailing winds and sensitive receptors.	Apply water spraying, speed restrictions, covered transportation, equipment maintenance and emission controls. Prohibit open burning.	Stabilize exposed soil, revegetate disturbed surfaces and remove residual dust-generating materials.	Dust levels and ambient air quality against applicable standards.	Air Quality and Dust Management Plan; monitoring records.

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17	Noise and vibration	Identify baseline noise, residential and institutional receptors, equipment sources and blasting activities.	Restrict noisy activities to approved hours, maintain machinery, install acoustic barriers and implement vibration controls.	Remove temporary noise sources and verify that no residual disturbance remains.	Noise and vibration monitoring results; complaints register.	Noise and Vibration Management Plan; monitoring reports.
18	Surface water and drainage	Identify rivers, streams, seasonal nullahs, irrigation channels, floodplains and natural drainage pathways.	Maintain natural drainage, install appropriate culverts and diversion drains, prevent untreated wastewater discharge and control sediment runoff.	Restore natural drainage, remove temporary diversions and stabilize disturbed riverbanks and drainage channels.	Water quality; drainage functionality; absence of sediment discharge.	Surface Water Management Plan, drainage layout and water quality monitoring records.
19	Groundwater and water abstraction	Identify groundwater sources, wells, abstraction points, water table conditions and existing users.	Obtain water abstraction licences, monitor abstraction quantities and prevent groundwater contamination or overextraction.	Safely decommission temporary boreholes and reinstate abstraction areas.	Abstraction volumes; groundwater quality; compliance with licence conditions.	Water Abstraction Plan, abstraction licence, water quality results and borehole closure records.
20	Soil quality and contamination	Assess soil type, fertility, erosion potential and contamination risks from fuel, oil, chemicals and bitumen.	Salvage and separately stockpile topsoil; provide bunded fuel storage, designated refuelling areas and spill response materials.	Remove or remediate contaminated soil, decompact the ground, replace topsoil and restore soil fertility.	Soil quality; topsoil replacement; absence of residual contamination.	Soil Management Plan, topsoil inventory, contamination assessment and remediation records.
21	Erosion and sedimentation	Assess slope gradients, exposed surfaces, erosion-prone locations, runoff velocity and sediment pathways.	Implement silt fences, sediment tRP s, temporary drainage, slope stabilization and mulching.	Reshape slopes, reinstate topsoil, establish vegetation and maintain effective erosion control.	No progressive erosion; stable slopes; effective sediment control.	Erosion and Sediment Control Plan; slope stabilization and inspection records.
22	Biodiversity, flora and fauna	Identify natural and modified habitats, vegetation communities, wildlife movement routes, nesting areas and protected or threatened species.	Avoid unnecessary vegetation clearance, establish ecological buffers, prohibit hunting and wildlife disturbance and implement ecological chance-find procedures.	Restore disturbed habitats using suitable native species, control invasive species and monitor vegetation establishment and survival.	Native vegetation survival; habitat recovery; invasive species control.	Biodiversity Management Plan, vegetation clearance register and Habitat Restoration and Monitoring Plan.
23	Tree cutting and vegetation clearance	Record tree species, number, size, vegetation cover, topsoil depth and	Minimize clearance, obtain tree-felling permissions, salvage reusable	Reinstate salvaged topsoil, undertake native species plantation, grassing and	Plantation survival; ground cover; compliance with	Vegetation Clearance Plan, tree inventory,

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		areas requiring clearance.	topsoil and prohibit indiscriminate burning.	landscaping, and replace failed planting.	approved plantation targets.	plantation/compensation plan and monitoring register.
24	Wastewater and sanitation	Identify sewage sources, wastewater volumes, treatment capacity and potential contamination pathways.	Install septic tanks or appropriate wastewater treatment systems and prohibit discharge of untreated wastewater.	Empty and safely decommission septic tanks, remove wastewater residues and disinfect affected areas.	Wastewater treatment performance; no untreated discharge.	Wastewater Management Plan, maintenance records and decommissioning certificate.
25	Solid and hazardous waste	Identify waste streams, quantities, storage requirements, transport arrangements and authorized disposal facilities.	Implement waste segregation, reuse, recycling, appropriate storage, hazardous material labelling and authorized disposal.	Remove all waste, clean storage areas and remediate contaminated locations.	Waste inventory; disposal receipts; no residual waste.	Waste Management Plan, hazardous materials register and disposal records.
26	Occupational and community health and safety	Assess machinery hazards, excavation risks, blasting, traffic, fire, electrical hazards, worker accommodation and community exposure.	Implement OHS and Community Health and Safety Plans, emergency response, PPE, training, traffic management and restricted access.	Remove temporary hazards, secure excavations and ensure the site is safe for its intended future use.	Incident records; safety inspections; corrective action closure.	OHS Plan, Community Health and Safety Plan and Emergency Response Plan.
27	Cultural heritage and archaeological resources	Identify archaeological features, graveyards, religious places, historical structures and culturally sensitive locations.	Avoid sensitive locations and implement a Chance Finds Procedure, including work stoppage and notification of competent authorities.	Reinstate disturbed areas in accordance with competent authority instructions.	No unauthorized disturbance; chance finds appropriately managed.	Cultural Heritage Management Plan, Chance Finds Procedure and clearance records.
28	Traffic and community access	Assess haulage routes, traffic volumes, pedestrian movement and access to properties, markets, schools and community facilities.	Implement traffic controls, designated haulage routes, speed limits, signage, flagmen and community consultation.	Remove temporary diversions and restore public roads, access points and damaged community infrastructure.	Road condition; safe community access; grievances addressed.	Traffic Management Plan, road condition survey and reinstatement records.
29	Visual impacts and landscape	Assess visual intrusion, landscape character, exposed slopes, stockpiles and temporary structures.	Minimize unnecessary clearance, maintain orderly sites and prevent uncontrolled dumping.	Remove temporary structures, reshape landforms and undertake landscaping and revegetation.	Visual condition; removal of temporary infrastructure; landscape reinstatement.	Landscape Management Plan and site rehabilitation records.
D. DECOMMISSIONING, RESTORATION AND POST-CLOSURE MONITORING						

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30	Site decommissioning and clearance	Identify all temporary infrastructure, machinery, foundations, utilities, waste and disturbed areas.	Prepare a site-specific decommissioning schedule and ensure safe dismantling and removal.	Remove structures, equipment, waste and debris; remediate contamination and reinstate the site to the agreed final land use.	All temporary facilities removed; no residual waste or hazards.	Site Decommissioning Plan, infrastructure removal checklist and waste disposal records.
31	Landform and slope rehabilitation	Assess final ground levels, excavation profiles, slope stability, erosion potential and compatibility with surrounding terrain.	Ensure final landforms are physically stable and do not create additional flood, erosion or landslide risks.	Backfill, regrade, bench and stabilize disturbed areas as appropriate.	Stable landforms; no unacceptable erosion or slope failure.	Final Grading Plan and Geotechnical Inspection Report.
32	Topsoil replacement and soil rehabilitation	Assess availability, quality and suitability of salvaged topsoil and underlying soil conditions.	Prevent mixing topsoil with subsoil, debris or contaminated materials.	Replace topsoil to an appropriate depth, decompact soil and improve soil conditions where necessary.	Topsoil coverage and soil condition verified.	Topsoil Replacement Record and Soil Rehabilitation Checklist.
33	Revegetation and ecological restoration	Identify appropriate native grasses, shrubs and trees according to local ecological conditions, seasonality and intended land use.	Use locally appropriate native species and prevent the introduction or spread of invasive alien species.	Undertake plantation, grass seeding, mulching and habitat restoration; replace failed planting and maintain vegetation until establishment criteria are achieved.	Indicative first-year tree/shrub survival of at least 80%, subject to site-specific ecological conditions; adequate ground cover.	Ecological Restoration Plan, species list, plantation register and vegetation monitoring reports.
34	Watercourse and drainage restoration	Verify the condition of affected watercourses, drainage channels, culverts, riverbanks and temporary diversions.	Remove temporary obstructions and ensure restoration does not redirect runoff or increase downstream flood and erosion risks.	Reinstate natural flow paths, stabilize banks and restore riparian vegetation where disturbed.	Functional drainage; stable banks; no avoidable obstruction or sediment discharge.	Watercourse Restoration Plan and drainage inspection report.
35	Contaminated land remediation	Investigate spills, fuel leakage, chemical contamination, bitumen residues and evidence of soil or groundwater contamination.	Undertake appropriate sampling, delineation and remediation in accordance with applicable standards and regulatory requirements.	Verify that contamination has been removed or reduced to acceptable levels for the agreed future land use.	Laboratory results comply with applicable remediation criteria.	Contamination Investigation Report, Remediation Plan and laboratory test results.
36	Final land-use reinstatement and handover	Verify compliance with agreed restoration objectives, landowner conditions, permit	Conduct joint inspections with the Contractor, Supervision Consultant, PIU and landowner	Hand over the site in a safe, stable, clean and usable condition consistent with agreed post-construction land use.	All restoration obligations fulfilled; landowner acceptance obtained where applicable.	Joint Site Inspection Report, Landowner Acceptance/Handover Certificate and Site

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		requirements and approved C-ESMMP.	or relevant authority, as applicable.			Restoration Completion Certificate.
37	Post-restoration monitoring	Assess vegetation survival, ground cover, soil stability, erosion, drainage, water quality and residual contamination.	Implement corrective measures where restoration objectives are not achieved, including additional planting, erosion control and remediation.	Continue maintenance and remedial works until agreed restoration and closure criteria are fulfilled.	Restoration targets achieved; corrective actions closed; no significant residual impacts.	Post-restoration Monitoring Reports, Corrective Action Register and Final Site Closure Approval.
E. PREPARATION, REVIEW, APPROVAL AND IMPLEMENTATION OF SITE-SPECIFIC C-ESMMP						
38	Preparation of site-specific C-ESMMP	Prepare a separate plan for each ancillary facility, based on its location, design, proposed activities, environmental and social sensitivities and applicable legal requirements.	Define site-specific impacts, mitigation measures, monitoring indicators, implementation responsibilities, emergency response and reporting arrangements.	Include a dedicated, costed restoration and rehabilitation plan with methodology, schedule, measurable targets and closure criteria.	Complete plan addressing all relevant environmental and social risks.	Site-specific C-ESMMP and Restoration/Rehabilitation Plan.
39	Site-specific drawings and supporting studies	Prepare site layout, access routes, drainage arrangements, sensitive receptor maps, extraction drawings and other relevant technical assessments.	Incorporate design controls, environmental buffers, pollution prevention and safety arrangements into site layouts.	Include final landform, drainage, topsoil replacement, revegetation and post-restoration layout drawings.	Drawings and supporting studies consistent with actual site conditions.	Georeferenced site layout, cross-sections, drainage drawings and supporting assessments.
40	Review and approval	Submit the complete site-specific C-ESMMP and restoration plan before establishment or commencement of activities.	Address review comments and obtain written approval from the Supervision Consultant and PIU/NHA, as applicable. Obtain all statutory permits separately.	Ensure restoration provisions, budget, performance criteria and closure responsibilities are accepted before site occupation.	Written approval obtained; statutory permissions valid.	Review comments, compliance matrix, approval letter and permit register.
41	Implementation and environmental monitoring	Implement approved mitigation measures and conduct routine inspections and environmental monitoring throughout site operation.	Maintain qualified E&S personnel, monitoring equipment, inspection records and corrective action procedures.	Undertake progressive restoration wherever practicable rather than postponing all rehabilitation until final closure.	Compliance with approved monitoring schedule; corrective actions closed.	Inspection reports, environmental monitoring results and periodic C-ESMMP compliance reports.
42	Final closure and	Undertake final site inspection and verify completion of all	Address outstanding non-compliances and	Complete restoration, post-closure monitoring and any necessary remedial works	All agreed closure criteria achieved and verified.	Final Restoration Audit, Closure Report and

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	restoration acceptance	decommissioning, remediation and rehabilitation activities.	environmental liabilities before handover.	before obtaining final acceptance.		signed Site Handover Certificate.

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APPENDIX 7.9: INTEGRATED WASTE MANAGEMENT PLAN (IWMP)

No.	Waste Category / Source	Typical Waste Generated	Management Hierarchy / Mitigation Measures	Storage, Transportation, Treatment and Final Disposal	Responsible Entity	Monitoring Indicators / Frequency	Required Records / Verification
1	General domestic waste (camps, offices and kitchens)	Food leftovers, paper, cardboard, plastic packaging and household waste.	Minimize waste generation; segregate at source; promote reuse and recycling; prohibit open dumping and burning.	Provide covered, labelled bins; collect regularly; transport to authorized municipal collection or disposal facilities. Compost suitable biodegradable waste.	Contractor / Camp Manager / Environmental Officer	Waste segregation and collection – weekly.	Waste generation register; inspection checklist; disposal receipts.
2	Recyclable waste (offices, camps and construction sites)	Plastic bottles, metals, scRP steel, cardboard, paper, glass and packaging.	Prioritize reuse and recycling; establish separate collection points; minimize single-use materials.	Store in designated containers and transfer to authorized recyclers or registered scRP dealers.	Contractor / Waste Management Officer	Quantity recycled – monthly.	Recycling register; transfer receipts.
3	Construction and demolition waste	Concrete debris, broken asphalt, bricks, aggregates, timber and demolished structures.	Minimize generation; reuse suitable materials in approved construction applications; segregate reusable and non-reusable materials.	Store separately; reuse approved concrete and asphalt materials; transport residual waste to designated authorized disposal facilities.	Contractor / Construction Manager	Quantities generated, reused and disposed of – monthly.	Construction waste register; reuse records; disposal receipts.
4	Excavated soil and surplus earth	Topsoil, subsoil, rock fragments and surplus excavation materials.	Prioritize reuse; separately strip and preserve topsoil; minimize excavation and unnecessary disturbance.	Reuse suitable material in embankments, backfilling and landscaping. Dispose of unsuitable surplus material only at approved locations.	Contractor / Earthworks Supervisor	Excavated and reused quantities; topsoil storage inspections – monthly.	Excavation records; topsoil inventory; material reuse register.
5	Hazardous waste	Used lubricants, oily rags, contaminated soil, chemical containers, paint residues and solvents.	Prevent generation where possible; segregate hazardous waste; prohibit mixing with general waste; maintain spill response arrangements.	Store in sealed, labelled containers within covered and bunded areas. Transport through authorized handlers to approved treatment or disposal facilities.	Contractor's Environmental Officer / HSE Officer	Storage inspections – weekly; disposal verification – each collection.	Hazardous waste register; manifests; disposal certificates.
6	Used oil and lubricants	Waste engine oil, hydraulic oil,	Collect separately; maximize recovery and recycling; prevent	Store in leak-proof, labelled drums with secondary containment. Transfer to	Contractor / Workshop Manager	Quantity collected and recycled – monthly;	Used oil register; recycling

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	(workshops and machinery)	transmission oil and lubricants.	discharge onto soil or into drains.	authorized waste oil recyclers or treatment facilities.		leakage inspections – weekly.	receipts; spill records.
7	Wastewater and sewage (camps, kitchens and facilities)	Domestic sewage, greywater, kitchen wastewater, equipment wash water and concrete washout water.	Minimize wastewater generation; treat before discharge; reuse treated water where appropriate; prohibit untreated discharge.	Use septic tanks or package treatment plants for sewage; settling tanks and recycling systems for concrete wash water; dispose of treated effluent in accordance with applicable standards and approvals.	Contractor / Environmental Officer	Treatment system inspections – weekly; effluent sampling as per permit and monitoring plan.	Wastewater management records; maintenance logs; laboratory results.
8	Asphalt and bituminous waste	Bitumen residues, rejected asphalt, asphalt millings and contaminated containers.	Minimize wastage; reuse suitable asphalt millings in approved applications; prevent spills and contamination.	Store in designated areas; recycle suitable materials; transfer unsuitable residues to approved disposal facilities.	Asphalt Plant Operator / Environmental Officer	Quantity reused and disposed of – monthly; storage inspections – weekly.	Asphalt waste register; recycling and disposal receipts.
9	ScRP metal and machinery waste	Damaged equipment parts, steel reinforcement, cables, vehicle components and metal offcuts.	Prioritize reuse and recycling; segregate materials and prevent unnecessary disposal.	Store in designated areas and transfer to authorized scRP dealers or recycling facilities.	Contractor / Workshop Manager	Quantity recovered and recycled – monthly.	ScRP register; recycling receipts.
10	Medical and healthcare waste	Used dressings, contaminated gloves, syringes, expired medicines and infectious materials.	Segregate infectious waste, sharps and pharmaceutical waste; use colour-coded containers; train medical personnel.	Store securely in labelled containers and transfer through authorized healthcare waste handlers for approved treatment and disposal.	Camp Medical Officer / Contractor	Storage inspections – weekly; disposal verification – each collection.	Healthcare waste register; collection and treatment certificates.
11	Green and biodegradable waste	Cleared vegetation, tree branches, grass, leaves and food waste.	Minimize vegetation clearance; reuse suitable vegetation for mulching or composting; prohibit uncontrolled burning.	Compost biodegradable materials where practicable; use suitable cleared vegetation for approved rehabilitation activities.	Contractor / Environmental Officer	Quantity reused or composted – monthly; disposal inspections.	Vegetation clearance register; composting records.
12	E-waste and batteries	Used batteries, electrical components, damaged cables, computers, lamps and electronic equipment.	Segregate and recover reusable components; prevent breakage, leakage and mixing with general waste.	Store separately in secure, dry and labelled areas; transfer to authorized e-waste recyclers or approved treatment facilities.	Contractor / Electrical Supervisor	E-waste inventory – monthly; disposal verification – each collection.	E-waste register; recycling and disposal certificates.

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13	Waste management training and awareness	Improper segregation, handling, storage and disposal arising from inadequate worker awareness.	Conduct induction and periodic awareness sessions covering waste segregation, hazardous waste, spill prevention, recycling and housekeeping.	Provide labelled bins, segregation signage and waste handling instructions at camps, plants, workshops and construction sites.	Contractor / HSE Officer / Environmental Officer	Training at induction and periodically; site inspections weekly.	Training attendance sheets; awareness materials; inspection records.
14	Waste management compliance and auditing	Non-compliance with waste management procedures, unauthorized dumping and incomplete disposal records.	Implement routine inspections, corrective action procedures and periodic audits. Ensure subcontractors comply with the IWMP.	Verify authorized transporters, receiving facilities, treatment arrangements and final disposal documentation.	Contractor / Supervision Consultant / PIU	Contractor reporting monthly; Supervision Consultant audits quarterly.	Monthly IWMP reports; audit reports; corrective action register.
15	Site closure and waste clearance	Residual waste, contaminated materials, temporary storage facilities and waste treatment infrastructure.	Ensure complete removal of waste before site closure; remediate spills and contaminated areas; prohibit abandonment of waste.	Remove all waste to authorized facilities; decommission temporary storage and treatment systems safely; restore affected land.	Contractor / Environmental Officer / Supervision Consultant	Final site inspection before closure; verification of outstanding corrective actions.	Waste clearance certificate; disposal records; site restoration and closure report.

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APPENDIX 7.10: DETAILED MATRIX FOR ENVIRONMENTAL AND SOCIAL BASELINE, MONITORING, STAKEHOLDER CONSULTATIONS, IMPACT & RISK IMPLEMENTATION

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Valued E&S Components	Baseline Conditions and Key Stakes / Challenges
Physical environment	The corridor lies within a humid tropical setting characterized by high rainfall, a prolonged rainy season, lateritic soils and rolling terrain intersected by numerous streams and rivers. Lateritic soils are widely used for road construction but are susceptible to erosion, sediment loss and slope instability when exposed. Existing road conditions contribute to dust, muddy surfaces, inadequate drainage and restricted access during the rainy season. Construction activities, material extraction, drainage works and earthworks may increase erosion and sedimentation risks if not appropriately managed.
Water resources	The Project crosses several freshwater systems, including the Timbo, Gbowee and New Cess Rivers, as well as smaller streams, wetlands and drainage channels. Surface water supports domestic use, fishing, agriculture and other livelihood activities. Baseline water quality is generally within applicable limits for the parameters tested, although elevated turbidity and suspended solids occur at some locations. Key sensitivities include community dependence on surface water, downstream receptors, sedimentation, pollution from construction activities and potential abstraction of water for Project use.
Air quality, noise and vibration	The Project area has limited major industrial emission sources. Existing air quality concerns are principally associated with dust from the unpaved road, vehicle emissions and localized biomass combustion. Baseline noise levels are generally low to moderate and are associated with traffic, settlements and small businesses. Sensitive receptors occur close to the road, including residences, schools, health facilities, businesses and community activity areas. Construction traffic, earthworks, crushing, batching and material haulage may therefore create localized air quality, noise and vibration impacts both within and outside the immediate road corridor.
Biological environment	The surveyed road corridor is predominantly modified by long-standing road use, settlements, agriculture, fallows, rubber cultivation and other human activities. Natural and semi-natural habitats, including secondary forest, wetlands, riverine vegetation and other habitat areas, remain within the broader Project landscape. No protected areas are reported to intersect the main road alignment. However, biodiversity sensitivity cannot be defined solely by conditions within the surveyed road corridor. Borrow pits, quarries, camps, access roads, haul routes and other ancillary facilities located outside the corridor may interact with natural habitats and require site-specific biodiversity screening and assessment before siting or development.
Socio-economic environment	The road passes through or provides access to 44 towns and villages between Buchanan and Cestos City Junction. Communities are predominantly rural and depend on smallholder agriculture, petty trade, transport services, logging, fishing and other natural-resource-based livelihoods. The road provides important access to markets, schools, health facilities, administrative centres and Buchanan Port. Changes in accessibility, travel time and economic activity may generate substantial benefits, but may also contribute to induced development, changing land values, in-migration and increased pressure on land and natural resources.
Community health, safety and vulnerability	Common health concerns include malaria, respiratory infections, water-borne diseases and constraints in access to health services, including maternal health services. Roadside settlements, pedestrians, children, motorcyclists, traders and users of schools, markets and health facilities may be particularly exposed to construction and road-safety risks. Women, children, elderly persons, persons with disabilities, female-headed households, very poor households and other disadvantaged groups may face greater barriers to information, mobility, employment opportunities, compensation and grievance processes. Labor influx and worker-community interaction may also increase risks related to communicable disease, social conflict and sexual exploitation and abuse and sexual harassment.
Cultural heritage	Known and potential cultural heritage resources within the Project landscape include graves, cemeteries, shrines, sacred trees and other places or features of cultural importance. Earthworks, road widening, drainage works and ancillary facilities may affect known or previously unidentified heritage resources. Cultural heritage screening should therefore extend to the full Project footprint, including off-corridor facilities, with avoidance and culturally appropriate consultation applied where resources are identified and chance-find procedures maintained for previously unknown resources.

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Land, assets and livelihoods	Residential structures, shops, kiosks, fences, crops, farms, economic trees, community assets and other livelihood resources occur within and adjacent to the existing Right of Way and proposed works footprint. Land acquisition and temporary occupation may also arise from diversions, drainage works, construction areas and ancillary facilities such as camps, borrow pits, quarries and access roads. Potential impacts include physical displacement, economic displacement, temporary loss of access, crop and tree losses and disruption of roadside and natural-resource-based livelihoods. These impacts should be assessed in coordination with the Resettlement Action Plan and any subsequent site-specific land acquisition requirements.

Table 2: Summary of Stakeholder Consultations

Location	Engagement Method	Stakeholders Consulted	Main Concerns Raised	Responses/ Commitments	How feedback is addressed in Project Planning	Responsibility
Buchanan City and surrounding communities	Public consultation, introductory meeting and stakeholder discussions.	County authorities, line ministries, CSOs, transport unions, community members, PAPs, women and youth representatives.	Road safety, traffic regulation, local employment, port traffic, market disruption, ROW and compensation issues.	Incorporate road safety features; coordinate with traffic police; establish transparent local recruitment procedures; disclose RP information; prepare and implement a Traffic Management Plan.	Reflect road safety and traffic concerns in the ESIA/ESMP and traffic management arrangements. Address ROW, compensation and displacement concerns through the RP and stakeholder communication process. Consider market access and port-related traffic interfaces in construction planning.	MPW/IIU, supervision consultant and contractor, as applicable, to document the consultation date, attendance, concerns, agreed actions and disclosure of responses. Review traffic arrangements with relevant authorities and report progress to affected communities.
Big Joe Town and nearby settlements	Community meetings and focus group discussions, with separate or targeted sessions where needed to facilitate women's and other potentially disadvantaged groups' participation.	Town chiefs, elders, women, youth, farmers, traders and affected households.	Dust, noise, construction safety, loss of roadside stalls, safe crossings for children, and drainage to prevent flooding of farms.	Implement dust suppression and noise control; schedule disruptive construction activities appropriately; maintain business access; provide safe pedestrian crossings; incorporate appropriate drainage design.	Include sensitive receptors and roadside businesses in the ESMP and construction planning. Review drainage outlets and flood pathways against farm locations and community concerns. Identify safe crossings and temporary access requirements in the Traffic Management Plan.	MPW/IIU, supervision consultant and contractor to verify receptor locations, communicate construction schedules, inspect dust/noise controls and drainage works, and record unresolved concerns and corrective actions through the project GM.

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Yarpah Town and Rivercess corridor communities	Community consultation and discussions on establishing or strengthening the Grievance Mechanism (GM).	Local authorities, traditional leaders, PAPs, women, youth, farmers, traders and community members.	Relocation of structures, crop compensation, protection of water points, youth employment, cultural sites and GBV risks associated with labour influx.	Implement the RP ; provide compensation at replacement cost in accordance with applicable ESS5 requirements; protect or replace affected water sources where required; establish transparent local recruitment procedures; implement a GBV/SEA/SH Action Plan and worker Codes of Conduct.	Address displacement and compensation through the RP and livelihood restoration measures. Incorporate water-source protection into the ESMP and engineering design. Address cultural heritage through avoidance, consultation and the applicable Chance Finds Procedure. Manage GBV/SEA/SH risks through confidential reporting and appropriate survivor-centred referral arrangements.	MPW/IIU and resettlement specialists to track RP actions; the contractor to implement relevant labour, community safety and GBV/SEA/SH measures; the designated GM focal point to document and track complaints. Confirm the location's relationship to the actual alignment and area of influence.
Full 60.9 km corridor and affected communities	Socioeconomic survey, asset inventory, key informant interviews and transect walks. Supplement with community meetings and targeted consultations where required.	PAP households, businesses, farmers, traditional leaders, road users and community representatives.	Asset valuation, eligibility, livelihood impacts, temporary access disruption and grievance channels.	Conduct the census and asset inventory; assign PAP identification codes; establish and disclose the compensation framework and GM; document affected assets and applicable eligibility information.	Use verified survey and consultation findings to inform the ESIA, RP , livelihood restoration planning and construction access arrangements. Maintain traceability between the affected-person database, asset inventory, disclosed eligibility criteria and recorded grievances. Distinguish consultation records from formal census and asset verification records.	Resettlement team and MPW/IIU to reconcile the census, asset inventory and RP ; disclose applicable procedures in accessible formats; maintain records of consultation and feedback; track compensation and livelihood restoration actions. Provide further engagement where design changes or newly identified impacts affect communities.
Sectoral agencies and civil society stakeholders	Technical interviews and institutional consultations.	Environmental NGOs, gender/GBV service providers, road safety NGOs and relevant	Cumulative impacts, biodiversity, water resources, GBV/SEA/SH prevention,	Incorporate biodiversity and water-management measures; consider appropriate CSO participation;	Reflect relevant technical advice in the ESIA/ESMP, biodiversity and water-management measures, GBV/SEA/SH arrangements and	MPW/IIU and relevant technical specialists to document institutional recommendations, assign actions, consult appropriate service

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		government agencies.	independent monitoring and potentially disadvantaged or vulnerable groups.	establish survivor-centred referral pathways; undertake targeted engagement with disadvantaged or vulnerable groups.	stakeholder engagement programme. Assess cumulative impacts where appropriate and document how material recommendations are accepted, modified or not adopted, with reasons.	providers and agencies, and monitor implementation. Establish further consultation or monitoring arrangements where risks or stakeholder concerns warrant them.

Table 3: Environmental and Social Monitoring Matrix

Code	Parameter to Monitor	Sampling Method / Approach	Frequency	Cost Treatment	Responsibility	Reporting
EM-01	Dust and ambient air quality (PM_{10}, $PM_{2.5}$)	Visual inspection of dust emissions; portable particulate monitoring at active work fronts, settlements, schools, clinics, haul roads, and other sensitive receptors. Record dust-control measures, exposed surfaces, vehicle movements, and weather conditions.	Weekly during dry-weather works; increase monitoring near sensitive receptors, during intensive earthworks, and following complaints.	Included in Contractor ESMMP, dust-control measures, equipment, and supervision budget.	Contractor HSE Officer; Supervision Consultant; PIU E&S Team.	Monthly E&S report, monitoring results, exceedances, complaints, and corrective-action register.
EM-02	Noise and vibration levels	Use a calibrated sound-level meter at representative residential areas, schools, clinics, and active work fronts. Record measurement duration, time, equipment, and background conditions. Conduct vibration monitoring where blasting, rock breaking, or heavy compaction could affect buildings or sensitive receptors.	Monthly at representative receptors and during high-noise activities; vibration monitoring during blasting or other high-vibration activities where risk assessment requires it. Repeat after substantiated complaints.	Included in the Contractor ESMMP and noise/vibration monitoring budget; specialist testing charged to the responsible contract allocation.	Contractor HSE Officer; Supervision Consultant; PIU E&S Team; qualified monitoring specialist, where required.	Monthly E&S report; activity-specific vibration reports and records of complaints, exceedances, and corrective actions.
EM-03	Surface water quality	Collect samples upstream and downstream of active	Baseline sampling before works at	Included in ESMMP monitoring; laboratory	Contractor; Supervision	Monthly summary of monitoring activities;

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		river/stream crossings and at appropriate reference locations. Analyse pH, turbidity, total suspended solids (TSS), oil and grease, and additional parameters such as dissolved oxygen, BOD, nutrients, or microbial indicators where relevant to identified risks. Use appropriate sample preservation, laboratory methods, and chain-of-custody records.	relevant locations; quarterly during construction; additionally after major spills, uncontrolled discharges, or incidents likely to affect water quality.	and sample-transport costs allocated to the Contractor and/or PIU monitoring budget, as specified in the contract.	Consultant; PIU E&S Team; accredited laboratory, where available.	laboratory reports and incident-related results submitted promptly to the PIU, EPA, and financing partner, as applicable.
EM-04	Soil erosion, sediment control, and slope stability	Inspect cut and fill slopes, exposed soil, embankments, drains, culverts, borrow pits, spoil areas, sediment tRP s, and river approaches. Record erosion features, sediment runoff, blocked drains, slope instability, and the condition of control measures using photogRP hs and inspection checklists.	Weekly during earthworks and after heavy rainfall; inspect high-risk slopes and drainage structures more frequently where necessary.	Included in Contractor ESMMP, erosion and sediment control measures, and construction method statements.	Contractor; Supervision Consultant; PIU E&S Team.	Monthly E&S report, inspection checklist, photogRP hic evidence, erosion incidents, and corrective-action log.
EM-05	Vegetation clearance, biodiversity protection, and land-cover restoration	Verify approved clearing limits and no-go areas; inspect vegetation clearance, wildlife encounters, nests or other sensitive features, and compliance with pre-clearance procedures. Record cleared and restored areas, survival of planted vegetation, erosion-control vegetation, and evidence of invasive species. Use photogRP hs and GIS/land-cover records where appropriate.	Before vegetation clearance; throughout clearing activities; monthly during clearing; quarterly during restoration and revegetation, including survival checks during the establishment period.	Included in reinstatement, landscaping, and biodiversity management costs; any specialist ecological monitoring should be budgeted separately where required.	Contractor; Supervision Consultant; PIU E&S Team; Forestry Development Authority (FDA) or other relevant authority, where required.	Monthly clearing and compliance records; quarterly restoration and biodiversity reports; non-compliance and corrective-action records.

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EM-06	Borrow pits, quarries, and material sources	Inspect approved locations, permits, landowner agreements, extraction limits, drainage, slope stability, dust, haul-road safety, worker safety, and rehabilitation. Verify source documentation for materials and check progressive restoration and closure against approved plans.	Before use; monthly during operation; following significant changes or incidents; and at closure.	Included in material-source management, borrow-pit/quarry rehabilitation plans, and Contractor ESMMP.	Contractor; Supervision Consultant; PIU; EPA or other relevant authority, as applicable.	Monthly inspection records; permit and source registers; progressive rehabilitation records; final closure and reinstatement report.
EM-07	Waste management and hazardous materials	Inspect waste segregation, storage, labelling, secondary containment, hazardous-material inventories, spill kits, sanitation, waste transport, and disposal receipts. Record waste quantities and types where practicable, spill incidents, and evidence of improper disposal or burning.	Weekly at camps, workshops, storage areas, and active sites; immediately after spills or waste-related incidents.	Included in Contractor ESMMP, waste management plan, hazardous-material controls, and incident-response budget.	Contractor HSE Officer; Supervision Consultant; PIU E&S Team.	Monthly waste and hazardous-material register, disposal records, spill reports, and corrective-action log.
EM-08	Occupational health and safety (OHS)	Inspect PPE, machinery guards, equipment certification, excavation safety, working at height, lifting operations, electrical safety, toolbox talks, worker induction, first aid, and emergency arrangements. Review incident, near-miss, occupational illness, and corrective-action registers.	Routine site checks daily by the Contractor; formal inspections weekly; immediate notification and investigation of serious incidents, in accordance with contractual requirements.	Included in the Contractor OHS Plan, personnel, PPE, training, medical and first-aid arrangements, and supervision budget.	Contractor OHS/HSE Officer; Supervision Consultant; PIU E&S Team.	Monthly OHS statistics and inspection reports; prompt serious-incident notification; investigation reports and corrective-action tracking.
EM-09	Community health and safety (CHS)	Inspect barriers, warning signs, pedestrian crossings, access to homes and businesses, work-zone security, community exposure to open excavations, and public	Weekly and during changes to work zones; immediately following incidents or complaints; additional inspections near schools, markets,	Included in traffic management, community health and safety plans, temporary works, and Contractor ESMMP.	Contractor; Supervision Consultant; PIU Community Liaison Officer (CLO); relevant local authorities.	Monthly CHS and grievance summary; incident reports; records of corrective measures and follow-up.

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		safety near bridges and culverts. Review traffic incidents, complaints, and reported injuries involving community members.	settlements, and other sensitive receptors.			
EM-10	GBV/SEA/SH prevention and stakeholder concerns	Verify worker Code of Conduct signatures, induction and refresher training, awareness activities, availability of confidential reporting channels, and readiness of referral pathways. Review only aggregated, non-identifying grievance trends and implementation of the GBV/SEA/SH Action Plan. Do not conduct intrusive monitoring or disclose survivor identities.	Monthly review of implementation records; training and induction checks before deployment and as required; referral arrangements reviewed periodically and following relevant changes.	Included in ESMMP, GBV/SEA/SH Action Plan, worker training, grievance management, and service-provider/referral budgets.	PIU E&S Team; Contractor; designated GBV focal point; qualified service providers, as appropriate.	Monthly implementation summary; quarterly safeguards reporting using non-identifying information. Sensitive disclosures must follow confidential, survivor-centred procedures and applicable reporting protocols.
EM-11	Labour management and working conditions	Review worker contracts, wage and payment records, working hours, rest periods, employment conditions, non-discrimination measures, child and forced labour prohibitions, accommodation standards, and access to worker grievance channels. Conduct confidential worker interviews where appropriate.	Monthly document review and site inspection; at mobilisation and following significant labour-related complaints or incidents.	Included in Contractor labour management arrangements, camp management, HR administration, and supervision costs.	Contractor HR Manager and HSE Officer; Supervision Consultant; PIU E&S Team.	Monthly labour compliance report, workforce statistics, grievance trends, and records of corrective action.
EM-12	Worker accommodation, sanitation, and communicable disease prevention	Inspect worker camps, toilets, bathing facilities, drinking-water provision, drainage, food preparation and storage, ventilation, pest control, and waste collection. Review health-awareness sessions and arrangements	Weekly at worker camps and welfare facilities; periodic checks of drinking-water quality based on risk and applicable requirements; additional checks	Included in Contractor camp-management, sanitation, drinking-water, and worker welfare budgets.	Contractor; Supervision Consultant; PIU E&S Team; relevant health authorities, where required.	Monthly camp inspection and welfare report; water-quality results; incident and corrective-action records.

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		for accessing appropriate health services.	following complaints or outbreaks.			
EM-13	Traffic management and road-user safety	Inspect traffic management plans, diversion routes, road signs, barriers, flag persons, speed controls, night-time visibility, pedestrian routes, haul-road condition, and access to businesses and properties. Review vehicle logs, traffic incidents, and community complaints.	Weekly and whenever traffic arrangements change; daily checks by site traffic personnel; immediately after traffic incidents.	Included in the Contractor Traffic Management Plan, road safety measures, signage, and traffic-control personnel.	Contractor Traffic/Safety Officer; Supervision Consultant; PIU; relevant traffic and local authorities.	Monthly traffic and road safety report; incident notifications; diversion inspection records and corrective-action log.
EM-14	Drainage, culverts, and flood-related impacts	Inspect drains, culverts, watercourse crossings, temporary diversions, and outfalls for obstruction, erosion, sediment deposition, and uncontrolled discharge. Check whether works are affecting natural flow paths, nearby farms, settlements, or access routes. Record flood-related complaints and damage.	Weekly during drainage and earthworks; before and during the rainy season; after heavy rainfall and reported flooding.	Included in drainage works, temporary water management, erosion-control measures, and Contractor ESMMP.	Contractor; Supervision Consultant; PIU E&S Team; relevant water and local authorities, where required.	Monthly drainage inspection records; post-rainfall reports where warranted; incident and corrective-action log.
EM-15	Land acquisition, compensation, and livelihood restoration	Verify that required compensation and assistance have been provided before displacement or taking possession, consistent with the approved RP and applicable ESF requirements. Track affected households, assets, crop compensation, business interruption, livelihood-restoration measures, outstanding entitlements, and grievances. Conduct follow-up with affected people while respecting privacy.	Before access to affected land; monthly during construction; periodic follow-up until outstanding RP commitments and livelihood-restoration actions are completed.	RP implementation and independent monitoring costs should be budgeted separately from routine Contractor ESMMP costs, unless explicitly allocated otherwise.	PIU/RP implementation team; Supervision Consultant; Contractor for construction-related impacts; independent monitor, where required.	Monthly RP implementation and grievance updates; compensation and livelihood-restoration tracking; periodic monitoring and completion reports.

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EM-16	Stakeholder engagement and grievance redress	Maintain a stakeholder engagement register, consultation minutes, attendance records, disclosed information, feedback responses, and grievance register. Check accessibility of complaint channels for women, vulnerable groups, affected businesses, and communities with limited access to formal mechanisms. Track resolution time and complainant feedback.	Continuous engagement; monthly review of consultation and grievance records; additional engagement before disruptive works or following significant complaints.	Included in the Stakeholder Engagement Plan (SEP), GM implementation, community liaison, and PIU E&S budget.	PIU E&S Team and CLO; Contractor CLO; relevant grievance redress committee (GRC).	Monthly stakeholder engagement and GM report; unresolved grievance register; records of responses, referrals, and corrective actions.
EM-17	Cultural heritage and chance finds	Verify implementation of the Chance Finds Procedure, worker awareness, protection of known cultural sites, and immediate cessation of work and notification when potential heritage items, graves, sacred sites, or archaeological materials are encountered. Record discoveries and authorised clearance to resume work without publicly disclosing sensitive site information.	Before works through worker induction; continuous vigilance during excavation and earthworks; immediate action upon discovery; periodic compliance inspections.	Included in Contractor ESMMP, training, and Chance Finds Procedure; specialist assessment and authorised recovery costs allocated as required.	Contractor; Supervision Consultant; PIU E&S Team; relevant heritage authority and community representatives, as appropriate.	Immediate chance-find notification; incident and follow-up records; clearance documentation and monthly summary where applicable.
EM-18	Temporary land occupation, property damage, and access restoration	Record pre-construction conditions of access roads, buildings, farmland, utilities, and other potentially affected assets. Inspect temporary occupation areas, detours, worksite boundaries, and access to homes, farms, and businesses. Verify restoration and document damage claims and resolution.	Before occupation or works; monthly during construction; at demobilisation and before handover of temporary sites.	Included in temporary works, reinstatement, and contractual property-damage obligations; compensation for eligible impacts should follow the approved RP and applicable arrangements.	Contractor; Supervision Consultant; PIU E&S/RP team.	Baseline condition records; monthly access and damage register; reinstatement inspection and handover records.

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EM-19	Emergency preparedness and response	Check emergency response plans, evacuation routes, first-aid resources, fire extinguishers, spill-response equipment, emergency contacts, worker awareness, and coordination with relevant emergency services. Record drills, response times where measured, incidents, and lessons learned.	Monthly inspection; drills at the frequency specified in the approved plan; immediate review following an emergency or significant incident.	Included in Contractor emergency preparedness, OHS, fire safety, and incident-response budgets.	Contractor; Supervision Consultant; PIU; relevant emergency services, where appropriate.	Monthly preparedness checklist; drill records; prompt incident notifications and post-incident review reports.
EM-20	Contractor ESMMP implementation and subcontractor compliance	Audit approved management plans, method statements, permits, competent E&S staffing, induction records, inspection registers, subcontractor compliance, monitoring results, and closure of corrective actions. Check that camps, workshops, material sources, and other ancillary facilities are covered by approved procedures.	Before mobilisation and commencement of relevant activities; monthly formal compliance audit; additional audits following major non-compliance or repeated incidents.	Included in Contractor ESMMP implementation and Supervision Consultant/PIU oversight budgets.	Contractor E&S Manager; Supervision Consultant; PIU E&S Team.	Monthly ESMMP compliance report; audit findings; corrective-action tracker; escalation of overdue or serious non-compliances.
EM-21	Resource use and climate resilience	Record water and fuel use where practicable; inspect water conservation, equipment efficiency, drainage resilience, erosion protection, and preparedness for heavy rainfall or other identified climate hazards. Review damage and performance of temporary and permanent works after significant weather events.	Monthly resource-use review; inspections before the rainy season and after significant weather events; periodic review of climate-related risks during construction.	Included in Contractor resource management, drainage, maintenance, and climate-resilient construction arrangements.	Contractor; Supervision Consultant; PIU E&S Team and engineering team.	Monthly resource-use summary where data are available; weather-related incident and damage reports; corrective-action records.
EM-22	Site reinstatement and final environmental closure	Inspect demobilised camps, workshops, borrow areas, quarries, spoil areas, stockpiles, detours, and	Monthly during progressive reinstatement; formal inspection before site	Included in Contractor reinstatement, demobilisation, and rehabilitation	Contractor; Supervision Consultant; PIU E&S Team; FDA	Progressive reinstatement records; photogRP hic evidence; outstanding-

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		temporary access roads. Verify removal of waste and temporary structures, safe grading, drainage restoration, soil stabilisation, revegetation, and resolution of outstanding landowner claims.	demobilisation and final handover; follow-up during the agreed vegetation establishment period.	obligations; retention or other contractual mechanisms may be applied as specified in the contract.	or other authority, where relevant.	defects register; final environmental closure and handover report.

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Table 4: Impact Implementation Matrix

Code	Impact	Measures	Deadline	Cost / Funding Source	KPI	Implementation	Oversight
ESMMP-01	Soil erosion, slope instability and sedimentation from earthworks	Limit clearing; install drainage, sediment tRP s and slope stabilization; revegetate exposed areas	Before and during earthworks, completed before demobilization	Included in Contractor ESMMP	No uncontrolled erosion; drainage and sediment controls installed and maintained	Contractor	Supervision Consultant / PIU
ESMMP-02	Water pollution from runoff, wastewater, oils and fuels	Maintain stream buffers; control wastewater; provide sanitation; prohibit discharge to streams; implement spill response	Before camp operation and throughout construction	Included in Contractor ESMMP and monitoring budget	No untreated discharge; spill records closed; water quality monitoring completed	Contractor	Supervision Consultant / PIU / EPA
ESMMP-03	Dust and air emissions from haulage, earthworks and equipment	Water haul roads; cover trucks; enforce speed limits; maintain equipment; avoid unnecessary idling	Throughout construction, especially dry season	Included in Contractor ESMMP	Dust complaints reduced; PM10 monitoring completed; corrective actions closed	Contractor	Supervision Consultant / PIU
ESMMP-04	Noise and vibration impacts on settlements and sensitive receptors	Restrict noisy work hours; maintain equipment; notify communities; use temporary barriers where needed	During high-noise works	Included in C-ESMMP	Noise levels monitored; no unresolved complaints near schools/clinics	Contractor	Supervision Consultant / PIU
ESMMP-05	Vegetation loss and habitat disturbance	Confine clearing to approved corridor; avoid riparian/sensitive areas; restore disturbed sites; implement biodiversity monitoring	Before clearing, during works and during reinstatement	Included in Contractor ESMMP / biodiversity plan	Clearing within approved footprint; restoration completed; borrow sites rehabilitated	Contractor	Supervision Consultant / PIU / FDA, where required

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Code	Impact	Measures	Deadline	Cost / Funding Source	KPI	Implementation	Oversight
ESMMP-09	Land acquisition and livelihood impacts	Implement RP before civil works; compensate at replacement cost; provide livelihood restoration and support to vulnerable households	Before displacement and before civil works in affected sections	RP budget	Compensation completed; livelihood restoration tracked; grievances addressed	PIU E&S Team / PFMU	AfDB / Independent Monitor / Supervision Consultant
ESMMP-10	Cultural heritage and chance finds	Avoid known sites; consult communities; implement Chance Finds Procedure; relocate graves/cultural assets with agreed rituals where required	Before working in sensitive areas and during excavation	Included in ESMMP/RP as applicable	Chance finds recorded; no unauthorized disturbance; culturally agreed relocation completed	Contractor / PIU	Supervision Consultant / Local Authorities / EPA

Table 5: Risk Implementation Matrix

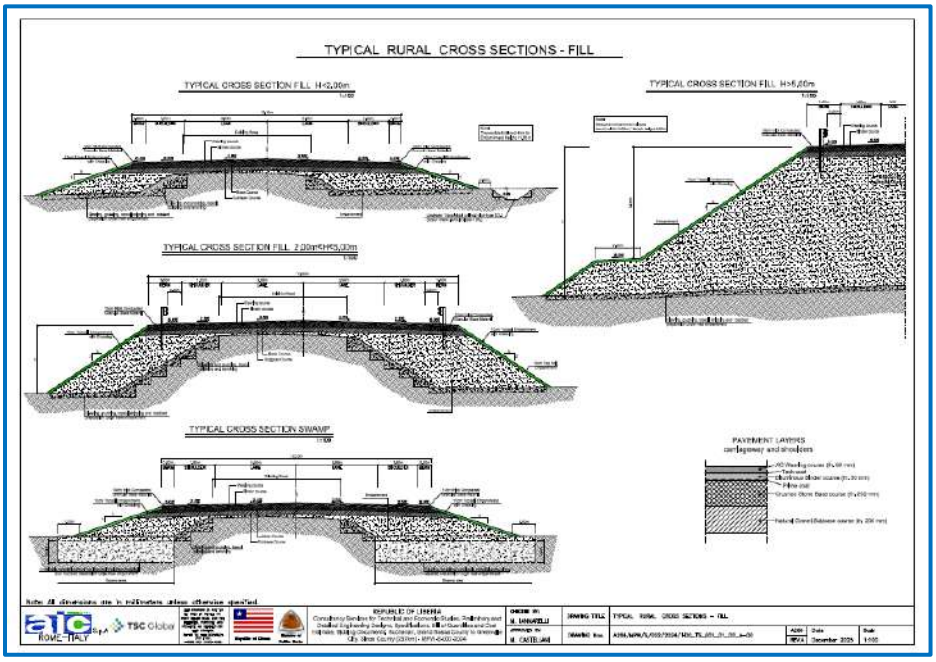
Code	Risk	Prevention / Management Measures	Deadline	Cost / Funding Source	KPI	Implementation	Oversight
ESMMP-06	Traffic and community safety risks	Implement traffic plan; install signage; use marshals; maintain safe diversions; conduct road safety awareness	Before traffic diversion and throughout works	Included in traffic management plan	Traffic controls are functional; accidents are recorded and investigated; access is maintained	Contractor	Supervision Consultant / PIU / Traffic Police
ESMMP-07	OHS risks to workers	Implement OHS Plan, PPE, induction, toolbox talks, first aid, emergency response and incident reporting	Before mobilization and throughout works	Included in Contractor OHS budget	Training records, PPE compliance, incident rate and corrective action closure	Contractor	Supervision Consultant / PIU

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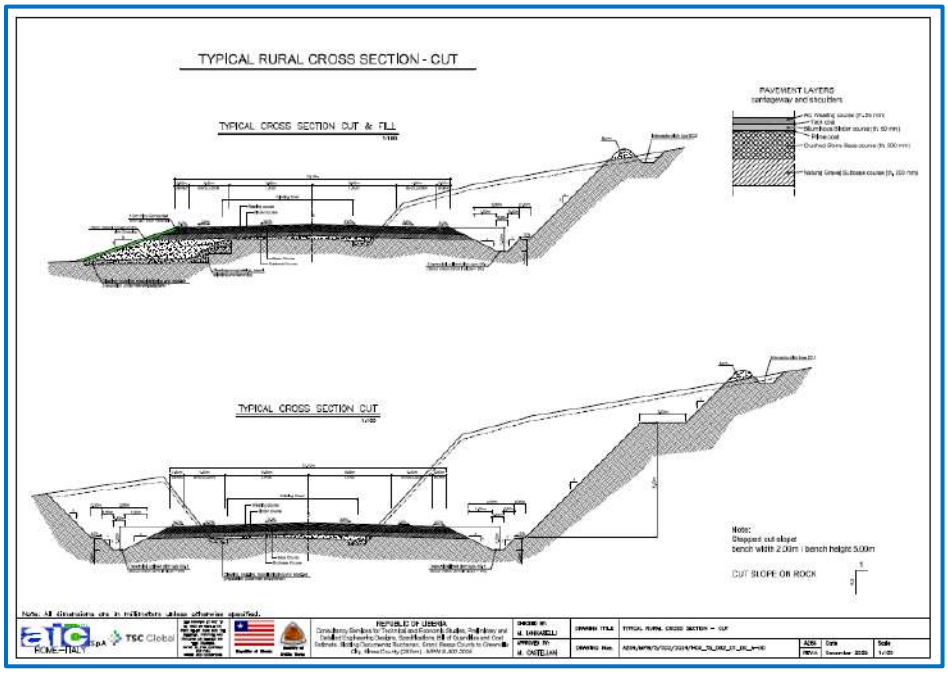
Code	Risk	Prevention / Management Measures	Deadline	Cost / Funding Source	KPI	Implementation	Oversight
ESMMP-08	Labour influx, GBV/SEA/SH and social tension	Apply LMP, Codes of Conduct, GBV/SEA/SH Action Plan, local recruitment procedures and confidential and survivor centered grievance pathway	Before worker mobilization and throughout works	Included in PIU/Contractor ESMMP allocations	All workers sign CoC; training completed; referral pathway active	Contractor / PIU E&S Team	Supervision Consultant / PIU / MoG-CSP

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APPENDIX 7.11: TYPICAL CROSS SECTIONS /DRAWINGS

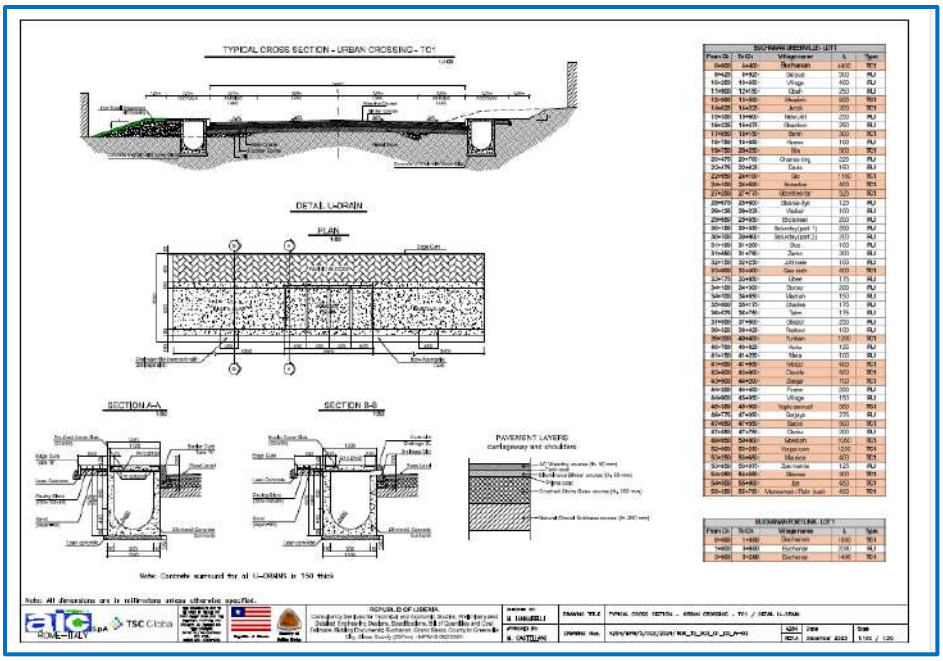


Typical Rural Cross Section (FILL)

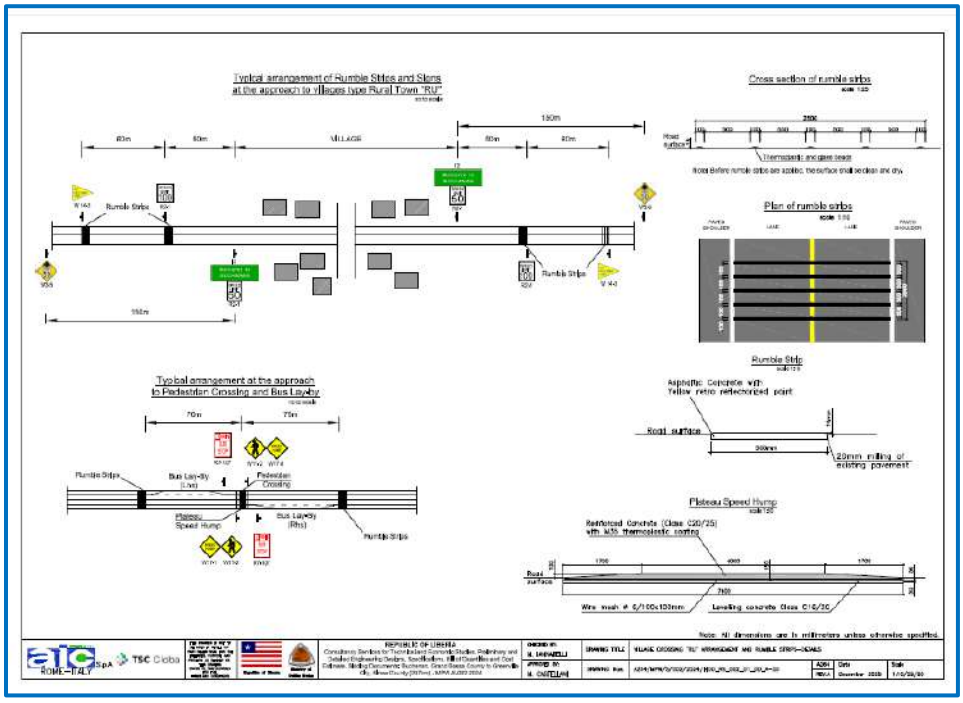


Typical Rural Cross Section (CUT)

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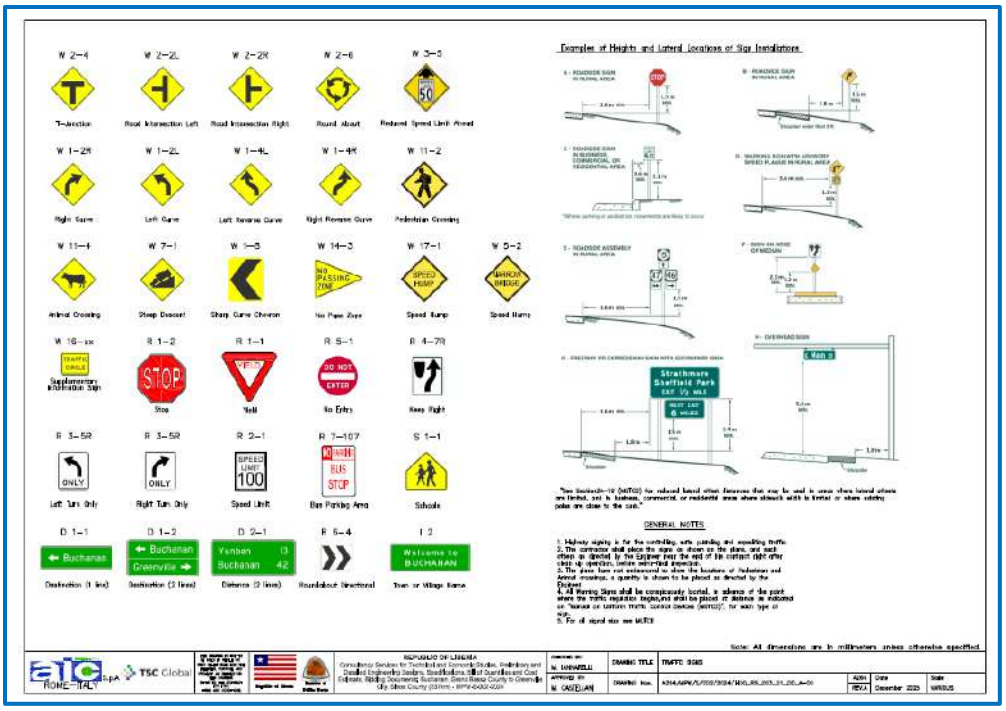


Typical Cross Section (Urban Crossing- Showing Road Structure)

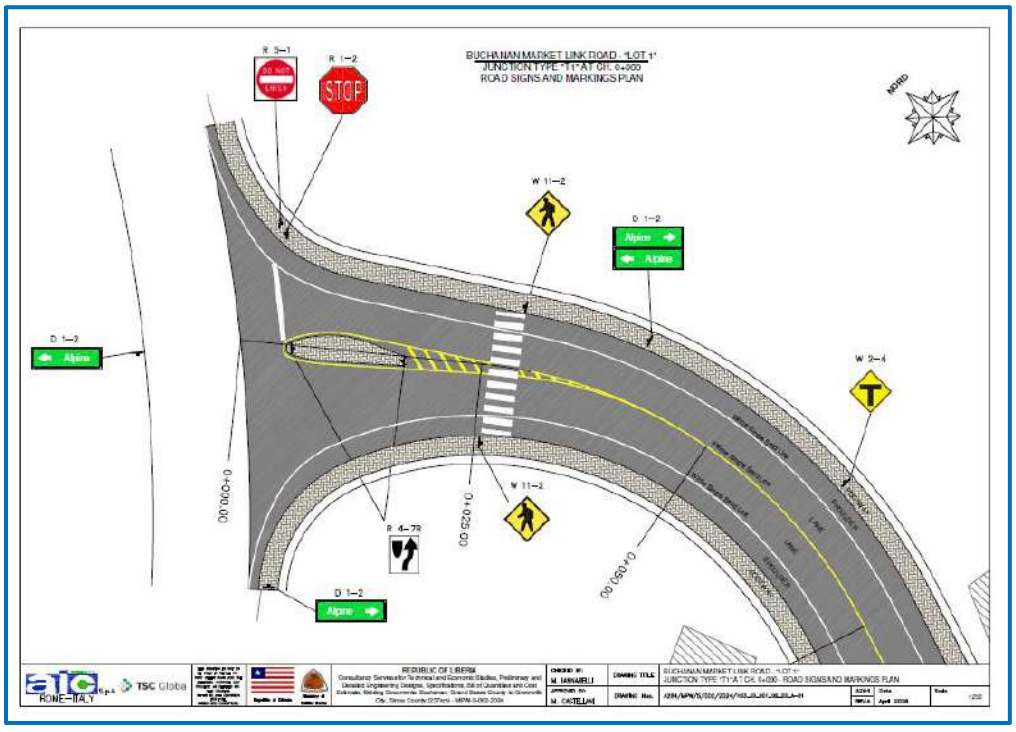


Village Crossing Typical (Pedestrian Safety)

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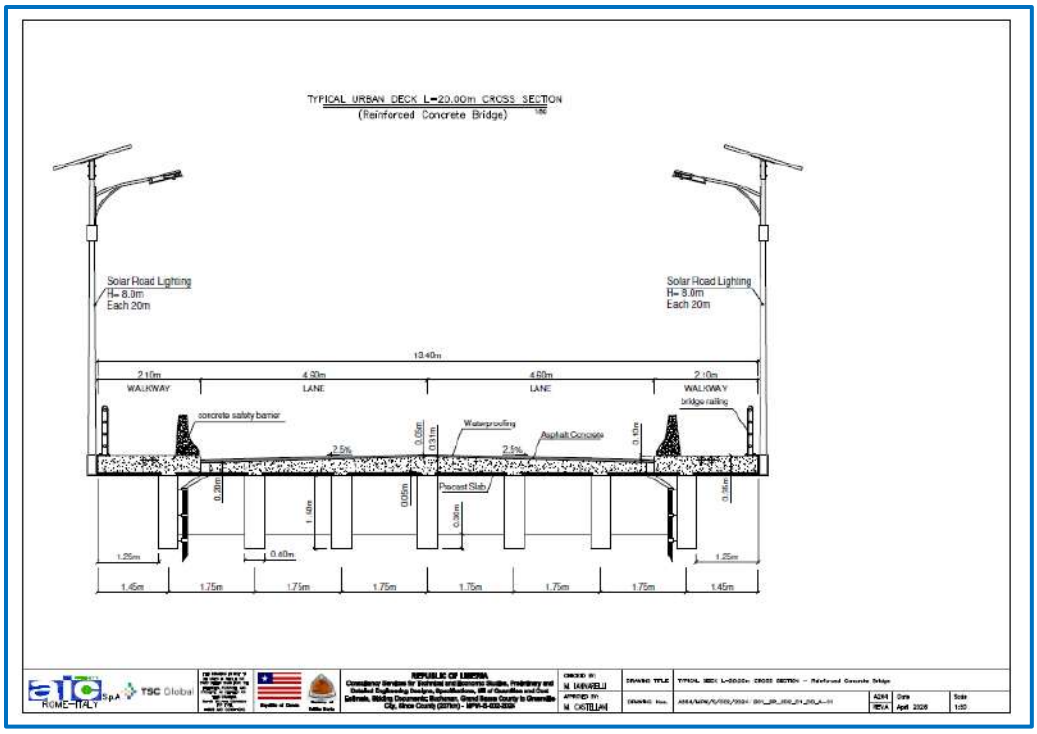


Typical Safety Signs

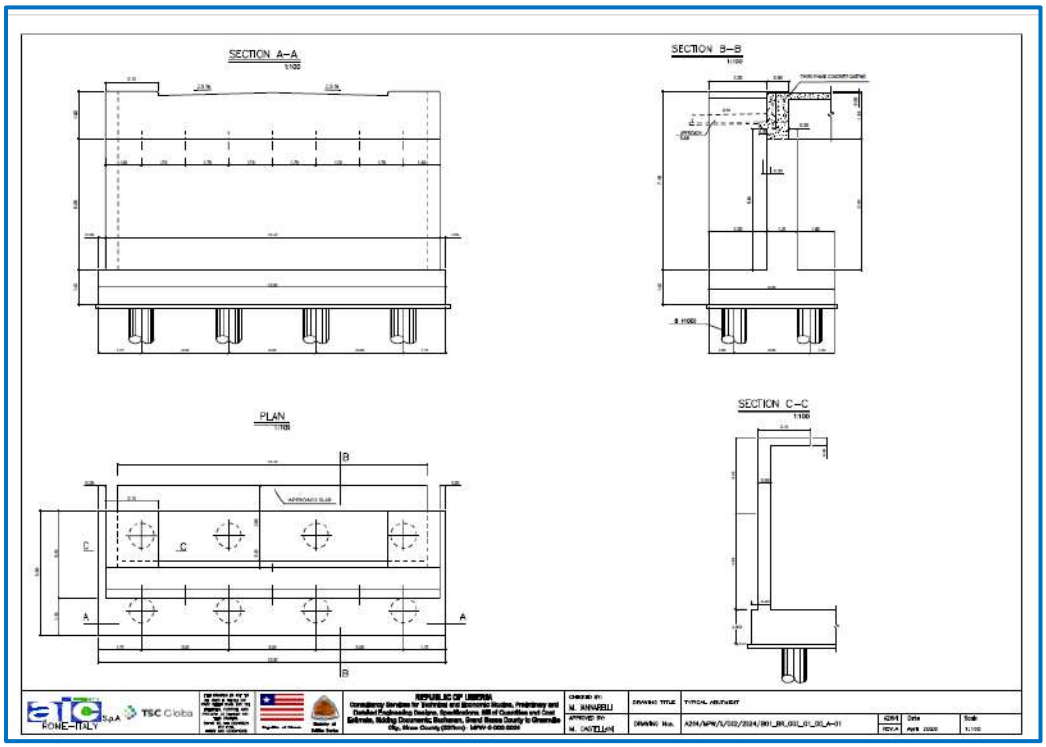


Typical Rod Signs & Marking Plan (Pedestrian Safety)

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Typical Section for RCC bridge



Typical Section for RCC bridge

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