



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)  
*Paving of the Buchanan-Cestos City Junction Corridor (60.9 km)*

Project ID No.: P-Z1-DBO-216

Submitted to:

The Environmental Protection Agency of Liberia  
Mamba Point, Bright Building 307-A  
Old CID Road, Monrovia, Liberia

Report prepared by:

Royal Environmental Group-Liberia  
72<sup>nd</sup> SKD Boulevard Road, opposite 72<sup>nd</sup> Mosque  
Email: [regroupliberia@gmail.com](mailto:regroupliberia@gmail.com)  
Contact: Clarence E. Buigbo (Managing Director)  
Tel: +231777917398 + 231 292 987 + 231 775 278 167 + 1 (902) 410-7211



Project Title: Paving of the Buchanan-Cestos Junction Road Corridor (60.9km)

|                          |                                              |                                                            |
|--------------------------|----------------------------------------------|------------------------------------------------------------|
| Version                  | 03                                           | July 16, 2026                                              |
| Reviewed and Revised by: | Patrick M. Scere, EPA<br>Certified Evaluator | Environmental and Social Risk Management (ESRM) Consultant |

# 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, the African Development Bank (AfDB) Integrated Safeguards System (ISS), and Good International Industry Practice (GIIP).

Specifically, the ESIA has been prepared to comply with:

1. **Environmental Protection and Management Law (EPML)** 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 (2022)**, 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** and relevant sector laws and regulations applicable to roads and associated facilities, including legislation on land, water, forestry, public health, labour, cultural heritage, and gender-based violence.
4. **AfDB Integrated Safeguards System (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 impacts in Bank-financed operations.
5. **International standards and GIIP**, including IFC Performance Standards on Environmental and Social Sustainability and the World Bank Group Environmental, Health and Safety (EHS) Guidelines.

The ESIA adopts a risk-based, mitigation-hierarchy approach (avoid–minimize–restore–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 AfDB ISS.

## 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.

### EPA-Certified Lead Consultant Certification

The undersigned, acting as EPA-certified Lead ESIA Consultant for this assignment, hereby certifies that:

1. This ESIA has been prepared in accordance with the Environmental Protection and Management Law of Liberia, the EPA ESIA Procedural Guidelines (2022), and any other relevant national regulations and standards in force. ([epa.gov.lr](http://epa.gov.lr))
2. The ESIA has been prepared to satisfy the environmental and social requirements of the AfDB Integrated Safeguards System (ISS) and its ten Operational Safeguards (OS1–OS10).
3. The assessment follows Good International Industry Practice (GIIP), including the IFC Performance Standards and the World Bank Group EHS Guidelines, and applies the mitigation hierarchy. ([IFC](http://www.ifc.org))
4. To the best of my knowledge and belief, the information presented herein is accurate and complete. It provides an adequate basis for decision-making by the EPA, AfDB, and other competent authorities.

| Name            | EPA Registration No. | Position          | Signature | Date              | Official Stamp / Seal |
|-----------------|----------------------|-------------------|-----------|-------------------|-----------------------|
| Clarence Buigbo |                      | Managing Director |           | December 10, 2025 |                       |

### DOCUMENT CONTROL AND DISTRIBUTION LIST

| Version | Date              | Status                                  | Description of Change                                                                                                                                       | Prepared by                                 | Reviewed by        | Approved by |
|---------|-------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------|-------------|
| 1.0     | February 27, 2025 | Draft ESIA for Disclosure               | Complete ESIA, including ESMP and summary RAP                                                                                                               | 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 RAP and revised SEP/GRM budgets; corrected ESMP budget consistency, RAP impact figures, annex references, and document control. | Royal Environmental Group-Liberia / MPW PIU | Abraham Bility     |             |

## TABLE OF CONTENTS

### CONTENTS

|                                                                                                          |    |
|----------------------------------------------------------------------------------------------------------|----|
| CONTENTS                                                                                                 | 4  |
| LIST OF TABLES                                                                                           | 8  |
| FIGURES                                                                                                  | 10 |
| ACRONYMS AND ABBREVIATIONS                                                                               | 11 |
| GLOSSARY OF KEY TERMS                                                                                    | 14 |
| EXECUTIVE SUMMARY                                                                                        | 17 |
| 0.1 OVERVIEW OF THE PROJECT AND ALTERNATIVES                                                             | 17 |
| 0.2 ALTERNATIVES CONSIDERED                                                                              | 18 |
| 0.3 PROJECT SITE, AREA OF INFLUENCE, BASELINE CONDITIONS, AND VALUED ENVIRONMENTAL AND SOCIAL COMPONENTS | 23 |
| 0.4 INSTITUTIONAL AND LEGAL FRAMEWORK FOR ESMP IMPLEMENTATION                                            | 24 |
| 0.5 MAJOR AND MODERATE ENVIRONMENTAL AND SOCIAL IMPACTS                                                  | 25 |
| 0.6 STAKEHOLDER CONSULTATIONS AND DISCLOSURE                                                             | 27 |
| 0.7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN                                                             | 30 |
| RISK AND IMPACT MANAGEMENT MEASURES                                                                      | 30 |
| ENVIRONMENTAL, OCCUPATIONAL HEALTH AND SAFETY CLAUSES FOR CONTRACTS                                      | 31 |
| ENVIRONMENTAL MONITORING MATRIX                                                                          | 32 |
| RISK MANAGEMENT MATRIX                                                                                   | 34 |
| ESMP IMPLEMENTATION MATRIX                                                                               | 37 |
| KEY ESMP IMPLEMENTATION INDICATORS                                                                       | 41 |
| GRIEVANCE REDRESS MECHANISM                                                                              | 41 |
| INSTITUTIONAL ARRANGEMENTS FOR ESMP IMPLEMENTATION                                                       | 41 |
| ESTIMATED BUDGET FOR ENVIRONMENTAL AND SOCIAL MEASURES                                                   | 42 |
| 0.15 OVERALL CONCLUSION AND ENVIRONMENTAL AND SOCIAL ACCEPTABILITY                                       | 44 |
| 1.0 INTRODUCTION                                                                                         | 46 |
| 1.1 BACKGROUND AND CONTEXT                                                                               | 46 |
| 1.2 PROJECT OBJECTIVES AND RATIONALE                                                                     | 46 |
| 1.3 OBJECTIVES OF THE ESIA                                                                               | 47 |
| 1.4 SCOPE OF THE ESIA                                                                                    | 48 |
| 1.5 ESIA APPROACH AND METHODOLOGY                                                                        | 50 |
| ECONOMIC INFORMATION AND PROJECT BENEFITS                                                                | 53 |
| ECONOMIC AND SOCIAL BENEFITS                                                                             | 54 |
| DISTRIBUTIONAL IMPACTS                                                                                   | 56 |
| ENVIRONMENTAL AND SOCIAL EXTERNALITIES IN THE ECONOMIC ANALYSIS                                          | 57 |
| 2.0 POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK                                                           | 58 |
| 2.1 NATIONAL POLICY AND LEGAL FRAMEWORK                                                                  | 58 |
| CONSTITUTIONAL AND OVERARCHING ENVIRONMENTAL FRAMEWORK                                                   | 58 |
| 2.2 LIBERIA EPA ESIA PROCEDURAL GUIDELINES (2022)                                                        | 61 |
| 2.3 INSTITUTIONAL FRAMEWORK                                                                              | 62 |
| 2.4 AfDB'S UPDATED INTEGRATED SAFEGUARDS SYSTEM (ISS, 2023)                                              | 64 |

|                                                                             |            |
|-----------------------------------------------------------------------------|------------|
| 2.5 INTERNATIONAL STANDARDS AND GOOD INTERNATIONAL INDUSTRY PRACTICE (GIIP) | 66         |
| 2.6 GAP ANALYSIS: LIBERIAN FRAMEWORK VS AfDB ISS & GIIP                     | 68         |
| 2.7 PERMITS, LICENSES, AND APPROVALS REQUIREMENTS                           | 69         |
| 2.8 LAND ACQUISITION AND RESETTLEMENT FRAMEWORK (NATIONAL AND AfDB OS5)     | 72         |
| <b>3.0 PROJECT DESCRIPTION</b>                                              | <b>73</b>  |
| 3.1 PROJECT LOCATION AND SETTING                                            | 73         |
| 3.2 PROJECT JUSTIFICATION                                                   | 78         |
| 3.3 PROJECT COMPONENTS AND ACTIVITIES                                       | 78         |
| 3.4 PROJECT PHASES AND ACTIVITIES                                           | 81         |
| 3.5 DESIGN STANDARDS AND CRITERIA                                           | 84         |
| 3.6 PROJECT INPUTS AND OUTPUTS                                              | 85         |
| 3.7 IMPLEMENTATION SCHEDULE                                                 | 88         |
| 3.8 CONSIDERATION OF BEST AVAILABLE TECHNOLOGIES AND PRACTICES              | 88         |
| <b>4.0 PROJECT ALTERNATIVES</b>                                             | <b>90</b>  |
| 4.1 METHODOLOGY AND EVALUATION CRITERIA FOR ALTERNATIVES                    | 90         |
| 4.2 "NO PROJECT" ALTERNATIVE                                                | 91         |
| 4.3 ALIGNMENT AND ROUTE ALTERNATIVES                                        | 92         |
| 4.4 DESIGN ALTERNATIVES                                                     | 95         |
| 4.5 CONSTRUCTION METHOD ALTERNATIVES                                        | 97         |
| 4.6 ENVIRONMENTAL AND SOCIAL COMPARISON OF ALTERNATIVES                     | 99         |
| 4.7 SELECTED ALTERNATIVE AND JUSTIFICATION                                  | 101        |
| <b>5.0 DESCRIPTION OF THE ENVIRONMENT (BASELINE CONDITIONS)</b>             | <b>104</b> |
| 5.1 DEFINITION OF PROJECT AREA AND AREA OF INFLUENCE                        | 104        |
| 5.2 BASELINE STUDY METHODOLOGY                                              | 105        |
| 5.3 ENVIRONMENTAL BASELINE MONITORING                                       | 107        |
| 5.4 ENVIRONMENTAL BASELINE                                                  | 108        |
| 5.5 HYDROLOGY AND HYDROGEOLOGY                                              | 114        |
| 5.6 BIOLOGICAL ENVIRONMENT                                                  | 143        |
| 5.7 SOCIO-ECONOMIC AND HUMAN ENVIRONMENT                                    | 146        |
| 5.8 CULTURAL HERITAGE                                                       | 152        |
| 5.9 SUMMARY OF KEY ENVIRONMENTAL AND SOCIAL SENSITIVITIES                   | 153        |
| <b>6.0 ENVIRONMENTAL AND SOCIAL RISK AND IMPACT ASSESSMENT</b>              | <b>154</b> |
| 6.1 IMPACT ASSESSMENT METHODOLOGY                                           | 154        |
| 6.2 IMPACT AND RISK ASSESSMENT                                              | 158        |
| 6.3 MITIGATION MEASURES                                                     | 164        |
| 6.4 IMPACT IDENTIFICATION BY PROJECT PHASE AND ACTIVITY                     | 164        |
| BIOPHYSICAL IMPACTS (OS1, OS3, OS6)                                         | 165        |
| SOCIO-ECONOMIC IMPACTS (OS1, OS5, OS7, OS10)                                | 171        |
| LABOUR AND WORKING CONDITIONS (OS2)                                         | 173        |
| RESOURCE EFFICIENCY AND POLLUTION PREVENTION/MANAGEMENT (OS3)               | 175        |
| COMMUNITY HEALTH, SAFETY, AND SECURITY (OS4)                                | 176        |
| LAND ACQUISITION, RESTRICTIONS ON LAND USE AND RESETTLEMENT (OS5)           | 178        |

|                                                                                                     |            |
|-----------------------------------------------------------------------------------------------------|------------|
| HABITAT AND BIODIVERSITY CONSERVATION (OS6)                                                         | 178        |
| IMPACTS ON VULNERABLE GROUPS (OS7)                                                                  | 179        |
| CULTURAL HERITAGE IMPACTS (OS8)                                                                     | 179        |
| STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE (OS10)                                            | 180        |
| CUMULATIVE AND INDUCED IMPACTS                                                                      | 180        |
| RESIDUAL IMPACTS AND SIGNIFICANCE AFTER MITIGATION                                                  | 181        |
| STATEMENT ON DEGREE OF IRREVERSIBLE DAMAGE AND UNAVOIDABLE RESIDUAL IMPACTS                         | 182        |
| UNCERTAINTIES AND LIMITATIONS OF THE ESIA                                                           | 182        |
| <b>7.0 E&amp;S IMPLEMENTATION CAPACITY</b>                                                          | <b>184</b> |
| 7.1 INSTITUTIONAL AND REGULATORY FRAMEWORK                                                          | 184        |
| 7.2 DECENTRALIZED E&S GOVERNANCE STRUCTURES                                                         | 185        |
| 7.3 ASSESSMENT OF INSTITUTIONAL CAPACITY                                                            | 185        |
| 7.4 CAPACITY AT PROJECT LEVEL (PIU AND CONTRACTORS)                                                 | 186        |
| 7.5 GAP ANALYSIS AND RECOMMENDED CAPACITY STRENGTHENING MEASURES                                    | 187        |
| 7.5.1 DECENTRALIZED ESA OVERSIGHT AND CAPACITY STRENGTHENING IN GRAND BASSA AND RIVER CESS COUNTIES | 187        |
| 7.6 IMPLICATIONS FOR ESMP IMPLEMENTATION                                                            | 192        |
| <b>8.0 GRIEVANCE REDRESS MECHANISM</b>                                                              | <b>194</b> |
| 8.1 GRIEVANCE RESOLUTION COMMITTEE (GRC)                                                            | 194        |
| 8.2 PRINCIPLES OF THE GRM                                                                           | 195        |
| 8.3 WORKERS' GRIEVANCE MECHANISM                                                                    | 196        |
| 8.4 STRUCTURE AND LEVELS OF GRIEVANCE REDRESS                                                       | 197        |
| 8.4.1 GRM GOVERNANCE, CONTRACTOR INTAKE ROLE, AND CONFIDENTIAL SEA/SH REFERRAL PATHWAY              | 197        |
| 8.5 GRIEVANCE REDRESS PROCESS                                                                       | 200        |
| 8.6 SOURCES OF COMMUNITY GRIEVANCES                                                                 | 200        |
| 8.7 COMMUNITY EXPECTATIONS                                                                          | 200        |
| 8.8 IMPLEMENTATION OF THE GRM                                                                       | 201        |
| 8.9 RESETTLEMENT, LIVELIHOOD RESTORATION AND SOCIAL PROTECTION                                      | 201        |
| 8.10 GRM IMPLEMENTATION BUDGET                                                                      | 202        |
| <b>9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)</b>                                          | <b>205</b> |
| 9.1 INTRODUCTION                                                                                    | 205        |
| 9.2 OBJECTIVES OF THE ESMP                                                                          | 205        |
| 9.3 ESMP MINIMUM REQUIREMENTS MATRIX                                                                | 207        |
| 9.4 INSTITUTIONAL RESPONSIBILITIES                                                                  | 216        |
| 9.5 C-ESMP REQUIREMENTS                                                                             | 225        |
| 9.6 CHANCE FINDS PROCEDURE                                                                          | 237        |
| 9.7 LEGAL AND POLICY FRAMEWORK                                                                      | 240        |
| 9.8 ESMP MONITORING AND REPORTING                                                                   | 241        |
| 9.9 E&S PERFORMANCE AND RAP COMPLETION AUDITS                                                       | 242        |
| <b>10.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN</b>                                                | <b>243</b> |
| 10.1 ESMP BUDGET AND FINANCING                                                                      | 243        |
| <b>11.0 RAP/ARAP PLANNING AND IMPLEMENTATION FRAMEWORK</b>                                          | <b>247</b> |
| 11.1 PRINCIPLES AND OBJECTIVES OF THE RAP/ARAP                                                      | 247        |

|                                                                                     |            |
|-------------------------------------------------------------------------------------|------------|
| 11.2 SUMMARY OF SOCIO-ECONOMIC SURVEY OF PAPs                                       | 247        |
| 11.3 ELIGIBILITY AND ENTITLEMENTS                                                   | 249        |
| 11.4 LIVELIHOOD RESTORATION AND DEVELOPMENT MEASURES                                | 251        |
| 11.5 IMPLEMENTATION ARRANGEMENTS, SCHEDULE AND BUDGET                               | 252        |
| 11.6 GRIEVANCE REDRESS FOR RESETTLEMENT-RELATED ISSUES                              | 254        |
| 11.7 MONITORING AND EVALUATION OF RAP OUTCOMES                                      | 254        |
| <b>12.0 STAKEHOLDER ENGAGEMENT, PUBLIC PARTICIPATION AND INFORMATION DISCLOSURE</b> | <b>257</b> |
| 12.1 OBJECTIVES AND PRINCIPLES                                                      | 257        |
| 12.2 REGULATORY CONTEXT FOR PUBLIC PARTICIPATION                                    | 258        |
| 12.3 STAKEHOLDER IDENTIFICATION AND ANALYSIS                                        | 259        |
| 12.4 STAKEHOLDER ENGAGEMENT DURING ESIA PREPARATION                                 | 261        |
| 12.5 HOW STAKEHOLDER INPUTS INFLUENCED PROJECT DESIGN AND MITIGATION                | 262        |
| 12.6 FUTURE STAKEHOLDER ENGAGEMENT PLAN                                             | 263        |
| 12.7 GRIEVANCE REDRESS MECHANISM (GRM)                                              | 264        |
| 12.8 INFORMATION DISCLOSURE                                                         | 267        |
| <b>13.0 POST-CONSTRUCTION REMEDIATION PLAN</b>                                      | <b>269</b> |
| <b>14.0 CONCLUSIONS AND RECOMMENDATIONS</b>                                         | <b>272</b> |
| 14.1 OVERALL CONCLUSIONS ON ENVIRONMENTAL AND SOCIAL ACCEPTABILITY                  | 272        |
| 14.2 KEY RECOMMENDATIONS AND CONDITIONS FOR IMPLEMENTATION                          | 273        |
| 14.3 RECOMMENDATIONS FOR MONITORING, SUPERVISION AND ADAPTIVE MANAGEMENT            | 275        |
| <b>REFERENCES</b>                                                                   | <b>279</b> |
| <b>APPENDICES</b>                                                                   | <b>281</b> |
| APPENDIX 1: DETAILED PHYSICAL ENVIRONMENT BASELINE TABLES                           | 281        |
| APPENDIX 2: TRAFFIC COUNTS AND ROAD SAFETY BASELINE                                 | 293        |
| APPENDIX 3: DETAILED ESMP MITIGATION AND MONITORING MATRICES                        | 296        |
| APPENDIX 4: STAKEHOLDER ENGAGEMENT PLAN (SEP) AND CONSULTATION RECORDS              | 306        |
| APPENDIX 5: BIOLOGICAL SURVEY REPORTS AND SPECIES LISTS                             | 311        |
| APPENDIX 6: PICTORIAL RECORD OF STAKEHOLDER CONSULTATIONS                           | 319        |
| <b>APPENDIX 7: PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT MEETING RECORDS</b>   | <b>322</b> |
| APPENDIX 7.1: PUBLIC CONSULTATION MEETING MINUTES – BUCHANAN                        | 322        |
| APPENDIX 7.2: PUBLIC CONSULTATION MEETING MINUTES – BIG JOE TOWN                    | 327        |
| APPENDIX 7.3: PUBLIC CONSULTATION MEETING MINUTES – YARPAH TOWN                     | 332        |
| APPENDIX 7.4: STAKEHOLDER ENGAGEMENT ATTENDANCE RECORD                              | 339        |
| APPENDIX 7.5: PROJECT PROPONENT APPLICATION AND EPA APPROVAL FOR THE ESIA           | 340        |

## LIST OF TABLES

|                                                                                         |     |
|-----------------------------------------------------------------------------------------|-----|
| TABLE 1: MAIN CATEGORIES OF COSTS AND BENEFITS IN THE ECONOMIC APPRAISAL                | 53  |
| TABLE 2: SUMMARY OF KEY ECONOMIC AND SOCIAL BENEFITS                                    | 55  |
| TABLE 3: DISTRIBUTIONAL IMPACTS BY STAKEHOLDER GROUP (QUALITATIVE)                      | 56  |
| TABLE 4: KEY NATIONAL LEGAL AND POLICY INSTRUMENTS RELEVANT TO MRU/RDTFP                | 59  |
| TABLE 5: AFDB OPERATIONAL SAFEGUARDS AND RELEVANCE TO MRU/RDTFP                         | 65  |
| TABLE 6: GAP ANALYSIS – LIBERIAN FRAMEWORK VS AFDB ISS & GIIP AND ESIA/ESMP COMMITMENTS | 68  |
| TABLE 7: KEY PERMITS, LICENSES AND APPROVALS FOR MRU/RDTFP                              | 70  |
| TABLE 8: ILLUSTRATIVE KEY SETTLEMENTS ALONG THE BUCHANAN–CESTOS JUNCTION CORRIDOR       | 74  |
| TABLE 9: COMMUNITIES ALONG THE PROJECT CORRIDOR                                         | 74  |
| TABLE 10: SUMMARY OF MAIN PHYSICAL COMPONENTS AND ASSOCIATED FACILITIES                 | 81  |
| TABLE 11: SUMMARY OF PROJECT PHASES AND TYPICAL ACTIVITIES                              | 84  |
| TABLE 12: KEY GEOMETRIC AND STRUCTURAL DESIGN PARAMETERS (INDICATIVE)                   | 85  |
| TABLE 13: INDICATIVE MATERIAL INPUTS DURING CONSTRUCTION                                | 86  |
| TABLE 14: INDICATIVE IMPLEMENTATION SCHEDULE                                            | 88  |
| TABLE 15: EVALUATION CRITERIA FOR ALTERNATIVES                                          | 91  |
| TABLE 16: COMPARISON OF “NO PROJECT” VS. PROPOSED PROJECT                               | 92  |
| TABLE 17A: QUALITATIVE COMPARISON OF ROUTE ALTERNATIVES                                 | 94  |
| TABLE 17B: QUALITATIVE AND RESETTLEMENT SCREENING COMPARISON OF ALIGNMENT ALTERNATIVES  | 94  |
| TABLE 18: COMPARISON OF PAVEMENT ALTERNATIVES                                           | 96  |
| TABLE 19: SUMMARY OF MATERIALS SOURCING ALTERNATIVES                                    | 98  |
| TABLE 20: ENVIRONMENTAL AND SOCIAL COMPARISON OF PRINCIPAL ALTERNATIVES                 | 100 |
| TABLE 21: SUMMARY OF SPATIAL, TEMPORAL AND THEMATIC BOUNDARIES                          | 105 |
| TABLE 22: SOIL SAMPLING LOCATIONS AND COORDINATES                                       | 109 |
| TABLE 23: SUMMARY OF SOIL QUALITY ALONG THE CORRIDOR (SSPT-1 TO SSPT-22)                | 112 |
| TABLE 24: WATER SAMPLING POINTS/LOCATIONS AND COORDINATES                               | 116 |
| TABLE 25: LIBERIA WATER QUALITY STANDARDS (LWQS) CLASS III                              | 119 |
| TABLE 26: SURFACE AND GROUNDWATER QUALITY RESULTS AND COMPLIANCE STATUS                 | 120 |
| TABLE 27: POTENTIAL IMPACTS (AFDB OS4 & EPA FRAMEWORK)                                  | 124 |
| TABLE 28: MONITORING PLAN FOR WATER QUALITY                                             | 125 |
| TABLE 29: AMBIENT AIR QUALITY MONITORING LOCATIONS AND COORDINATES                      | 126 |
| TABLE 30: AMBIENT AIR QUALITY RESULTS (AAQMPT-1 TO AAQMPT-5)                            | 129 |
| TABLE 31: AMBIENT AIR QUALITY RESULTS (AAQMPT-6 TO AAQMPT-10)                           | 129 |
| TABLE 32: APPLICABLE GUIDELINE VALUES (REFERENCE STANDARDS)                             | 129 |
| TABLE 33: TYPICAL GUIDELINE LIMITS USED FOR ASSESSMENT:                                 | 133 |
| TABLE 34: AMBIENT NOISE MEASUREMENT LOCATIONS AND COORDINATES                           | 134 |
| TABLE 35: SUMMARY OF MEASURED NOISE LEVELS                                              | 135 |
| TABLE 36: ANMPT-1: BUCHANAN (URBAN/PORT INFLUENCE)                                      | 139 |
| TABLE 37: ANMPT-2: BRUMSKINE FARM (RURAL/AGRICULTURAL)                                  | 139 |
| TABLE 38: ANMPT-3: KASUAH TOWN (RURAL SETTLEMENT)                                       | 139 |

|                                                                                                                         |     |
|-------------------------------------------------------------------------------------------------------------------------|-----|
| TABLE 39: ANMPT-4: DAVID TOWN (QUIET RURAL AREA)                                                                        | 140 |
| TABLE 40: ANMPT-5: GIO TOWN (VILLAGE SETTING)                                                                           | 140 |
| TABLE 41: ANMPT-6: ZAHNTO TOWN (PROPOSED QUARRY SITE – BASELINE QUIET)                                                  | 141 |
| TABLE 42: ANMPT-7: YARPLEAH TOWN (RURAL COMMUNITY)                                                                      | 141 |
| TABLE 43: CESTOS JUNCTION (PROPOSED CAMP SITE / TRANSPORT NODE)                                                         | 141 |
| TABLE 44: SUMMARY DEMOGRAPHIC CHARACTERISTICS (SEBS, 2025)                                                              | 148 |
| TABLE 45: SUMMARY OF KEY ENVIRONMENTAL AND SOCIAL SENSITIVITIES                                                         | 153 |
| TABLE 46: IMPACT MAGNITUDE CATEGORIES                                                                                   | 156 |
| TABLE 46A: RECEPTOR SENSITIVITY/VULNERABILITY CRITERIA                                                                  | 157 |
| TABLE 46B: TYPICAL SIGNIFICANCE MATRIX                                                                                  | 157 |
| TABLE 47A: QUANTITATIVE ENVIRONMENTAL AND SOCIAL RISK ASSESSMENT                                                        | 159 |
| TABLE 47B: QUANTITATIVE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT                                                      | 161 |
| TABLE 47C: MITIGATION MEASURES FOR ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS, ASSOCIATED RISKS, AND MANAGEMENT ACTIONS | 164 |
| TABLE 51: SUMMARY OF KEY INTERACTIONS BY PROJECT PHASE                                                                  | 165 |
| TABLE 52: SUMMARY OF KEY RESIDUAL IMPACTS AFTER MITIGATION                                                              | 181 |
| TABLE 53: DECENTRALIZED ESA OVERSIGHT AND CAPACITY STRENGTHENING ARRANGEMENTS IN GRAND BASSA AND RIVER CESS COUNTIES    | 188 |
| TABLE 54: GRM GOVERNANCE, INTAKE, ESCALATION AND CLOSURE RESPONSIBILITIES                                               | 198 |
| TABLE 55: ITEMIZED BUDGET FOR IMPLEMENTATION OF THE GRIEVANCE REDRESS MECHANISM (GRM)                                   | 203 |
| TABLE 56: ESMP MINIMUM REQUIREMENTS COMPLIANCE MATRIX                                                                   | 207 |
| TABLE 57A: IMPACT MANAGEMENT AND IMPLEMENTATION MATRIX                                                                  | 209 |
| TABLE 57B: RISK MANAGEMENT AND IMPLEMENTATION MATRIX                                                                    | 213 |
| TABLE 58: TRAINING PROGRAM FOR CONTRACTING ENTITY                                                                       | 236 |
| TABLE 59: DETAILED ESMP IMPLEMENTATION BUDGET                                                                           | 244 |
| TABLE 60: SUMMARY ESMP BUDGET                                                                                           | 246 |
| TABLE 61: SOCIO-ECONOMIC PROFILE OF CORRIDOR HOUSEHOLDS (INDICATIVE FOR PAP5)                                           | 249 |
| TABLE 62: ELIGIBILITY CATEGORIES                                                                                        | 249 |
| TABLE 63: SUMMARY ENTITLEMENT MATRIX                                                                                    | 250 |
| TABLE 64: EXAMPLE LIVELIHOOD RESTORATION MEASURES BY PAP GROUP                                                          | 252 |
| TABLE 65: OUTLINE RAP/ARAP IMPLEMENTATION SCHEDULE                                                                      | 253 |
| TABLE 66: INDICATIVE RAP MONITORING AND EVALUATION INDICATORS                                                           | 255 |
| TABLE 67: KEY LEGAL AND SAFEGUARD REQUIREMENTS FOR STAKEHOLDER ENGAGEMENT AND DISCLOSURE                                | 259 |
| TABLE 68: STAKEHOLDER ANALYSIS AND ENGAGEMENT STRATEGY                                                                  | 260 |
| TABLE 69: ILLUSTRATIVE SUMMARY OF ESIA STAGE CONSULTATIONS                                                              | 261 |
| TABLE 70: FORWARD-LOOKING STAKEHOLDER ENGAGEMENT PLAN                                                                   | 263 |
| TABLE 71: GRM PROCESS AND INDICATIVE TIMEFRAMES                                                                         | 265 |
| TABLE 72: INFORMATION DISCLOSURE PLAN                                                                                   | 268 |
| TABLE 73: KEY RECOMMENDATIONS AND CONDITIONS FOR IMPLEMENTATION                                                         | 274 |
| TABLE 74: KEY MONITORING AND ADAPTIVE MANAGEMENT PRIORITIES                                                             | 277 |

## FIGURES

|                                                                                                                                  |     |
|----------------------------------------------------------------------------------------------------------------------------------|-----|
| FIGURE 1: REGIONAL ROAD ALIGNMENT MAP                                                                                            | 19  |
| FIGURE 2: LIBERIA COASTAL ROAD CORRIDOR CONCEPT MAP                                                                              | 20  |
| FIGURE 3: BUCHANAN-CESTOS PROJECT CORRIDOR                                                                                       | 21  |
| FIGURE 4: PROJECT ROAD ALIGNMENT AND KEY RIVER CROSSINGS                                                                         | 22  |
| FIGURE 5: MAP OF THE LIBERIA COASTAL HIGHWAY CORRIDOR.....                                                                       | 76  |
| FIGURE 6: MAP OF THE PROJECT CORRIDOR.....                                                                                       | 76  |
| FIGURE 7: PICTORIAL OF LATOSOL SOIL ON THE EXISTING CORRIDOR.....                                                                | 108 |
| FIGURE 8: MAP OF THE PROJECT AREA SHOWING 22 SOIL SAMPLING POINTS AT 2.5KM INTERVALS OF THE PROJECT ROAD<br>.....                | 111 |
| FIGURE 9: DOWNSTREAM PICTORIAL OF THE TIMBO RIVER                                                                                | 115 |
| FIGURE 10: MAP OF THE PROJECT AREA SHOWING 12 WATER SAMPLING POINTS AT 5KM INTERVALS OF THE PROJECT<br>ROAD.....                 | 118 |
| FIGURE 11: MAP OF THE PROJECT AREA SHOWING 10 AMBIENT AIR QUALITY MONITORING POINTS<br>AT SPECIFIC LOCATIONS OF THE PROJECT ROAD | 128 |
| FIGURE 12: MAP OF THE PROJECT AREA SHOWING 8 AMBIENT NOISE MEASUREMENT LEVELS AT<br>SPECIFIC LOCATIONS OF THE PROJECT ROAD       | 135 |
| FIGURE 13: PARTIAL VIEW OF THE EXISTING CORRIDOR                                                                                 | 147 |

## ACRONYMS AND ABBREVIATIONS

| Acronym/Abbreviation | 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                                                               |
| ARAP                 | Abbreviated Resettlement Action Plan                                            |
| 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-ESMP               | Contractor Environmental and Social Management 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                                      |
| ESMP                 | Environmental and Social Management Plan                                        |
| ESMS                 | Environmental and Social Management System                                      |

| Acronym/Abbreviation | Meaning                                                                     |
|----------------------|-----------------------------------------------------------------------------|
| 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 |
| GHG                  | Greenhouse Gas                                                              |
| GIIP                 | Good International Industry Practice                                        |
| GIS                  | Geographic Information System                                               |
| GoL                  | Government of Liberia                                                       |
| GPS                  | Global Positioning System                                                   |
| GRC                  | Grievance Redress Committee                                                 |
| GRM                  | Grievance Redress 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                                           |
| IIV                  | 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                                                            |

| Acronym/Abbreviation | Meaning                                                                    |
|----------------------|----------------------------------------------------------------------------|
| MRU/RDTP             | 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                                                 |
| PAP                  | Project-Affected Person                                                    |
| PCR                  | Physical Cultural Resources                                                |
| PFMU                 | Project Financial Management Unit                                          |
| PIU                  | Project Implementation Unit                                                |
| PM <sub>2.5</sub>    | Particulate Matter with an Aerodynamic Diameter of 2.5 Micrometres or Less |
| PM <sub>10</sub>     | Particulate Matter with an Aerodynamic Diameter of 10 Micrometres or Less  |
| POPs                 | Persistent Organic Pollutants                                              |
| PPE                  | Personal Protective Equipment                                              |
| P RTP                | ECOWAS Priority Road Transport Programme                                   |
| QA/QC                | Quality Assurance and Quality Control                                      |
| RAP                  | Resettlement Action Plan                                                   |
| RIT                  | RAP 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                                                     |

| Acronym/Abbreviation | Meaning                       |
|----------------------|-------------------------------|
| 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          |

## GLOSSARY OF KEY TERMS

*Definitions are consistent with the Liberian legal framework, the EPA ESIA Procedural Guidelines, the AfDB ISS, and GIIP; wording is adapted to the context of this project.*

([epa.gov.lr](http://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 geographic area over which the project's environmental and social impacts may occur. It includes the 250 m corridor on each side of the road centreline; the locations of camps, borrow pits, quarries, and access roads; communities and ecosystems potentially affected by induced development; associated facilities; and cumulative impacts. (
3. **Associated Facilities:** Facilities or activities that are not financed by the AfDB but are necessary for the project to be viable and would not have been constructed or expanded without the project (e.g. some access roads, power connections or material sources). ([MFISEASH](#))
4. **Chance Finds:** 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. ([African Development Bank](#))
5. **Critical Habitat:** Areas with particularly high biodiversity 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. ([esa.afdb.org](http://esa.afdb.org))
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. ([IISD](#))
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. ([African Development Bank](#))

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 project, including analysis of alternatives, development of mitigation measures, and preparation of an Environmental and Social Management Plan (ESMP).
9. **Environmental and Social Management Plan (ESMP)**: A set of site-specific, time-bound measures and procedures that describe how identified environmental and social 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, GIIP is represented principally by IFC Performance Standards and the World Bank Group EHS Guidelines. ([IFC](#))
11. **Grievance Redress Mechanism (GRM)**: 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)**: *Natural habitat* comprises areas composed of viable assemblages of native species where human activity has not essentially modified ecological functions. *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. ([African Development Bank](#))
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. ([African Development Bank](#))
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. ([African Development Bank](#))
16. **Resettlement Action Plan (RAP) / Abbreviated RAP (ARAP)**: 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 OS5 and national requirements. ([African Development Bank](#))
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. ([MFISEASH](#))

18. **Vulnerable Groups:** Individuals or groups who, due to factors such as gender, age, disability, poverty, social or economic marginalization, or minority status, may be disproportionately affected by project impacts or have limited ability to benefit from project opportunities. The AfDB ISS emphasizes protection and inclusion of such groups, including highly vulnerable rural minorities. ([idev.afdb.org](#))
19. **Workers (Direct, Contracted, and Community Workers):** People employed or engaged directly by the project proponent or contractor, through third parties, or working in community-based arrangements linked to the project, whose labour rights, working conditions, and health and safety must be protected in line with OS2 and national labour laws. ([MFISEASH](#))

## EXECUTIVE SUMMARY

This Summary presents the main findings of the Environmental and Social Impact Assessment (ESIA) for the **paving of the 60.9 km Buchanan–Cestos Junction Road** under the Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP), Phase V, Lot 1.

### 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 1. It replaces the previous Non-Technical Summary and is aligned with the main ESIA report, Version 03, dated July 16, 2026.

The project covers approximately 60.9 km, including the link to the Port of Buchanan, and is located in Grand Bassa and River Cess 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.

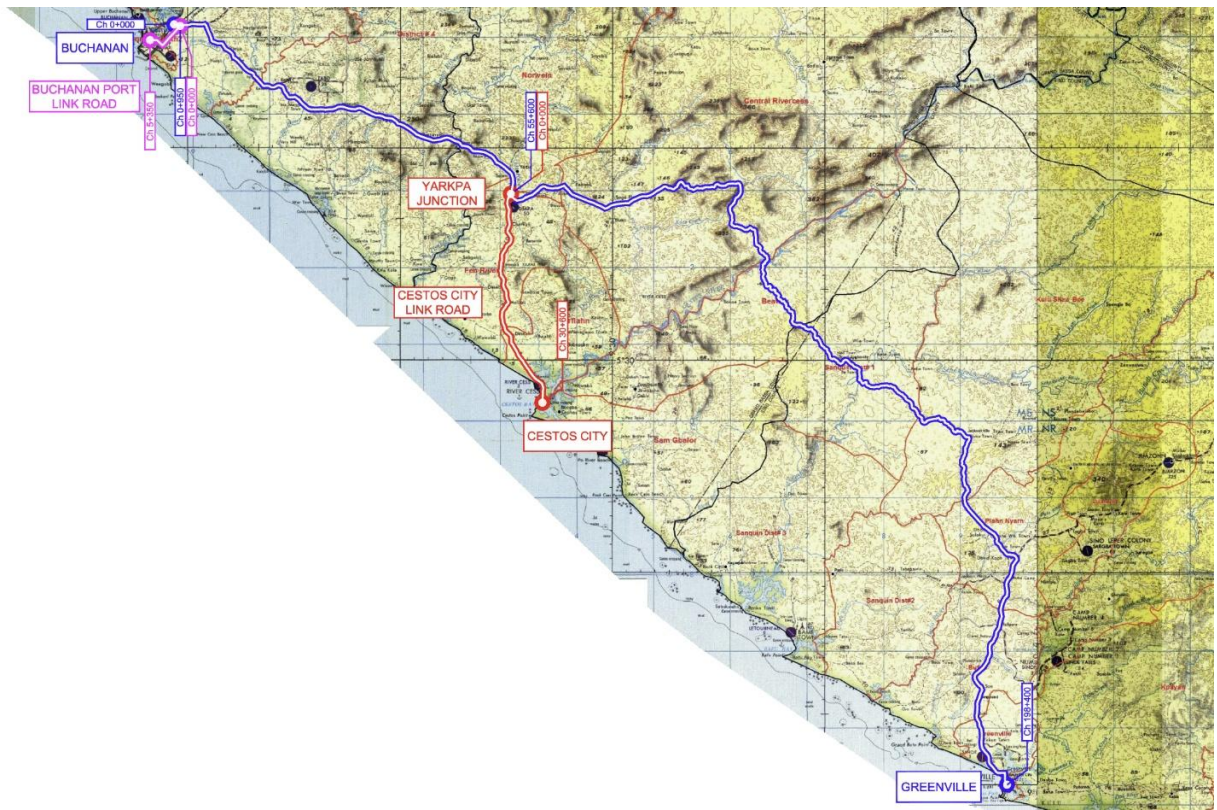
The objective of development is to improve road infrastructure and cross-border transport connectivity within the Mano River Union area in order to facilitate trade, movement of people, regional integration, post-conflict economic recovery, and poverty reduction. Specifically, the project seeks to provide 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 1 – 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, River Cess 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 |
| Project phases        | Planning and design, pre-construction, construction, quality control and environmental monitoring, operation and maintenance, and reinstatement of temporary facilities                             |
| ESIA category         | Category 1 under the AfDB Integrated Safeguards System and a major road scheme requiring a detailed ESIA and EPA environmental permit under Liberia's ESIA process                                  |

## O.2 ALTERNATIVES CONSIDERED

The ESIA considered the no-project option, alignment and route alternatives, design alternatives, and construction method/material-source alternatives. The no-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. The preferred alternative is to upgrade the existing alignment with 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.



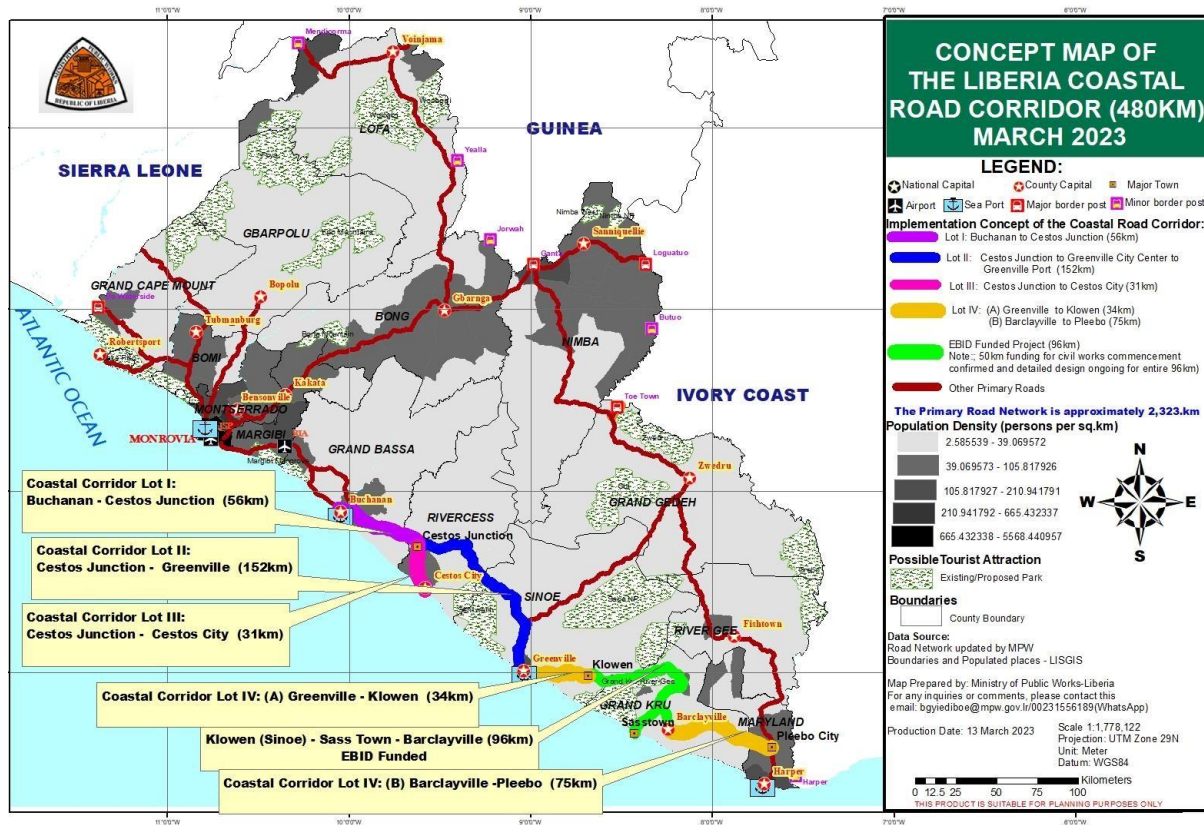
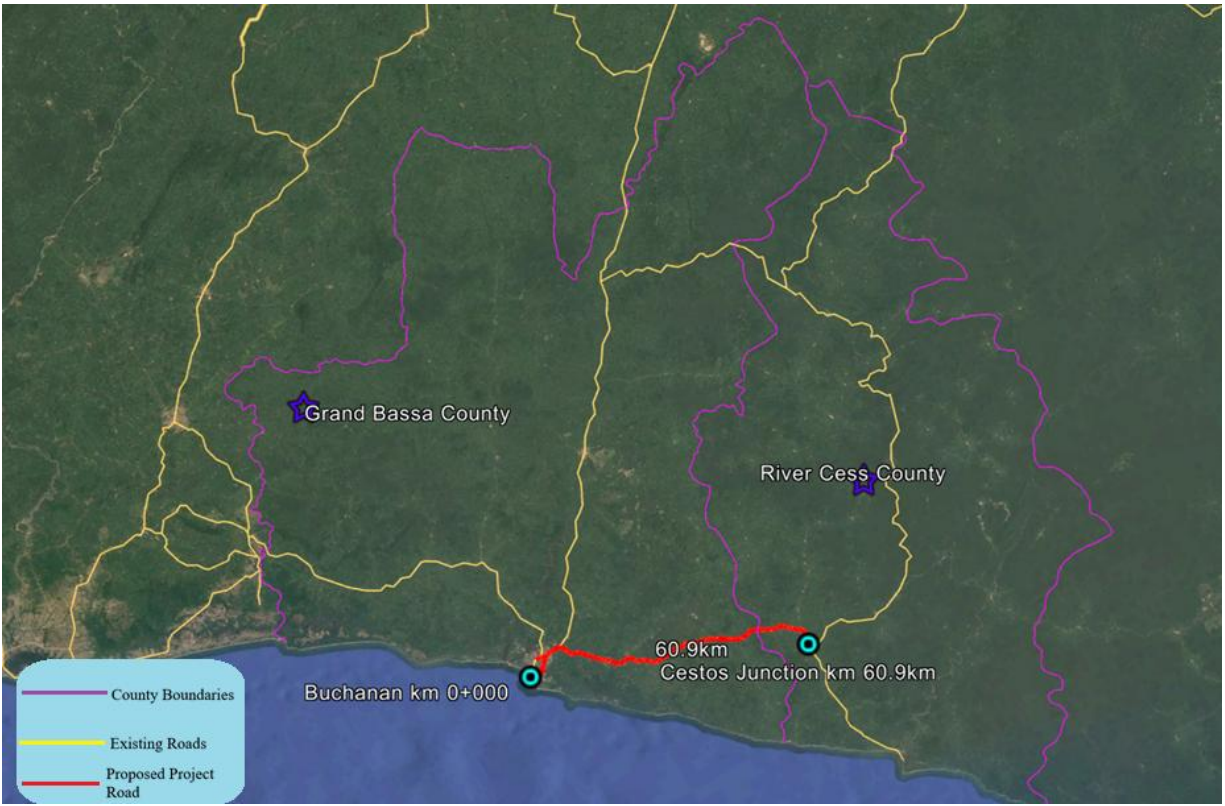


Figure 2: Liberia Coastal Road Corridor Concept Map



*Figure 3: Buchanan-Cestos Project Corridor*

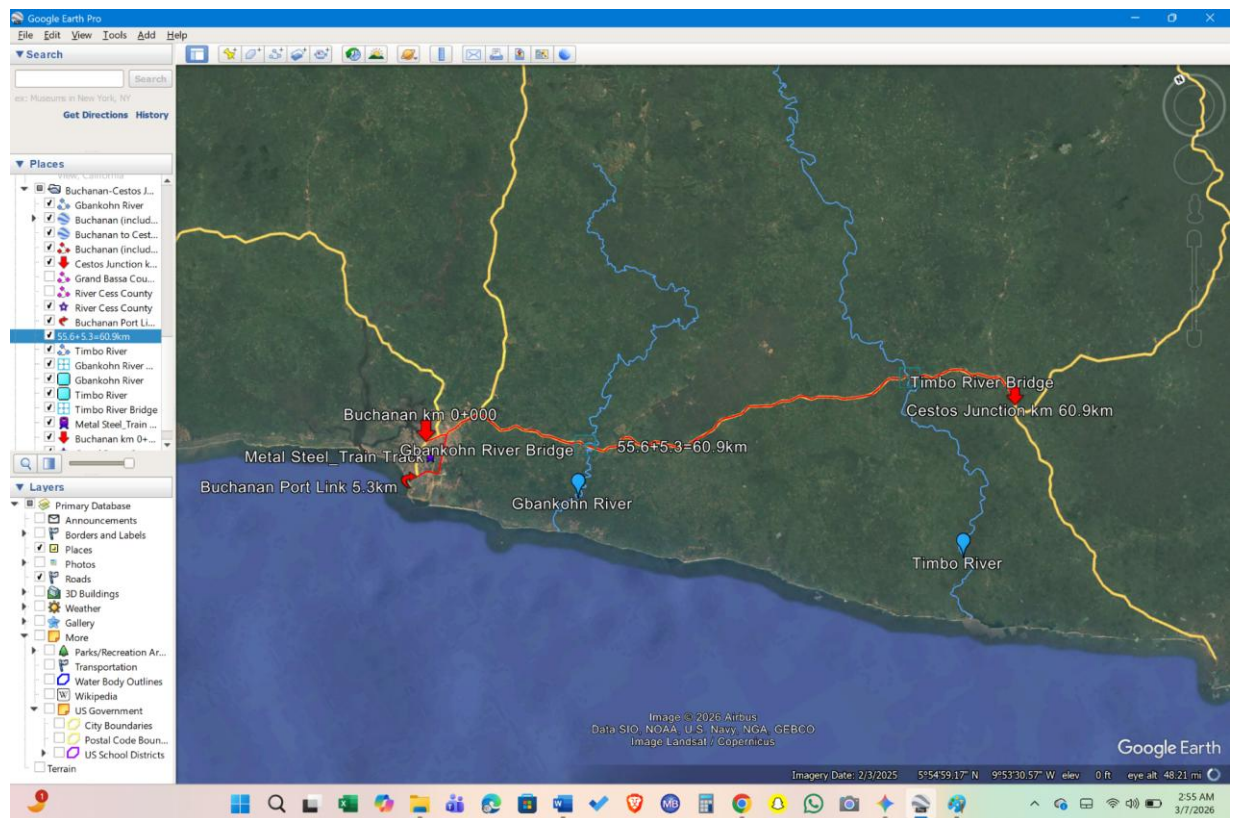


Figure 4: Project Road Alignment and Key River Crossings

### O.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 River Cess 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 ESIA, the Direct Area of Influence is defined as a corridor of 250 m on each side of the existing road centreline along the 60.9 km road. This includes the right-of-way, works areas, safety zones and immediately adjacent land uses where direct construction impacts such as dust, noise and access disruption are expected. The Indirect Area of Influence includes communities using the road, areas of associated facilities, haul roads, downstream receptors such as rivers and wetlands, and wider areas affected by induced access, land-use change and economic activity.

The direct corridor has been modified by more than five decades of use as a laterite road, with adjacent land used for settlements, agriculture, logging, small businesses and other human activities. No sensitive or critical species were observed within the direct 250 m corridor during field surveys, although natural habitats, forests and wetlands remain important in the wider landscape

*Table ES-2: Baseline Conditions and Key Environmental and Social Sensitivities*

| Valued Environmental and Social Component | Baseline Conditions and Key Stakes / Challenges                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Physical environment                      | The corridor lies within a humid tropical setting with high rainfall, a long rainy season, deep lateritic soils and rolling terrain intersected by streams and rivers. Lateritic soils are suitable for road construction but vulnerable to erosion when exposed. Road conditions currently contribute to dust, muddy surfaces, poor drainage and restricted rainy-season access. |
| Water resources                           | The corridor crosses freshwater systems including the Timbo, Gbowee and New Cess Rivers. Surface water is used for domestic needs, fishing and livelihoods. Laboratory results indicate generally acceptable pH, dissolved solids and major ions within applicable limits, with some elevated turbidity and suspended solids typical of unpaved-road environments.                |
| Air quality, noise and vibration          | The area has no major industrial sources. Existing air quality concerns are mainly dust from unpaved roads and localized vehicle and biomass-cooking emissions. Baseline noise is generally low to moderate and associated with traffic, community activity and small businesses.                                                                                                 |
| Biological environment                    | The direct 250 m corridor is heavily modified by settlements, farms, fallows, rubber and other agricultural uses. The wider area contains secondary forests, bush fallows, wetlands and riverine vegetation. No protected areas, critical habitats or globally significant biodiversity sites intersect the road alignment.                                                       |
| Socio-economic environment                | Communities are predominantly rural and rely on smallholder agriculture, petty trade, transport services, logging and artisanal fishing. The road is the main access route to markets, schools, health facilities, Buchanan Port and administrative centres.                                                                                                                      |
| Community health and vulnerability        | Common health issues include malaria, respiratory infections, water-borne diseases and limited access to maternal health services. Women, youth, elderly persons,                                                                                                                                                                                                                 |

| Valued Environmental and Social Component | Baseline Conditions and Key Stakes / Challenges                                                                                                                                                          |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                           | persons with disabilities and very poor households face greater constraints in access to land, services, employment and decision-making.                                                                 |
| Cultural heritage                         | The corridor contains known and potential cultural heritage resources, including graves, cemeteries, shrines, sacred trees and possible chance find during earthworks and excavation.                    |
| Land, assets and livelihoods              | The project corridor contains residential structures, shops, kiosks, fences, crops, farms, economic tree crops, community assets and other livelihood resources located within or near the right-of-way. |

#### O.4 INSTITUTIONAL AND LEGAL FRAMEWORK FOR ESMP IMPLEMENTATION

The ESIA has been prepared in accordance with Liberia's national legal framework, EPA requirements, AfDB ISS 2023 and Good International Industry Practice. The ESMP will be implemented under the leadership of MPW through the IIU/PIU, with regulatory oversight by EPA and supervision support from AfDB, the Supervision Consultant and relevant national and local institutions.

*Table ES-3: Institutional Roles and Responsibilities for ESMP Implementation*

| Institution / Actor                                | Roles and Responsibilities for ESMP Implementation                                                                                                                                                                                                                                                |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MPW / IIU / PIU                                    | Serves as the Project Implementation Entity and is responsible for overall safeguards coordination, ESMP implementation oversight, contractor ESMP review and approval, stakeholder engagement, GRM operation, RAP 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 RAP 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 and co-financiers                             | Review ESIA, ESMP, RAP and monitoring reports, conduct supervision missions and ensure compliance with applicable financing safeguards requirements.                                                                                                                                              |

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 AfDB Operational Safeguards OS1, OS2, OS3, OS4, OS5, OS6, OS7, OS8 and OS10. Where national and AfDB requirements differ, the more stringent requirement applies.

## 0.5 MAJOR AND MODERATE ENVIRONMENTAL AND SOCIAL IMPACTS

The ESIA indicates that most adverse impacts will be localized, temporary and manageable through effective implementation of the ESMP and RAP. Some permanent impacts will occur, particularly land acquisition, vegetation loss and physical alteration of the road corridor and ancillary sites. The key major and moderate impacts are summarized below.

*Table ES-4: Environmental and Social Risk Assessment*

| Code | Risk                                   | Quantitative Estimate / Receptor                                                                                                                          | Risk Rating                            | Potential Consequence                                                                  |
|------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------|
| I-04 | Soil erosion                           | An estimated 10–25 tons/ha/year if not properly controlled                                                                                                | Construction / Moderate to Substantial | Erosion, gully formation, sediment movement and slope instability                      |
| I-05 | Water quality deterioration            | Localized increase in Total Suspended Solids by approximately 50–150 mg/L above baseline at crossings, if unmanaged                                       | Construction / Moderate                | Sedimentation, increased turbidity and localized aquatic habitat degradation           |
| I-11 | Community health and safety            | Potential 20–40 percent increase in accident risk during construction if unmanaged                                                                        | Construction / Substantial             | Traffic accidents, pedestrian injury, road safety risks and public safety concerns     |
| I-12 | Communicable disease and labour influx | Potential 5–10 percent increase in communicable disease risks, including HIV/STIs; labour force estimated at 200–400 workers with 20–40 percent non-local | Construction / Moderate to Substantial | Disease transmission, social tension and pressure on local services                    |
| I-13 | GBV/SEA/SH risks                       | Moderate to substantial risk where worker-community interaction is unmanaged                                                                              | Construction / Moderate to Substantial | GBV/SEA/SH incidents, exploitation, social harm and under-reporting                    |
| I-14 | Occupational health and safety         | Accident rates are estimated at 2–5 incidents per 100 workers per year without adequate controls                                                          | Construction / Substantial             | Worker injury, heat stress, dust exposure, noise exposure and hazardous material risks |

| Code | Risk              | Quantitative Estimate / Receptor                                                                                | Risk Rating                                                  | Potential Consequence                                                     |
|------|-------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------|
| I-15 | Cultural heritage | Approximately 1–15 sites of cultural importance may be affected, including shrines, cemeteries and sacred trees | Pre-construction and construction / Substantial if unmanaged | Disturbance or loss of cultural heritage resources and community conflict |

*Table ES-5: Environmental and Social Impact Assessment*

| Code | Impact                                   | Quantitative Estimate / Receptor                                                                                                                           | Significance                           | Key Consequence                                                                        |
|------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------|
| I-01 | Land take and permanent land-use change  | Approximately 183–244 ha within the right-of-way and associated project footprint                                                                          | Permanent / Moderate to Substantial    | Land acquisition, change in land use, displacement and livelihood impacts              |
| I-02 | Vegetation loss                          | Approximately 90–140 ha of vegetation loss within the project corridor; an additional 20–40 ha disturbance through borrow pits and ancillary facilities    | Construction / Moderate to Substantial | Loss of vegetation cover, habitat disturbance and landscape alteration                 |
| I-03 | Economic tree crop and useful plant loss | Verified RAP data records 5,656 economic tree crops across 61 farms, including pineapple, rubber, banana/plantain, coconut, oil palm and cocoa             | Construction / Moderate                | Loss of household economic resources and compensable crop/tree assets                  |
| I-06 | Air quality deterioration                | PM10 in some work areas may reach 150–300 $\mu\text{g}/\text{m}^3$ without dust control                                                                    | Construction / Moderate                | Dust nuisance and respiratory irritation for nearby receptors                          |
| I-07 | Noise and vibration                      | Construction noise levels may reach 70–90 dB(A) near work zones                                                                                            | Construction / Moderate to Substantial | Disturbance to households and sensitive receptors such as schools and clinics          |
| I-08 | Physical and economic displacement       | 1,093 PAPs are affected through structure, asset and livelihood losses; 500 of these also experience business income loss, while households losing primary | Pre-construction / Substantial         | Loss of structures, businesses, crops, farms, trees and access to livelihood resources |

| Code | Impact                          | Quantitative Estimate / Receptor                                                                                                                                        | Significance                                                | Key Consequence                                                                  |
|------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------|
|      |                                 | residences are subject to physical relocation                                                                                                                           |                                                             |                                                                                  |
| I-09 | Cropland and livelihood impacts | Up to 120–180 ha may be exposed to temporary construction disturbance, while the verified RAP-compensable farmland loss is 6 ha, affecting 56 farm owners               | Pre-construction and construction / Moderate to Substantial | Loss or disruption of agricultural production, income and market access          |
| I-10 | Temporary access disruption     | Approximately 1,000–2,000 people may experience temporary access disruption during construction                                                                         | Construction / Moderate                                     | Disrupted access to homes, farms, markets, schools and health facilities         |
| I-16 | Waste generation                | Approximately 5–10 m <sup>3</sup> /day mixed waste at construction camps if unmanaged                                                                                   | Construction / Moderate                                     | Soil and water contamination, sanitation nuisance and vector-borne disease risks |
| I-17 | Positive impacts                | Travel time reduction of approximately 30–50 percent, transport cost reduction of about 20–40 percent, and direct/indirect benefits to an estimated 5,000–10,000 people | Operation / Beneficial                                      | Improved access, trade, services, safety and livelihood opportunities            |

## 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 ESMP and RAP 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.

*Table ES-6: Summary of Stakeholder Consultations*

| Location / Area                                  | Engagement Method                                                                   | Stakeholders Consulted                                                                                                | Main Concerns Raised                                                                                                                            | Developer Responses / Commitments                                                                                                                                        |
|--------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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                                 | Road safety features, coordination with traffic police, local labour provisions, RAP disclosure, compensation process and traffic management plan                        |
| Big Joe Town and nearby settlements              | Community meeting and focus group discussions                                       | 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               | Dust suppression, noise control, construction scheduling, business access management, pedestrian crossings and drainage design                                           |
| Yarpah Town and River Cess corridor communities  | Community consultation and GRC establishment discussions                            | 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 linked to labour influx | RAP implementation, compensation at replacement cost, protection/replacement of water sources, local recruitment procedures, GBV/SEA/SH Action Plan and Codes of Conduct |
| Full 60.9 km corridor and affected communities   | Socio-economic survey, asset inventory, key informant interviews and transect walks | PAP households, businesses, farmers, traditional leaders, road users and community representatives                    | Asset valuation, eligibility, livelihood impacts, temporary access disruption and grievance channels                                            | Census and asset inventory, PAP coding, compensation framework, GRM disclosure and documentation of affected assets                                                      |
| Sectoral agencies and civil society stakeholders | Technical interviews and institutional consultations                                | Environmental NGOs, gender/GBV service providers, road safety NGOs and relevant agencies                              | Cumulative impacts, biodiversity, water resources, GBV/SEA/SH prevention, independent                                                           | Biodiversity and water management measures, CSO involvement, survivor-centred referral pathways and targeted engagement of vulnerable groups                             |

| Location / Area | Engagement Method | Stakeholders Consulted | Main Concerns Raised             | Developer Responses / Commitments |
|-----------------|-------------------|------------------------|----------------------------------|-----------------------------------|
|                 |                   |                        | monitoring and vulnerable groups |                                   |

## O.7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The ESMP 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, GRM, capacity building and budgeted implementation arrangements. Detailed ESMP mitigation, monitoring and implementation matrices are provided in the main ESIA and its appendices.

### *Risk and Impact Management Measures*

*Table ES-7: Impact Management Measures*

| Impact Area                 | Mitigation and Management Measures                                                                                                                              |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Soils and erosion           | Erosion control, slope stabilization, staged clearing, sediment traps, revegetation, drainage management and borrow pit rehabilitation                          |
| Water resources             | Stream buffers, silt fences, sediment traps, wastewater control, camp sanitation, spill prevention and periodic water quality monitoring                        |
| Air quality and dust        | Watering of haul roads, speed controls, equipment maintenance, covered haulage, dust suppression and community notification of dusty works                      |
| Noise and vibration         | Work-hour controls near sensitive receptors, equipment maintenance, silencers, advance notice to communities and temporary noise barriers where necessary       |
| Biodiversity and vegetation | Limit clearing to approved corridor, avoid sensitive riparian zones, restore disturbed areas, control timber/fuelwood sourcing and apply offsets where required |
| Land and livelihoods        | RAP implementation, compensation at replacement cost, livelihood restoration, transitional assistance and targeted support to vulnerable households             |

*Table ES-8: Risk Management Measures*

| Risk Area                   | Preventive and Management Measures                                                                                                        |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Community health and safety | Traffic management, safety signage, pedestrian crossings, road safety campaigns, speed controls, access management and emergency response |

| Risk Area                    | Preventive and Management Measures                                                                                                            |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Labour and OHS               | OHS Plan, PPE, toolbox talks, safe work procedures, worker GRM, no child or forced labour, non-discrimination and routine supervision         |
| GBV/SEA/SH and labour influx | Worker Code of Conduct, GBV/SEA/SH Action Plan, awareness sessions, referral pathways, survivor-centred GRM and sanctions for non-compliance  |
| Cultural heritage            | Avoidance, consultation with communities, Chance Finds Procedure, culturally appropriate relocation of graves or cemeteries where unavoidable |

### ENVIRONMENTAL, OCCUPATIONAL HEALTH AND SAFETY CLAUSES FOR CONTRACTS

The following Environmental, Occupational Health and Safety clauses shall be inserted into works contracts and enforced through the Contractor ESMP and Supervision Consultant monitoring:

- General hygiene, health and safety rules for construction sites, including safe access, sanitation, drinking water, first aid, PPE, emergency response, site housekeeping and accident reporting.
- HIV/STI and communicable disease awareness and prevention measures for workers and surrounding communities.
- Worker-community relationship requirements, including respectful conduct, control of worker movement, prohibition of harassment, protection of minors and vulnerable persons, and sanctions for misconduct.
- Gender equity and GBV/SEA/SH prevention and response requirements, including worker Codes of Conduct, training, confidential reporting and survivor-centred referrals.
- Chance Finds Procedure for graves, shrines, sacred trees, cultural sites and archaeological or cultural objects encountered during works.
- Traffic and road safety requirements, including speed controls, traffic marshals, signage, pedestrian crossings and safe diversions.
- Pollution prevention, waste management, spill response, hazardous materials handling and camp sanitation requirements.
- Reinstatement requirements for borrow pits, quarries, camps, stockpile areas, detours and other temporary facilities.

## ENVIRONMENTAL MONITORING MATRIX

The summary monitoring matrix below identifies the main monitoring parameters, approaches, responsibilities, and reporting channels. The detailed ESMP budget shall identify each mitigation and monitoring measure, quantity and unit, 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 ESMP before mobilization.

*Table ES-9: Environmental Monitoring Matrix*

| Code  | Parameter to Monitor                  | Sampling Method / Approach                                                                                        | Frequency                                                             | Cost Treatment                                                                                    | Responsibility                                   | Reporting                         |
|-------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------|
| EM-01 | Dust / PM10                           | Visual inspection and portable air quality monitoring at active works, settlements and haul roads                 | Weekly during dry works; more frequent near sensitive receptors       | Included in Contractor ESMP and supervision budget                                                | Contractor HSE Officer; Supervision Consultant   | Monthly E&S report to PIU         |
| EM-02 | Noise levels                          | Noise meter readings near schools, clinics, homes and active work fronts                                          | Monthly and during high-noise activities                              | Included in monitoring budget                                                                     | Contractor HSE Officer; Supervision Consultant   | Monthly E&S report                |
| EM-03 | Surface water quality                 | Sampling for turbidity, TSS, pH, oil/grease and selected parameters at river/stream crossings and reference sites | Before works, quarterly during construction and after major incidents | Included in ESMP monitoring; laboratory costs covered under Contractor/PIU monitoring allocations | Contractor; Supervision Consultant; PIU E&S Team | Monthly report to PIU/EPA/AfDB    |
| EM-04 | Soil erosion and sediment control     | Site inspection of slopes, drains, exposed soil, borrow pits, spoil areas and sediment traps                      | Weekly during earthworks and after heavy rainfall                     | Included in Contractor ESMP                                                                       | Contractor; Supervision Consultant               | Monthly corrective action log     |
| EM-05 | Vegetation and land-cover restoration | Field inspection, photographic records and                                                                        | Monthly during clearing and quarterly during restoration              | Included in reinstatement and                                                                     | Contractor; PIU; FDA where required              | Quarterly E&S/ESMP implementation |

| Code  | Parameter to Monitor                | Sampling Method / Approach                                                                                         | Frequency                                         | Cost Treatment                                       | Responsibility                                      | Reporting                                                   |
|-------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------|
|       |                                     | GIS/land-cover verification where required                                                                         |                                                   | biodiversity management costs                        |                                                     | report submitted by the PIU to EPA and AfDB, as applicable. |
| EM-06 | Borrow pits and quarries            | Inspection of siting, permits, drainage, safety, rehabilitation and closure status                                 | Monthly during use and at closure                 | Included in borrow pit and quarry reinstatement plan | Contractor; Supervision Consultant; EPA/PIU         | Site closure report                                         |
| EM-07 | Waste and hazardous materials       | Inspection of storage, segregation, disposal records, spill kits and sanitation at camps and workshops             | Weekly                                            | Included in Contractor ESMP                          | Contractor HSE Officer; Supervision Consultant      | Monthly E&S report                                          |
| EM-08 | OHS performance                     | Toolbox records, PPE compliance, incident/near-miss records and corrective actions                                 | Weekly; immediate reporting for serious incidents | Included in Contractor OHS Plan                      | Contractor HSE Officer; Supervision Consultant; PIU | Monthly OHS report and incident reports                     |
| EM-09 | Community health and safety         | Traffic incidents, road safety complaints, access disruptions, signage and speed control compliance                | Weekly and after complaints/incidents             | Included in traffic and community safety plans       | Contractor; Supervision Consultant; PIU CLO         | Monthly GRM and CHS report                                  |
| EM-10 | GBV/SEA/SH and stakeholder concerns | Training records, Code of Conduct signatures, confidential referral readiness and non-identifying grievance trends | Monthly                                           | Included in ESMP/GBV/GRM budget                      | PIU E&S Team; Contractor; MoGCSP/service providers  | Non-identifying quarterly safeguards report                 |

## RISK MANAGEMENT MATRIX

Table ES-10: Risk Preparedness and Response Matrix

Table ES-11: 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 RAP; compensate eligible PAPs at replacement cost; provide livelihood restoration and vulnerable-person assistance.   | Before displacement and before civil works in affected sections | Cleared RAP budget: USD 5,047,158.69 | Compensation completed; livelihood restoration tracked; RAP Completion Audit undertaken | PIU E&S Team / PFMU | 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-ESMP | Clearing within approved footprint; restoration and closure verified                    | Contractor          | Supervision Consultant / PIU / FDA |
| IM-03 | Dust, noise and                                                   | Apply dust suppression, equipment                                                                                                           | Throughout construction                                         | Priced works BOQ and                 | Monitoring completed; access                                                            | Contractor          | Supervision Consultant / PIU       |

| Code  | Impact                                              | Management Measure                                                                                        | Completion Deadline            | Cost / Funding Source                      | Indicator                                                          | Implementation      | Oversight                  |
|-------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------|--------------------------------------------------------------------|---------------------|----------------------------|
|       | temporary access disruption                         | maintenance, working-hour controls, community notification and safe temporary access measures.            |                                | approved C-ESMP                            | maintained; complaints resolved                                    |                     |                            |
| IM-04 | Economic tree, crop and livelihood losses           | Verify affected assets, pay compensation and implement livelihood restoration in accordance with the RAP. | Before clearance or land entry | Cleared RAP budget                         | Eligible assets compensated; livelihood support documented         | PIU E&S Team / PFMU | 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 |

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 traps, 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 |

| Code  | Risk                                               | Risk Nature / Description                                          | Risk Level              | Prevention Measure                                                                         | Preparedness / Management Action                                                  | Alert Notification Officer | Supervision                        |
|-------|----------------------------------------------------|--------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------|------------------------------------|
| 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 / PIV |
| RM-07 | Community grievance escalation                     | Work stoppage, conflict, loss of social licence                    | Moderate to Substantial | Active GRM, community liaison, advance notice, transparent communication                   | Register grievance, investigate, agree on a resolution, and escalate where needed | PIV CLO / Contractor CLO   | PIV 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 / PIV       |

## ESMP IMPLEMENTATION MATRIX

Table ES-12A: Impact Implementation Matrix

| Code    | Impact                                                            | Measures                                                                                            | Deadline                                                      | Cost / Funding Source           | KPI                                                                              | Implementation | Oversight                          |
|---------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------|----------------------------------------------------------------------------------|----------------|------------------------------------|
| ESMP-01 | Soil erosion, slope instability and sedimentation from earthworks | Limit clearing; install drainage, sediment traps and slope stabilization; re-vegetate exposed areas | Before and during earthworks, completed before demobilization | Included in Contractor ESMP     | No uncontrolled erosion; drainage and sediment controls installed and maintained | Contractor     | Supervision Consultant / PIV       |
| ESMP-02 | Water pollution from runoff,                                      | Maintain stream buffers; control wastewater;                                                        | Before camp operation and                                     | Included in Contractor ESMP and | No untreated discharge; spill records closed; water                              | Contractor     | Supervision Consultant / PIV / EPA |

| Code    | Impact                                                             | Measures                                                                                               | Deadline                                               | Cost / Funding Source                           | KPI                                                                                   | Implementation | Oversight                                          |
|---------|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------|----------------|----------------------------------------------------|
|         | wastewater, oils and fuels                                         | provide sanitation; prohibit discharge to streams; implement spill response                            | throughout construction                                | monitoring budget                               | quality monitoring completed                                                          |                |                                                    |
| ESMP-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 ESMP                     | Dust complaints reduced; PM10 monitoring completed; corrective actions closed         | Contractor     | Supervision Consultant / PIV                       |
| ESMP-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 Contractor ESMP                     | Noise levels monitored; no unresolved complaints near schools/clinics                 | Contractor     | Supervision Consultant / PIV                       |
| ESMP-05 | Vegetation loss and habitat disturbance                            | Confine clearing to approved corridor; avoid riparian/sensitive areas; restore disturbed sites;        | Before clearing, during works and during reinstatement | Included in Contractor ESMP / biodiversity plan | Clearing within approved footprint; restoration completed; borrow sites rehabilitated | Contractor     | Supervision Consultant / PIV / FDA, where required |

| Code    | Impact                                  | Measures                                                                                                                                     | Deadline                                                        | Cost / Funding Source              | KPI                                                                                        | Implementation      | Oversight                                           |
|---------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------|
|         |                                         | implement biodiversity monitoring                                                                                                            |                                                                 |                                    |                                                                                            |                     |                                                     |
| ESMP-09 | Land acquisition and livelihood impacts | Implement RAP before civil works; compensate at replacement cost; provide livelihood restoration and support to vulnerable households        | Before displacement and before civil works in affected sections | RAP budget                         | Compensation completed; livelihood restoration tracked; grievances addressed               | PIU E&S Team / PFMU | AfDB / Independent Monitor / Supervision Consultant |
| ESMP-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 ESMP/RAP as applicable | Chance finds recorded; no unauthorized disturbance; culturally agreed relocation completed | Contractor / PIU    | Supervision Consultant / Local Authorities / EPA    |

Table ES-12B: Risk Implementation Matrix

| Code    | Risk                                         | Prevention / Management Measures                                                                                     | Deadline                                        | Cost / Funding Source                       | KPI                                                                                            | Implementation            | Oversight                                     |
|---------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------|
| ESMP-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 / PIV / Traffic Police |
| ESMP-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 / PIV                  |
| ESMP-08 | Labour influx, GBV/SEA/SH and social tension | Apply LMP, Codes of Conduct, GBV/SEA/SH Action Plan, local recruitment procedures and confidential grievance pathway | Before worker mobilization and throughout works | Included in PIV/Contractor ESMP allocations | All workers sign CoC; training completed; referral pathway active                              | Contractor / PIV E&S Team | Supervision Consultant / PIV / MoG-CSP        |

## KEY ESMP IMPLEMENTATION INDICATORS

The following five key ESMP implementation indicators will be used to track implementation performance:

- At least 95 percent of site-specific mitigation measures in the ESMP and Contractor ESMP are implemented on schedule and verified through supervision reports.
- Zero unresolved serious environmental incidents, with all spills, accidents and non-compliances reported and closed through corrective action plans.
- All active borrow pits, quarries, camps, detours and stockpile areas have approved management and reinstatement plans, with progressive rehabilitation implemented.
- At least 90 percent of grievances are acknowledged and processed within the GRM timeframes, with SEA/SH cases handled through confidential survivor-centred pathways.
- All workers receive OHS and Code of Conduct induction before site deployment, and refresher training is provided during construction.

## GRIEVANCE REDRESS MECHANISM

The project will operate an accessible, locally based, empowered and transparent GRM covering compensation, construction impacts, community safety, access disruption, labour issues and environmental concerns. Complaints may be received through community representatives, GRC members, the PIU, the Contractor, local authorities or other agreed local channels. The GRM 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 GRM shall be disclosed in affected communities before commencement of civil works and shall remain operational throughout RAP implementation and construction.

### *Institutional Arrangements for ESMP Implementation*

*Table ES-13: Institutional Arrangements for ESMP Implementation*

| Institution / Actor | Specific Mission in ESMP Implementation                                                                                                                              |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MPW / IIV / PIU     | Overall ESMP leadership, safeguards coordination, RAP oversight, stakeholder engagement, GRM management, reporting to EPA and AfDB, and approval of Contractor ESMPs |

| Institution / Actor             | Specific Mission in ESMP Implementation                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 Contractor ESMP and sub-plans, worker training, OHS, traffic safety, waste management, pollution control and site restoration            |
| 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 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 quantified PIU/RAP safeguards allocation presented in the main ESIA is USD 6,251,533.69, comprising the cleared RAP budget and the revised non-RAP ESMP implementation, monitoring, and institutional-support allocation. It covers compensation, livelihood restoration, RAP implementation support, PIU environmental and social mitigation and monitoring, supervision, capacity building, project-wide GRM operation, GBV/SEA/SH prevention and response, stakeholder engagement, biodiversity-related measures, communicable-disease awareness, annual E&S audits, permitting, and related implementation support. Contractor site-level C-ESMP measures are financed through the priced civil-works BOQ and accepted bid and are therefore not added again to this total.

The cleared RAP implementation budget is USD 5,047,158.69. The non-RAP allocation of USD 1,204,375.00 comprises USD 700,250.00 for PIU-managed ESMP implementation and monitoring, USD 173,750.00 for the consolidated SEP and project-wide GRM, USD 120,000.00 for the GBV/SEA/SH Action Plan, and USD 210,375.00 for the Biodiversity Action Plan. Contractor OHS/PPE, traffic, dust, erosion, waste, spill response, camp management, restoration, and other site-level obligations remain financed through the priced works BOQ and the approved Contractor ESMP and are not included again in the PIU-managed allocation.

*Table ES-14: Detailed ESMP and RAP Budget and Funding Sources*

| Budget Item                          | Coverage                                                                                                                                                                        | Source of Funds / Responsibility                         | Amount (USD) | Local Currency Equivalent (LRD)                                  |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------|------------------------------------------------------------------|
| RAP implementation and related costs | Compensation, livelihood restoration, RAP implementation support, resettlement-related grievance handling, RAP monitoring and the one-time RAP 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 |

| Budget Item                                           | Coverage                                                                                                                                                                                                                                                       | Source of Funds / Responsibility                                    | Amount (USD)           | Local Currency Equivalent (LRD)                                  |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------|------------------------------------------------------------------|
| EPA permitting, license renewal and monitoring visits | EPA permitting acquisition and annual PIV/EPA/MME site visits.                                                                                                                                                                                                 | PIU/MPW project funds                                               | 24,250.00              | To be calculated using the agreed PIV/PFMU project exchange rate |
| PIU safeguards capacity building                      | Training for the PIV Environmental and Social Safeguard Officers.                                                                                                                                                                                              | PIU/MPW project funds                                               | 60,000.00              | To be calculated using the agreed PIV/PFMU project exchange rate |
| PIU ESMP monitoring site visits                       | Monthly monitoring by the PIV safeguards and technical team over the implementation period.                                                                                                                                                                    | PIU/MPW project funds                                               | 456,000.00             | To be calculated using the agreed PIV/PFMU project exchange rate |
| ROW clearance implementation                          | Implementation support following RAP compensation.                                                                                                                                                                                                             | PIU/MPW project funds                                               | 35,000.00              | To be calculated using the agreed PIV/PFMU project exchange rate |
| 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 PIV/PFMU project exchange rate |
| 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 PIV/PFMU project exchange rate |
| RAP 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 RAP monitoring allocation under RAP Budget Item B.2; no additional amount is added here. | Cleared RAP budget / PIV-PFMU                                       | Included in RAP budget | To be calculated using the agreed PIV/PFMU project exchange rate |
| Consolidated SEP and project-wide GRM                 | Core stakeholder engagement and disclosure (USD 48,500.00) plus project-wide GRM implementation (USD 125,250.00).                                                                                                                                              | PIU/MPW project funds                                               | 173,750.00             | To be calculated using the agreed PIV/PFMU project exchange rate |
| GBV/SEA/SH Action Plan implementation                 | Specialist prevention, training, referral and survivor-centred support.                                                                                                                                                                                        | PIU/MPW/MoGCSP and qualified service providers                      | 120,000.00             | To be calculated using the agreed PIV/PFMU project exchange rate |
| Biodiversity Action Plan implementation               | Avoidance, pre-clearance checks, monitoring,                                                                                                                                                                                                                   | PIU/MPW, independent biodiversity                                   | 210,375.00             | To be calculated using the agreed                                |

| Budget Item                                    | Coverage                                                                                                             | Source of Funds / Responsibility         | Amount (USD) | Local Currency Equivalent (LRD)                                  |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------|------------------------------------------------------------------|
|                                                | restoration and capacity building.                                                                                   | specialist and Contractor, as applicable |              | PIU/PFMU project exchange rate                                   |
| Total quantified PIU/RAP safeguards allocation | Cleared RAP and PIU-managed ESMP/SEP/GRM/GBV/BAP costs; excludes C-ESMP 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 |

The final Liberian Dollar equivalent shall be inserted by the PIU/PFMU using the agreed project exchange rate applicable at the time of finalization. The detailed itemized budget is presented in the main ESIA under the Environmental and Social Monitoring Plan and ESMP implementation cost section.

Budget interpretation: the USD 173,750.00 line is the consolidated SEP and project-wide GRM allocation, comprising USD 48,500.00 for core stakeholder engagement and disclosure and USD 125,250.00 for project-wide GRM implementation. The GRM amount is included within, and is not additional to, the consolidated SEP/GRM line. Contractor site-level mitigation and OHS costs shall be priced in the works BOQ and detailed in the approved Contractor ESMP; these contract costs shall not be duplicated in the PIU-managed budget above. The cleared RAP budget separately includes USD 15,000 for resettlement-related grievance handling and USD 100,000 for RAP monitoring under RAP Budget Item B.2. These amounts are limited to RAP implementation and are not repeated in the PIU-managed ESMP allocation.

Budget-boundary clarification: the USD 9,000.00 SEP line finances stakeholder communication, awareness and disclosure concerning GBV/SEA/SH and referral pathways; the USD 125,250.00 project-wide GRM allocation finances grievance intake, GRC operations, records, communication and confidential referral coordination; and the USD 120,000.00 GBV/SEA/SH Action Plan allocation finances specialist prevention and response activities, worker training, service-provider arrangements and survivor-centred support. These allocations shall be planned, certified and reported separately to prevent double counting.

#### 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 ESMP, Contractor ESMP, RAP, GRM, monitoring programme, contractual EOHS clauses and institutional supervision arrangements.

Subject to implementation of the ESMP and RAP, continued stakeholder engagement, effective GRM operation, compliance with the Environmental Protection and Management Law, EPA ESIA Procedural Guidelines, AfDB ISS and Good International Industry Practice, the project is considered environmentally and socially acceptable and suitable for consideration for environmental permitting by EPA and continued financing by AfDB and other partners.

# 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) 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 River Cess 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 and other co-financiers together with the GoL. The Proponent is the Ministry of Public Works, and the study has been undertaken by Royal Environmental Group–Liberia (REGROUP Liberia), a licensed environmental and social consultancy based in Monrovia.

## 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](http://roadsai.org))
- **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 recognised 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), and Good International Industry Practice (GIIP). In particular, the ESIA aims to:

1. **Obtain an Environmental Permit** from the Environmental Protection Agency of Liberia (EPA) for the commencement of the project in line with the Environmental Protection and Management Law of Liberia, 2002
2. **Ensure compliance with Liberian legal and regulatory requirements**, including the Environmental Protection and Management Law (EPML) of Liberia, the National Environmental Policy, and the 2021 Revised Environmental and Social Impact Assessment / Strategic Environmental Assessment (ESIA/SEA) Procedural Guidelines (Instrument No. EPA/003/03-22, 2022).
3. **Meet AfDB's Updated Integrated Safeguards System requirements**, particularly the ten Environmental and Social Operational Safeguards (OS1–OS10), which set mandatory standards for assessment and management of environmental and social risks and impacts, labour and working conditions, resource efficiency and pollution prevention, community health and safety, land acquisition and resettlement, biodiversity and living natural resources, vulnerable groups, cultural heritage, financial intermediaries, and stakeholder engagement and information disclosure.

4. Identify, predict, and evaluate potential environmental and social risks and impacts of the project (adverse and beneficial; direct, indirect, and cumulative) during construction, operation, and decommissioning/rehabilitation.
5. Develop appropriate avoidance, minimization, mitigation, compensation and enhancement measures, including an Environmental and Social Management Plan (ESMP), a Biodiversity Action Plan (BAP), a Traffic and Road Safety Plan, an Occupational Health and Safety (OHS) Plan and other thematic management plans, to ensure that residual impacts remain within acceptable limits.
6. Provide the analytical basis for complementary instruments required under AfDB ISS and national law, including the Resettlement Action Plan (RAP) for land acquisition and resettlement (OS5), labour management and contractor OHS plans (OS2), GBV/SEAH Action Plan (OS2, OS4, OS7), and Stakeholder Engagement Plan (SEP) and grievance mechanisms (OS10).
7. Support informed decision-making by the EPA of Liberia, AfDB, and the Government of Liberia on project approval, design optimization, and environmental permitting.
8. Promote meaningful participation of stakeholders, including vulnerable and marginalized groups, and integrate their views and knowledge into project design and implementation.

#### 1.4 SCOPE OF THE ESIA

##### Spatial Scope

The spatial scope of the ESIA is defined in terms of the project's Area of Influence (AoI), covering both the immediate alignment and the broader areas where direct, indirect, and cumulative impacts may occur:

- **Direct Area of Influence (DAI):** For baseline characterization and impact assessment, the direct AoI is defined as a corridor of at least 250 m AoI on either side of the existing centerline of the Buchanan–Cestos City Junction Road along its entire 60.9 km length. This corridor fully encompasses the proposed 75-ft Right-of-Way (ROW) on each side of the centerline and includes all associated project footprints such as bridges, drainage structures, temporary detours, construction camps, quarries, borrow pits, stockpile areas, and access tracks.

The DAI is already significantly modified by long-standing human activities: the road is an existing laterite road that has been in operation for more than 50 years, with adjacent land used for settlements, farms, small-scale trade, artisanal activities, and linear infrastructure. Field surveys confirmed that no sensitive or critical habitats or species of conservation concern were recorded within the direct 250 m AoI, although biodiversity values remain in the wider landscape and along watercourses crossing the corridor.

- **Indirect Area of Influence (IAI):** The indirect Aoi covers areas beyond the 250 m corridor that may experience secondary or induced impacts due to changes in traffic, access, economic activity, land use, and population movement. This includes towns and villages up to several kilometers from the road; catchments of rivers and streams intersecting the alignment; and locations of key associated facilities such as material sources, disposal sites and lay-down areas.
- **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, AfDB ISS and GIIP, 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.
- **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/RDTPF and related infrastructure investments in the region.

### 1.5 ESIA APPROACH AND METHODOLOGY

#### Alignment with EPA ESIA Process

The ESIA was carried out in accordance with the Revised ESIA/SEA Procedural Guidelines of Liberia (EPA/OO3/O3-22, 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 include:

- **Screening and categorization:** Based on the project's type, scale, and sensitivity, the project is classified as a Category 1 activity under national regulations and AfDB ISS, requiring a comprehensive ESIA, RAP, and ESMP.
- **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 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, ESMP and monitoring:** Mitigation and enhancement measures were developed following the mitigation hierarchy (avoid, minimize, restore, offset/compensate) and consolidated into an ESMP 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 AfDB OS10, with a Grievance Redress Mechanism established to handle complaints and feedback.

### Application of GIIP and International Safeguard Frameworks

In addition to national requirements and AfDB's ISS, 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 ESMP 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, satellite imagery, climate data, and published information on biophysical and socio-economic conditions in Grand Bassa and River Cess Counties.

- **Field surveys – biophysical environment:**
  - Reconnaissance surveys along the 60.9 km corridor to characterize topography, 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 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 AfDB OS10 and EPA 2022 Guidelines, and a Grievance Redress Mechanism (GRM) 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, geographic 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

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

## ECONOMIC INFORMATION AND PROJECT BENEFITS

### Economic Evaluation Overview

In accordance with the 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 Mano River Union (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 include:

- **Economic costs:**
  - Capital investment costs for road construction and associated structures.
  - Periodic and routine maintenance costs over the appraisal period.
  - Environmental and social management and resettlement costs.
- **Economic benefits:**
  - Vehicle operating cost (VOC) savings for all vehicle types.
  - Travel time savings for passengers and freight.
  - Reduction in road accidents and associated fatalities, injuries, and property damage.
  - Enhanced reliability of transport services and year-round accessibility.
  - Wider economic benefits (trade facilitation, market integration, induced development).

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 the 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 | ESMP implementation, monitoring, RAP/ARAP implementation, livelihood restoration |
|                | Residual negative externalities | Non-mitigable environmental and social impacts (where quantifiable)              |

| Category                 | Sub-Category                              | Description/Examples                                                                               |
|--------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>Economic Benefits</b> | 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.

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.

#### 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, 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:

- **Geographic 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 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**
  - 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 group.

*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  |

| Stakeholder Group                 | Main Positive Impacts                                              | Potential Negative Impacts / Risks                             |
|-----------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------|
| 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, PWDs) | 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 ESMP and RAP/ARAP 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 ESMP and RAP/ARAP budgets.

## 2.0 POLICY, LEGAL, AND INSTITUTIONAL FRAMEWORK

This chapter presents the national and international policy, legal, and institutional framework governing the Mano River Union Road Development and Transport Facilitation Programme (MRU/RDTFP), Phase V, Lot 1 in Liberia. It sets out the requirements that guide project preparation, implementation, and monitoring, and explains how the ESIA complies with the Environmental Protection and Management Law of Liberia (EPML), the EPA's ESIA Procedural Guidelines (2022), AfDB's updated Integrated Safeguards System (ISS, 2023), other international standards, and Good International Industry Practice (GIIP).

### 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).

The key framework of environmental legislation is:

- **Environment Protection Agency (EPA) Act (2002)** – establishes the Environmental Protection Agency (EPA) as an autonomous agency under the Executive Branch, mandated to coordinate, monitor, supervise, and enforce environmental management, including environmental impact assessment (EIA/ESIA) and environmental quality standards.
- **Environmental Protection and Management Law (EPML, 2002/2003)** – provides the overarching legal framework for sustainable development, environmental management, and protection by the EPA in partnership with line ministries and regulated entities. The EPML covers environmental planning, environmental quality standards, pollution control, EIA/ESIA requirements, natural resources management (forests, water, wildlife, soils), information and public participation, offences and penalties.

Under the EPML, any project listed in Annex I or likely to have significant environmental or social impacts must undergo ESIA and obtain an environmental permit from the EPA prior to commencement.

#### i. **ESIA Regulations and Procedural Guidelines**

To operationalize the EPML, the EPA has issued a series of ESIA/SEA procedural guidelines, the latest of which is the **Revised Environmental and Social Impact Assessment / Strategic Environmental Assessment Procedural Guidelines (2021; formally adopted and disseminated in 2022)**. These guidelines specify: the ESIA process (project brief, screening, Notice of Intent,

scoping, impact assessment, ESIA reporting, review, decision, and follow-up), documentation requirements, and roles of the EPA and line ministries.

They also provide a fee regime for ESIA/SEA applications and monitoring, implemented through the **ESIA & SEA Revised Fees Regime 2021**.

## ii. Sectoral Laws and Regulations Relevant to Road Infrastructure

The MRU/RDTPF 5 Lot 1 road project must comply with several sectoral laws related to land, forests, water, public health, labour, transport, gender, GBV and child protection. Key instruments are summarized in Table 4.

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

| No. | Instrument                                                                                       | Key Provisions Relevant to the Project                                                                                                                                                  | Implications for MRU/RDTPF                                                                                                                                      |
|-----|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.        |

| No. | Instrument                                                                                               | Key Provisions Relevant to the Project                                                                                                                                 | Implications for MRU/RDTFP                                                                                                                                                 |
|-----|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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, prohibits forced and child labour, regulates working hours, OHS, and labour relations.                     | Contractor(s) must provide decent work conditions, ensure OHS, avoid 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/ESMP 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 Rape Amendment Act (2005/2006)                                          | Criminalizes domestic violence, strengthens penalties for rape and gang rape, 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 ESIAAs 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.
- c) **Screening** – EPA, in consultation with line ministries, determines whether the project requires:
  - o a full ESIA,
  - o a limited ESIA or EMP, or
  - o 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 (ESMPs), 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, ESMP, 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.

## ii. Required ESIA Content and Alignment of this Report

The Guidelines specify the minimum contents of an ESIA, including: ([Petra Liberia](#))

- Executive Summary;
- Project description and justification;
- Policy, legal and institutional framework;
- Environmental and social baseline;
- Analysis of alternatives (including “no-project”);
- Impact identification and evaluation;
- Environmental and Social Management Plan (ESMP) and monitoring plan;
- Resettlement Action Plan (RAP), where applicable;
- Public consultation and disclosure process;
- Emergency response and contingency planning; and
- Annexes (e.g. ToR, stakeholder lists, raw data, specialist studies).

This ESIA has been structured to meet and, where necessary, exceed these requirements, and integrates best available technology and GIIP, as well as specific plans for GBV/SEA/SH prevention, labour management, community health and safety, and grievance redress in line with AfDB ISS and GIIP.

### 2.3 INSTITUTIONAL FRAMEWORK

Implementation of the MRU/RDTEP 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;
- 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 ESMP 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/RDTEP 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.

- 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) **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.

#### iv. **Local Government and Traditional Authorities**

- **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.
- **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.

The ESIA process and ESMP implementation are designed to ensure meaningful participation of these stakeholders, in line with EPA guidelines and AfDB OS10.

#### **2.4 AfDB's UPDATED INTEGRATED SAFEGUARDS SYSTEM (ISS, 2023)**

- i. **AfDB Environmental and Social Policy and Scope**

The African Development Bank Group's updated Integrated Safeguards System (ISS, approved in 2023) comprises:

- A Vision for Sustainable Development;
- An Environmental and Social Policy, which sets out the Bank's commitments and principles;
- Ten Environmental and Social Operational Safeguards (OS1–OS10), which define mandatory requirements for Borrowers; and
- Environmental and Social Guidance Notes, supplemented by World Bank Group EHS Guidelines, providing GIIP benchmarks.

The ISS applies to all AfDB-financed operations, including this regional transport programme. Borrowers must identify and manage environmental and social (E&S) risks and impacts throughout the project life cycle and comply with both national law and ISS requirements, applying the more stringent standard where applicable.

ii. Summary of the 10 Operational Safeguards and Relevance

The ten OS are as in Table 5:

*Table 5: AfDB Operational Safeguards and Relevance to MRU/RDTFP*

| OS  | Title                                                                                        | Core Objective / Requirements (summary)                                                                                                                                                                 | Relevance to the Project                                                                                                                                                                                                                                                          |
|-----|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OS1 | Assessment and Management of Environmental and Social Risks and Impacts                      | Ensure integrated E&S assessment, risk classification, management plans, and effective implementation, including climate risk and adaptation.                                                           | Governs overall ESIA/ESMP process, risk categorization, mitigation hierarchy, monitoring, and adaptive management for the road project.                                                                                                                                           |
| OS2 | Labour and Working Conditions                                                                | Promote fair treatment, non-discrimination, safe and healthy working conditions, protection of vulnerable workers, and workers' GRMs.                                                                   | Requires a Labour Management Procedure, OHS Plan, workers' Code of Conduct, and compliance with the Decent Work Act.                                                                                                                                                              |
| OS3 | Resource Efficiency and Pollution Prevention and Management                                  | Improve resource use efficiency (energy, water, materials), prevent and control pollution and manage hazardous and non-hazardous waste.                                                                 | Guides borrow pit management, material sourcing, erosion and sediment control, noise/dust abatement, emissions and waste management in construction and operation.                                                                                                                |
| OS4 | Community Health, Safety and Security                                                        | Avoid or minimize risks and impacts on community health, safety and security, including traffic safety, hazardous materials and security personnel conduct.                                             | Requires traffic management plans, road safety measures, emergency response, communicable disease prevention (including HIV/STIs, COVID-19 and other outbreaks) and responsible use of security forces if engaged.                                                                |
| OS5 | Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement  | Avoid or minimize physical and economic displacement; ensure compensation at replacement cost, livelihood restoration and meaningful consultation.                                                      | Governs land acquisition within and beyond the existing 250 m Aol, management of economic displacement (e.g. roadside vendors) and preparation/implementation of RAPs where needed.                                                                                               |
| OS6 | Habitat and Biodiversity Conservation and Sustainable Management of Living Natural Resources | Protect and conserve biodiversity and ecosystem services, especially in natural and critical habitats; apply mitigation hierarchy and sustainable management of living natural resources.               | Even though the 250 m direct Aol is an existing laterite road with long-standing anthropogenic disturbance and no sensitive species observed, OS6 applies to avoid further habitat degradation, manage roadside vegetation, and protect any nearby sensitive habitats or species. |
| OS7 | Vulnerable Groups                                                                            | Avoid exacerbating vulnerabilities and ensure equitable access to project benefits and protections for vulnerable groups (e.g. women, children, elderly, persons with disabilities, ethnic minorities). | Requires consideration of vulnerable groups in impact assessment, consultations, mitigation and benefit-sharing, including targeted measures for women, youth and people with disabilities along the corridor.                                                                    |
| OS8 | Cultural Heritage                                                                            | Protect tangible and intangible cultural heritage from adverse impacts; promote its preservation and equitable benefit sharing.                                                                         | Requires a Cultural Heritage Management and Chance-Find Procedure for archaeological sites, sacred places, historical structures or cultural practices affected by road works.                                                                                                    |

| OS   | Title                                             | Core Objective / Requirements (summary)                                                                                          | Relevance to the Project                                                                                                                                                               |
|------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OS9  | Financial Intermediaries                          | Ensure FIs supported by AfDB manage E&S risks in their portfolios.                                                               | Not directly applicable unless components are implemented via FIs; however, OS9 principles may apply to any sub-financing arrangements.                                                |
| OS10 | Stakeholder Engagement and Information Disclosure | Promote meaningful, inclusive, gender-responsive stakeholder engagement, ongoing disclosure and accessible grievance mechanisms. | Requires a Stakeholder Engagement Plan (SEP), continuous consultation throughout the project cycle, feedback loops, and functional project-level GRM aligned with national procedures. |

The ESIA and ESMP are structured to demonstrate compliance with these OS, including cross-reference to national laws and GIIP.

## 2.5 INTERNATIONAL STANDARDS AND GOOD INTERNATIONAL INDUSTRY PRACTICE (GIIP)

In addition to AfDB ISS and national requirements, the project will be guided by the following international standards and GIIP benchmarks:

### i. World Bank Group Environmental, Health and Safety (EHS) Guidelines

The **General EHS Guidelines** and the **Industry Sector EHS Guidelines for Toll Roads** provide performance levels and measures for environmental, health and safety aspects that reflect GIIP and are widely adopted as technical references for road projects. ([World Bank](#))

These guidelines cover topics such as:

- Air emissions and dust;
- Wastewater and stormwater management;
- Solid and hazardous waste management;
- Noise and vibration;
- Occupational health and safety;
- Construction and road-safety measures;
- Community health and safety; and
- Traffic management and emergency response.

The ESMP will adopt these performance levels unless national standards are more stringent, in which case the stricter standard will apply.

### ii. 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](#))
- **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.

### iii. 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, Rape Law and Children's Law. ([landwise-production.s3.us-west-2.amazonaws.com](http://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.

## 2.6 GAP ANALYSIS: LIBERIAN FRAMEWORK VS AfDB ISS & GIIP

While Liberia has a relatively comprehensive environmental and social legal framework, certain aspects of AfDB ISS and GIIP go beyond national requirements, particularly in areas such as climate risk, cumulative impacts, stakeholder engagement, labour and GBV/SEA/SH. ([cepf.net](http://cepf.net))

Table 6 summarizes key areas of convergence and divergence and indicates how the ESIA/ESMP will apply the higher standard.

*Table 6: Gap Analysis – Liberian Framework vs AfDB ISS & GIIP and ESIA/ESMP Commitments*

| Thematic Area                                  | Liberian Legal/Policy Framework                                                                                                                                                                                                                           | AfDB ISS & GIIP Requirements                                                                                                       | Gaps / Differences                                                                                             | ESIA/ESMP Commitments (Higher Standard)                                                                                                                                               |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ESIA Scope &amp; Process</b>                | EPML and ESIA Guidelines require ESIA for listed projects, with project brief, screening, scoping, ESIA, review, and monitoring. Content focuses on biophysical and socio-economic impacts. ( <a href="http://ekmsliberia.info">ekmsliberia.info</a> )    | OS1 requires a comprehensive, integrated ESA, including climate risk, cumulative and transboundary impacts, and a structured ESMS. | National guidance is less explicit on climate, cumulative impacts, and ESMS requirements.                      | ESIA includes climate risk assessment, cumulative and indirect impacts, and recommends ESMS arrangements for MPW/IIU and contractors, consistent with OS1/.                           |
| <b>Stakeholder Engagement &amp; Disclosure</b> | EPML and ESIA Guidelines require public notice (NoI), public hearings, and disclosure of ESIA summaries but are less prescriptive on continuous engagement and SEP. ( <a href="http://ekmsliberia.info">ekmsliberia.info</a> )                            | OS10 requires a documented SEP, ongoing engagement, inclusive consultation (including vulnerable groups), and project-level GRM.   | No formal requirement for SEP or structured GRM across all project phases.                                     | A project-specific SEP and GRM are developed and implemented, with particular attention to communities along the 250 m AoI and broader influence area, aligned with OS10/WB ESS10.    |
| <b>Labour &amp; OHS</b>                        | Decent Work Act sets labour standards, prohibits child and forced labour, and addresses OHS, but does not fully prescribe contractor ESMS or worker GRM. (Civil Service Agency)                                                                           | OS2 requires detailed labour management procedures, worker engagement, accommodation standards, and dedicated worker GRM.          | Implementation tools (LMP, worker GRM, camp standards) not detailed in the national law.                       | ESMP includes Labour Management Procedure, worker GRM, OHS Plan and camp management standards consistent with OS2/and EHS Guidelines.                                                 |
| <b>Land Acquisition &amp; Resettlement</b>     | Land Rights Act and related laws provide for recognition of customary land and FPIC; EPA/ESIA practice often requires RAPs, but detailed national resettlement regulations are still evolving. ( <a href="http://ekmsliberia.info">ekmsliberia.info</a> ) | OS5 requires avoidance/minimization of displacement, replacement-cost compensation, livelihood restoration, and monitoring.        | National practice may not fully align with replacement cost, livelihood restoration, and long-term monitoring. | Any land take or economic displacement will be addressed through RAPs that apply OS5 principles (replacement cost, livelihood restoration, special support to vulnerable households). |

| Thematic Area                                    | Liberian Legal/Policy Framework                                                                                                                                                                                          | AfDB ISS & GIIP Requirements                                                                                                                                             | Gaps / Differences                                                                                       | ESIA/ESMP Commitments (Higher Standard)                                                                                                                                                                                |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Biodiversity &amp; Critical Habitat</b>       | EPML and forestry laws require forest and wildlife protection, ESIA for activities affecting forests, and community rights in forest lands, but do not fully define “critical habitat” or biodiversity offsets. (FAOLEX) | OS6 sets detailed requirements for modified, natural and critical habitats, ecosystem services and offsets.                                                              | Critical habitat assessment and offset design are not fully codified in national law.                    | The ESIA applies OS6, including screening for critical habitat along and beyond 250 m Aol, and commits to the mitigation hierarchy and no-net-loss/no-net-degradation objectives where sensitive habitats are present. |
| <b>Community Health &amp; Safety; GBV/SEA/SH</b> | Public Health Law, Domestic Violence Act, GBV Action Plans and National Gender Policy create a strong GBV and public health framework, but are not project-specific.                                                     | OS4, OS7, OS10, require systematic assessment of community health and safety, GBV/SEA/SH risk, labour influx and security; and specific management plans.                | National ESIA guidance does not prescribe detailed GBV/SEA/SH Action Plans or security management plans. | ESMP includes Community Health and Safety Plan, Traffic Management Plan and GBV/SEA/SH Action Plan (including Codes of Conduct, training and referral pathways) consistent with AfDB ISS and GIIP.                     |
| <b>Cultural Heritage</b>                         | National cultural heritage responsibilities exist under MICAT and related laws, but ESIA guidance is limited on chance finds and intangible heritage. (ictpolicyafrica.org)                                              | OS8 requires identification, consultation, chance-find procedures and, where applicable, benefit sharing.                                                                | Limited procedural detail for chance-finds and community involvement in cultural heritage management.    | ESIA includes cultural heritage baseline screening and a robust Chance-Find Procedure that will be included in contracts and supervised during construction.                                                           |
| <b>Climate Change &amp; GHG</b>                  | EPML and NDCs address climate change, but ESIA guidelines do not systematically require climate risk and GHG assessments for all projects. (UNFCCC)                                                                      | ISS requires climate risk screening under OS1 and integration of adaptation and resilience into project design; EHS and GIIP encourage GHG accounting where significant. | Climate risk considerations in project-level ESIA are still emerging.                                    | The ESIA assesses climate hazards (e.g. extreme rainfall, flooding) and recommends adaptation measures (e.g. drainage design, embankment protection), consistent with OS1 and GIIP.                                    |
| <b>Monitoring &amp; Reporting</b>                | EPA guidelines require monitoring and reporting but are less prescriptive on indicators and reporting formats. (ekmsliberia.info)                                                                                        | ISS requires measurable indicators, regular reporting and adaptive management.                                                                                           | Limited standardization of ESMP indicators and reporting.                                                | ESMP defines clear E&S indicators, responsibilities, reporting frequency and adaptive management measures, aligned with AfDB and GIIP.                                                                                 |

In all cases, the project commits to apply whichever requirement is more stringent between Liberian law and AfDB ISS/GIIP.

## 2.7 PERMITS, LICENSES, AND APPROVALS REQUIREMENTS

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, ESMP and RAP (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 ESMP, RAP and associated plans                       | EPA (in consultation with relevant line ministries) | Submission of final ESMP, RAP 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.                              |
| 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 RAP 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 ESMPs, 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 (if applicable)              | EPA; relevant basin authorities                     | Authorization for any work in wetlands, floodplains or water abstraction for construction, in line with                                                                                                                                                         | Before activities affecting wetlands or water bodies (e.g.                                                          |

| No. | Permit / Approval                                             | Competent Authority                                                                   | Key Requirements / Scope                                                                                                                         | Indicative Timing                                                                                                |
|-----|---------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|     |                                                               |                                                                                       | Ramsar obligations and national wetland regulations. (reports Ramsar.org)                                                                        | culvert upgrades, bridge works, water abstraction).                                                              |
| 9   | <b>Camp Establishment and Occupancy Permits (local level)</b> | 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.                                                                      |
| 10  | <b>Labour Registration / Workplace Inspections</b>            | Ministry of Labour                                                                    | 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.                      |
| 11  | <b>Traffic Management and Road Safety Approvals</b>           | 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). |

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 AND AfDB OS5)

Detailed RAP/ARAP 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. Where requirements differ, the more stringent provision applies.

### 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 right-of-way (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 River Cess Counties. It extends from the port city of Buchanan (Grand Bassa County) eastward to Cestos Junction in River Cess 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 tropical rainforest, secondary vegetation, wetlands and agricultural land, as well as dispersed rural settlements and roadside towns. 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 are the project's primary socio-economic receptors and the main focus of the ESIA stakeholder engagement and impact assessment.

For this ESIA, the **direct Area of Influence (AoI)** is defined as a band extending 250 m on either side of the road centerline along the 60.9 km corridor, encompassing the RoW and immediately adjacent land uses (homesteads, farms, roadside businesses, community

infrastructure, woodlots, and degraded vegetation). The **indirect Aol** encompasses the broader catchment of communities, farms, forests, and wetlands that may be affected by long-range impacts, including changes in traffic patterns, drainage, access, land values, and induced development.

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

| No. | Settlement / Node               | County      | Relative position along corridor* | Dominant surrounding land use                           |
|-----|---------------------------------|-------------|-----------------------------------|---------------------------------------------------------|
| 1   | Buchanan (Km 0)                 | Grand Bassa | Corridor starting point           | Urban/port, services, industry                          |
| 2   | Intermediate villages (various) | Grand Bassa | Km 5–25 (approx.)                 | Mixed farms, secondary forest, wetlands                 |
| 3   | Yarpah Town                     | River Cess  | Mid-corridor node                 | Town centre, markets, schools, and residences           |
| 4   | Big Joe Town                    | River Cess  | Along the Middle Eastern section  | Rural town, farms, small businesses                     |
| 5   | Gio's Town                      | River Cess  | Eastern segment                   | Rural settlement, smallholder agriculture               |
| 6   | Nyon Behn Town                  | River Cess  | Eastern segment                   | Rural settlement, shifting cultivation                  |
| 7   | Gbediah Town                    | River Cess  | Near Cestos Junction              | Rural town, farms, wetlands nearby                      |
| 8   | Cestos Junction (Km 60.9)       | River Cess  | Corridor terminus                 | Regional junction, access to Cestos City and hinterland |

\* Chainage and positions will be confirmed and refined during detailed engineering design and construction planning.

*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          |                              |
| 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        |                              |

| No  | Name of Communities | Counties                   |
|-----|---------------------|----------------------------|
| 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        |                            |



### 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 lead 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.

### iv. Surrounding Land Use and Condition of the 250 m Aol

Within the direct 250 m Aol, land use is characterized mainly by:

- Linear roadside settlements (houses, shops, schools, clinics, religious and community facilities).
- Smallholder agriculture (cassava, rice, vegetables, tree crops), fallow areas and mixed agroforestry.
- Secondary forest and woodlots, with patches of degraded natural vegetation.
- Wetlands, streams, small swamp rice fields and riparian vegetation.

Given the long history of road operation and associated human activities, the 250 m Aol is highly modified and largely anthropogenic. Very limited primary or undisturbed habitat remains immediately adjacent to the carriageway, and no critical or highly sensitive species were observed within this direct band during field surveys carried out for the ESIA. More sensitive ecological receptors (e.g., key biodiversity areas, higher-value forest habitats and species of conservation concern) occur at greater distances from the road and are addressed in the baseline and impact assessment chapters.

### 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/RDTPF, 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.
- 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.

### 3.3 PROJECT COMPONENTS AND ACTIVITIES

#### i. Main Road Works

The core civil works for the 60.9 km corridor include:

- 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-rap 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).

### 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.

Additional safety features will include:

- Speed-calming measures (e.g. speed humps, rumble strips) and reduced speed limits in densely populated or sensitive sections.
- Marked pedestrian crossings, warning signage and, where needed, guardrails, barriers or fencing to protect vulnerable users.

### iv. Ancillary and Associated 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.
- 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<sup>3</sup>/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.

*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          |
| 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 topographic 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, ESMP, and Resettlement Action Plan (RAP), including integration of environmental and social requirements into design and contract documents.

ii. **Pre-Construction Phase**

Key activities:

- Mobilization of the contractor and supervising engineer.
- Permitting and approvals (EPA ESIA Permit, quarry and borrow pit approvals, local government clearances).
- Detailed site selection and layout for camps, plants, quarries and borrow pits, including required site-specific ESMPs (e.g. quarry management plans, waste management plans).
- Land acquisition and resettlement as per approved RAP, including compensation payments, livelihood restoration and relocation of utilities (electricity poles, water lines, telecommunications).
- Establishment of Grievance Redress Mechanism (GRM), community liaison and initial information disclosure in project communities.

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 ESMP.

#### 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 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/ESMP/RAP preparation, tendering                             |
| Pre-construction        | Mobilisation, permits, land acquisition, utility relocation, camp/plant siting, GRM 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         | Demobilisation, 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:

- Road classification:** primary inter-urban trunk road serving regional and national traffic.
- Carriageway configuration:** single carriageway with two lanes (3.65 m each) and paved shoulders (1.8 m each).
- Right-of-Way (RoW):** 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.
- Pavement design life:** approximately 20 years based on projected traffic loading and environmental conditions.
- Pavement structure:** indicative typical section: asphalt concrete wearing course ( $\approx 50$  mm); crushed stone base ( $\approx 200$  mm); stabilized gravel sub-base ( $\approx 200$  mm); natural gravel subgrade ( $\approx 300$  mm) and natural gravel fill ( $\approx 300$  mm), subject to refinement in detailed design.

- f) **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.
- g) **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                                                      |

### 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. Major material inputs include:

- Crushed rock (aggregates) for base, concrete and asphalt.
- Laterite and gravel for embankment and subgrade fill.
- Sand for concrete and masonry works.
- Asphalt/bitumen for the wearing course.
- Cement, reinforcing steel and other structural materials for bridges, culverts and retaining structures.
- Water for concrete production, compaction and dust suppression.

- Diesel fuel and lubricants for plant, equipment and generators.

*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.

## 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).
- More than 500 national workers, including roughly 150 skilled workers, 100 semi-skilled workers and 350 unskilled workers. A proportion of these positions will be reserved for women, youth and vulnerable groups, in line with project labour and inclusion commitments.

Employment will span the design, construction and early operation phases and will be governed by Liberia's labour laws, AfDB Operational Safeguard on labour and working conditions (OS2), and the project's Labour Management Procedures, including provisions on fair recruitment, non-discrimination, avoidance of child and forced labour, worker accommodation and occupational health and safety.

## iii. 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 (NO<sub>x</sub>, SO<sub>2</sub>, 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).
- Domestic wastewater and sewage from worker camps and offices, requiring septic tanks or equivalent treatment.

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.
- 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 wastes 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, the EPA's waste management requirements and the project ESMP. The selected contractor shall be required to submit, prior to commencement of construction, a Contractor's Environmental and Social Management Plan (C-ESMP), which shall detail, among others, specific estimates of volumes of wastes anticipated, and the plans for safely managing these wastes.

#### iv. **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       |

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 RAP 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 Good International Industry Practice (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 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 ESMP and subsequent Contractor ESMP (C-ESMP) will embed GIIP reflected in the AfDB ISS,
- g) 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.
- h) **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 performance, cost-effectiveness and long-term sustainability, as required by national legislation, the EPA ESIA Procedural Guidelines and the AfDB Integrated Safeguards System.

## 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 AfDB ISS and Liberia EPA ESIA Procedural Guidelines 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 environmental and social (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. Criteria reflect AfDB ISS (particularly OS1, OS3, OS4, OS5, OS6 and OS7) and national priorities.

*Table 15: Evaluation criteria for alternatives*

| Criterion                                           | Description                                                                                                                                                                           |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Safety and security</b>                          | Degree to which the option improves road safety and reduces accident risks for road users and workers; implications for the security of communities and project assets.               |
| <b>Environmental performance</b>                    | Magnitude of impacts on air quality, noise, soils, water resources, biodiversity and ecosystem services; potential for pollution, erosion and habitat fragmentation.                  |
| <b>Social impacts and inclusion</b>                 | Impacts on livelihoods, land acquisition and resettlement, vulnerable groups (including women, youth, elderly and persons with disabilities), GBV/SEAH risks, and community cohesion. |
| <b>Public health</b>                                | Influence on communicable diseases, road safety injuries, dust and noise exposure, and access to health services.                                                                     |
| <b>Economic and financial viability</b>             | Capital and operating costs, maintenance requirements, impact on vehicle operating costs, travel times and regional trade; value for money.                                           |
| <b>Technical feasibility</b>                        | Compatibility with terrain, geotechnical conditions, hydrology and traffic forecasts; robustness under local climatic conditions and availability of required technology and skills.  |
| <b>Regulatory and stakeholder compliance</b>        | Alignment with EPML, EPA ESIA Procedural Guidelines, AfDB ISS, road design standards, and expectations of affected communities and local authorities.                                 |
| <b>Climate resilience</b>                           | Ability of the option to perform under projected increases in rainfall intensity, flooding frequency and temperature, and to minimize climate-related disruption.                     |
| <b>Synergy with regional integration objectives</b> | Extent to which the option enhances connectivity, supports MRU corridor objectives, and improves access to markets and social services.                                               |
| <b>Cultural heritage considerations</b>             | Potential to avoid or minimize impacts on known and chance-find cultural, historical and spiritual sites.                                                                             |

- 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 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 RAP |
| 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 AfDB 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:

- a) **Alternative A – Upgrading the existing alignment (Preferred):** Upgrade and pave the existing 60.9 km corridor, maintaining the current centerline to the greatest extent possible, with minor local realignments to improve horizontal curvature, gradients and safety at river crossings and sharp bends.
- b) **Alternative B – New greenfield alignment parallel to existing corridor:** Construct a new highway on a straighter alignment, bypassing some existing settlements to achieve higher design speeds.
- c) **Alternative C – Upgrading a different regional corridor:** Focus investment on an alternative route linking Buchanan to the south-eastern region through a different set of settlements.

### 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 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 to assess the alternatives against key technical, environmental, social, economic, and strategic criteria. 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 RAP 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 RAP. 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 RAP 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 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

##### **1. Pavement alternatives**

The following pavement options were considered:

- d) **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.
- e) **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.
- f) **Option P3 – Improved gravel road**

- Upgrading existing gravel standard without sealing (e.g. thicker gravel layers, better compaction).

*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).
- 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/ESMP 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,” “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 permits; amendments where needed | New permits required from the EPA and other agencies              | Existing permits at source, but transport permits are needed                |
| Community impacts         | Known and manageable                      | New impacts on nearby communities; requires strong consultation   | Traffic and safety impacts along haul routes                                |
| Overall approach          | Preferred as the first option             | 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.

## 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. 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.

*Table 20: Environmental and social comparison of principal alternatives*

| Alternative                                                                                | Land take/resettlement                          | Biodiversity & habitats                                                 | Water & soils                                                              | Community H&S & access                                                                    | Economic development & poverty reduction                                          | Climate resilience                                                | Overall ES performance                                 |
|--------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------|
| <b>No Project</b>                                                                          | None (no new land take)                         | Continued pressure on roadside vegetation; no new fragmentation         | Ongoing erosion and sedimentation; poor drainage                           | High accident risk; poor access to services; isolation in the rainy season                | Very limited; the corridor remains a bottleneck                                   | Low (road often impassable during extreme events)                 | <b>Unacceptable</b> given development objectives       |
| <b>New greenfield alignment (Alt. B)</b>                                                   | High; new RoW through farms and settlements     | High loss of forest and habitats; new fragmentation                     | Major new earthworks and stream crossings; high sedimentation risk         | Bypasses some communities; improved access for others                                     | Could be positive, but not targeted to current corridor communities               | High (if well designed) but at high environmental and social cost | Not preferred                                          |
| <b>Upgrade existing alignment, lower-standard design (e.g. DBST, narrow cross-section)</b> | Moderate                                        | Moderate                                                                | Improved vs. baseline but more vulnerable to failure                       | Some safety improvements, but limited; more frequent closures                             | Moderate gains; limited long-term reliability                                     | Medium                                                            | Better than baseline but sub-optimal                   |
| <b>Upgrade existing alignment, asphalt pavement, climate-resilient design (Preferred)</b>  | Moderate (within existing RoW; managed via RAP) | Moderate; works within already disturbed corridor; limited new clearing | Significant improvement in drainage and erosion control; robust structures | Strong positive: better safety features, lighting and signage; enhanced access year-round | High positive: supports trade, agriculture, employment, and regional connectivity | High: design includes enhanced drainage and scour protection      | <b>Best balance of benefits vs. manageable impacts</b> |

The preferred alternative delivers substantial long-term environmental and social benefits, while residual adverse impacts (mainly temporary construction impacts, land acquisition and community health and safety risks) are site-specific, reversible and manageable through the ESMP, RAP and associated management plans. Hence, the upgrade of the existing alignment with asphalt pavement and climate-resilient design is selected as the preferred alternative because it:

- Maximizes development benefits (connectivity, trade, access to services)
- Minimizes environmental footprint by using an already disturbed corridor
- Ensures climate resilience and long-term sustainability
- Keeps resettlement and social impacts manageable under established safeguards (ESMP, RAP)

Residual impacts—primarily related to construction, land acquisition, and community health and safety—are localized, temporary, and effectively mitigable through standard environmental and social management instruments.

#### 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 a combination of existing licensed and new, well-managed material sources, with progressive rehabilitation of borrow pits and quarries.
- 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 AfDB OS4 and national road safety objectives.
- **Supports climate resilience** by incorporating robust 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.

Residual adverse impacts—principally temporary construction-phase disturbances, land acquisition and resettlement, and community health, safety and security risks—will be addressed through dedicated instruments (RAP, ESMP and associated management plans), ensuring that the project remains compliant with the Environmental Protection and Management Law of Liberia, EPA ESIA Procedural Guidelines and AfDB ISS.

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.

Alternative A is therefore preferred under the mitigation hierarchy because it avoids opening an entirely new corridor and limits displacement to the verified 1,093 PAPs identified by the cleared RAP. Alternatives B and C would require new rights-of-way and are expected to affect more PAPs, although exact numbers cannot be established without detailed alternative alignments and censuses.

While the preferred option entails significant resettlement impacts, affecting approximately 1,093 Project Affected Persons (PAPs), these impacts are largely confined to the existing right-of-way and are therefore more predictable and manageable than the more extensive and uncertain displacement likely to arise under a new greenfield alignment. In addition, the affected corridor communities are also expected to be among the direct beneficiaries of the

project through improved year-round access to markets, healthcare, education, and other essential services.

Importantly, these impacts are manageable and mitigatable through the RAP, including compensation, livelihood restoration, and support to vulnerable groups.

The resettlement impacts, though notable, are proportionate, contained, and manageable, and are outweighed by the project's significant long-term socio-economic and climate resilience benefits.

## 5.0 DESCRIPTION OF THE ENVIRONMENT (BASELINE CONDITIONS)

Detailed physical-environment baseline tables are provided in Appendix 1, traffic counts and the road-safety baseline in Appendix 2, and biological survey reports and species lists in Appendix 5.

### 5.1 DEFINITION OF PROJECT AREA AND AREA OF INFLUENCE

The Buchanan–Cestos Junction Road upgrade extends for approximately 60.9 km from the outskirts of Buchanan in Grand Bassa County to Cestos Junction in River Cess County, traversing 44 towns and two main urban centres (Buchanan and Cestos Junction).

For this ESIA, the area of influence (AoI) is defined as follows:

- **Direct AoI (Project Footprint and Immediate Corridor):** A 250 m wide corridor (125 m on either side of the road centerline, or as finally defined by the right-of-way) along the 60.9 km alignment. This includes the existing carriageway, shoulders, drainage, roadside strips, and any realignments, as well as workspaces for cut-and-fill, roadside drainage and minor access adjustments. The direct AoI has already been heavily modified by more than 50 years of use as a laterite (dirt) road, with significant anthropogenic disturbance from settlements, farms, small businesses and informal resource use. No sensitive or threatened species were observed within this 250 m direct AoI during ecological surveys.
- **Indirect AoI (Wider Area of Influence):**
  - Settlements, farms and community lands that depend on or are functionally linked to the road (including 44 towns and surrounding rural communities).
  - Associated facilities and off-site project components such as construction camps, material sites (borrow pits, quarries), asphalt and concrete batching plants, laydown areas, spoil disposal sites and access roads.
  - Downstream surface-water catchments and groundwater users potentially affected by changes in drainage, erosion/sedimentation or accidental spills.
  - Terrestrial and aquatic habitats and species within at least 1 km of the centerline for biodiversity assessment, including two Key Biodiversity Areas (KBAs), Cestos–Senkwen and Weeni Creek, identified by IBAT as supporting at least 160 IUCN Red List species.
- **Temporal Boundaries:**
  - **Baseline:** Pre-construction conditions (including new samplings undertaken in 2025).

- **Construction:** Mobilizations through completion of civil works and demobilization.
  - **Operation:** The anticipated design life of the paved road (20–30 years), including routine and periodic maintenance.
  - **Decommissioning/Reinstatement:** End-of-life rehabilitation of temporary facilities (e.g., camps, borrow pits, access tracks) and any major reconfiguration of road infrastructure.
- **Thematic Boundaries:** Physical, biological, social, economic, health, gender, GBV/SEAH, cultural heritage, and climate-change-related conditions, consistent with the requirements of the EPA ESIA Guidelines and AfDB ISS.

*Table 21: Summary of Spatial, Temporal and Thematic Boundaries*

| Dimension                     | Scope for this ESIA                                                                                                                                                           |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Spatial – Direct Aol</b>   | 250 m corridor along 60.9 km alignment (existing road, roadside strip, immediate works areas).                                                                                |
| <b>Spatial – Indirect Aol</b> | Communities, associated facilities, catchments, and biodiversity receptors within at least 1 km (ecology) and wider socio-economic influence of the corridor.                 |
| <b>Temporal</b>               | Baseline (pre-construction), construction, operation, maintenance, and decommissioning/reinstatement.                                                                         |
| <b>Thematic</b>               | Physical (climate, air, noise, soils, water), biological (habitats, flora, fauna), socio-economic, health, gender/GBV, ecosystem services, cultural heritage, climate change. |

## 5.2 BASELINE STUDY METHODOLOGY

Baseline data for the proposed paving of the Buchanan (including the link to the Port of Buchanan) to Cestos Junction (60.9 km) road corridor in Grand Bassa and River Cess Counties were collected using a combination of complementary approaches, consistent with the requirements of the Liberian EPA ESIA Procedural Guidelines and the African Development Bank (AfDB) Integrated Safeguards System (ISS).

### 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.
- Assessment of previous technical studies, engineering designs, and investigations (including hydrological and materials studies) for the Buchanan–Cestos Junction road.
- 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 topography, landforms, land use, drainage systems, and habitat types.
- Flora and habitat assessments were undertaken using rapid 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 mammals, birds, reptiles, amphibians, and fish, and to estimate their relative abundance.
- 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:

**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), Yarp Leah Town, Cestos Junction (Proposed Camp Site)) along the project corridor during day/night times.

### 5.3 ENVIRONMENTAL BASELINE MONITORING

To ensure compliance with the Environmental Protection Agency of Liberia and the African Development Bank's Integrated Safeguards System (ISS), 52 sampling points were established along the 60.9 km Buchanan–Cestos Junction corridor. 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.

### Topography, Geology, and Soils

#### *Topography*

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.

- 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 on 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.

## 5.4 ENVIRONMENTAL BASELINE

### Sampling Programme

#### □ 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)

Collected samples were preserved and transported under controlled 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)

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

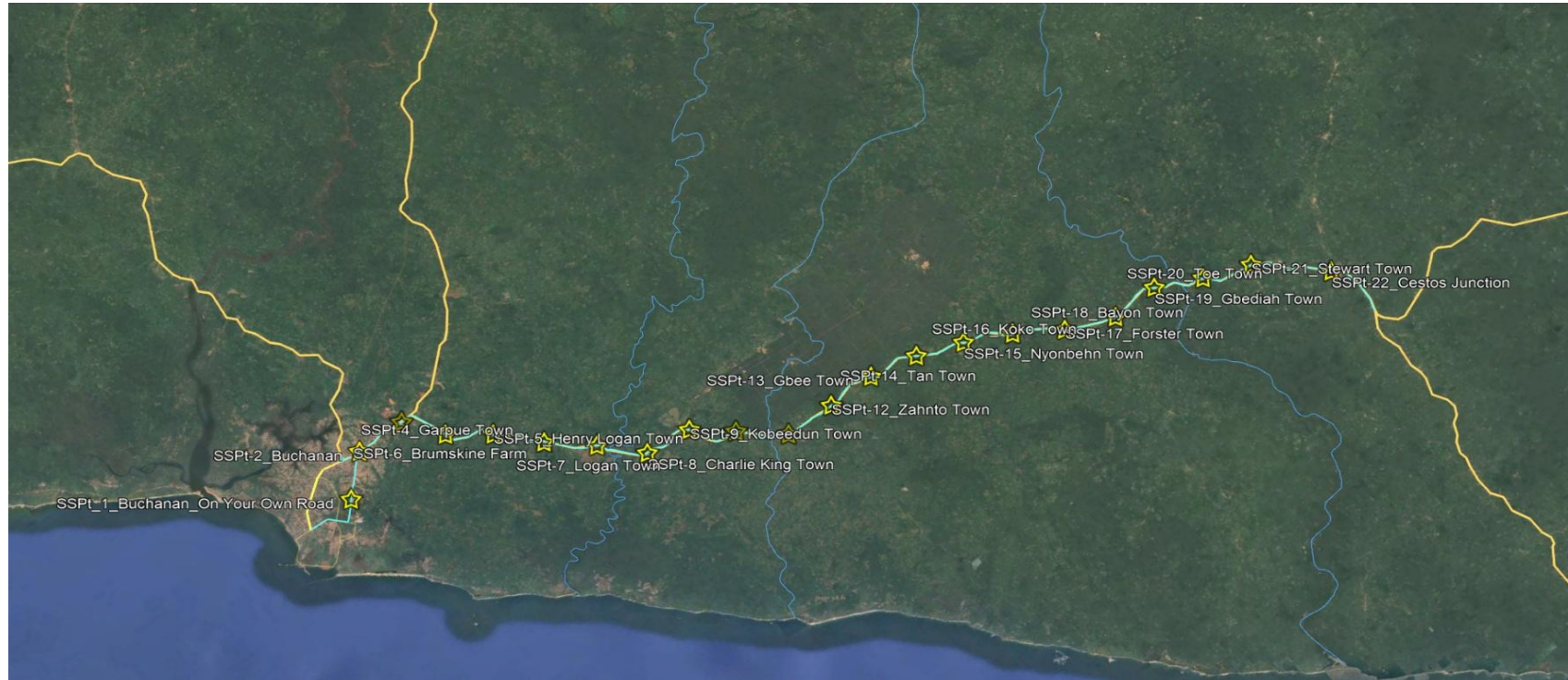
- Calibration of analytical instruments
- Use of blanks and control samples
- Duplicate sample analysis
- Adherence to internationally accepted laboratory standards

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 |

| No. | Sample Code | Location/Feature  | Longitude (W) | Latitude (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 |
| 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 |



## Legend

|   |                                                           |
|---|-----------------------------------------------------------|
| ★ | Soil Sampling Point Coordinates                           |
| — | Existing Roads                                            |
| — | Proposed Project Corridor                                 |
| — | Water Bodies (River, Stream, Creek, Pond, tributaries...) |

Signed: *Alex B. Nomo*  
Chemical Analyst



*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

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**

### **Erosion Control**

- Stabilization of exposed surfaces (mulching, vegetation, installation of gabion wall)
- Installation of drainage structures and silt traps
- 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 draining directly to the Atlantic Ocean.
- 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 and Groundwater 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). The assessment has been conducted in accordance with the requirements of the Environmental Protection Agency (EPA) of Liberia and the African Development Bank (AfDB) Integrated Safeguards System (ISS).

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
- African Development Bank (AfDB) Integrated Safeguards System (ISS), particularly Operational Safeguard (OS) 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency
- **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 | 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      | Grapue 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      |

| No                      | Sample Type/Perimeter | Sample Code | Location                                     | Coordinates (2.5km Intervals) |                   |
|-------------------------|-----------------------|-------------|----------------------------------------------|-------------------------------|-------------------|
|                         |                       |             |                                              | Longitude (X-axis)            | Latitude (Y-axis) |
| 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 |                       |             |                                              |                               |                   |

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

- **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               |

- **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 <sub>3</sub> <sup>-</sup> (mg/l) | SO <sub>4</sub> <sup>2-</sup> (mg/l) | Cl <sup>-</sup> (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    |
| Grapue 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)   |

| Sampling location             | Sample Code | KM    | Source type | pH   | Turbidity (NTU) | TDS (mg/l) | TSS (mg/l) | NO <sub>3</sub> <sup>-</sup> (mg/l) | SO <sub>4</sub> <sup>2-</sup> (mg/l) | Cl <sup>-</sup> (mg/l) | Fe (mg/l) | Cd (mg/l) | Cr(VI) (mg/l) | Compliance status                                                                                        |
|-------------------------------|-------------|-------|-------------|------|-----------------|------------|------------|-------------------------------------|--------------------------------------|------------------------|-----------|-----------|---------------|----------------------------------------------------------------------------------------------------------|
| 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            |
| 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...) |

Signed: *Alex B. Momo*  
Chemical Analyst




- 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.

- **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 traps 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 ( $\geq 30$  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.
- 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 mitigation:

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

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 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 (IMRURDTP) Phase-V. The baseline has been developed in accordance with the requirements of the Environmental Protection Agency of Liberia and the African Development Bank Integrated Safeguards System (ISS).

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.

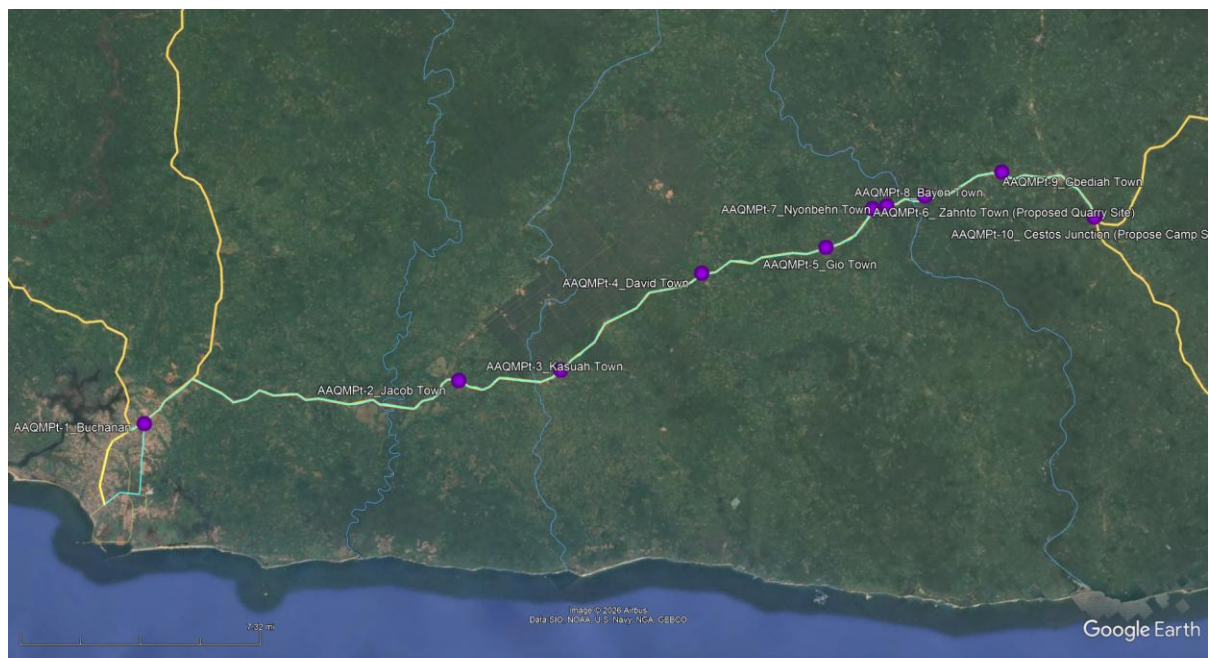
#### ■ Ambient Air Quality Monitoring Locations

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 |

| No.                                                  | Sample Type | Sample Code | Location / Feature                   | Longitude (X) | Latitude (Y)     |
|------------------------------------------------------|-------------|-------------|--------------------------------------|---------------|------------------|
| 4                                                    | Air         | AAQMpt-4    | Kasuaḥ 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"<br>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    | Gbediaḥ 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     |
| <i>AAQMpt = Ambient Air Quality Monitoring Point</i> |             |             |                                      |               |                  |



Legend:

|        |                                                           |
|--------|-----------------------------------------------------------|
| AAQMPT | Ambient Air Quality Monitoring Point                      |
| ●      | Ambient Air Quality Monitoring Location Coordinates       |
| —      | Existing Roads                                            |
| —      | Proposed Project Corridor                                 |
| —      | Water Bodies (River, Stream, Creek, Pond, tributaries...) |



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:  $PM_{10}$ ,  $PM_{2.5}$  ( $\mu g/m^3$ )
- Gaseous Pollutants: CO ( $mg/m^3$ ),  $NO_2$  ( $\mu g/m^3$ ),  $SO_2$  ( $\mu g/m^3$ )

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

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

| Sample Code | Location       | PM <sub>10</sub><br>( $\mu\text{g}/\text{m}^3$ ) | PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ ) | CO ( $\text{mg}/\text{m}^3$ ) | NO <sub>2</sub><br>( $\mu\text{g}/\text{m}^3$ ) | SO <sub>2</sub><br>( $\mu\text{g}/\text{m}^3$ ) |
|-------------|----------------|--------------------------------------------------|------------------------------------------------|-------------------------------|-------------------------------------------------|-------------------------------------------------|
| 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 <sub>10</sub><br>( $\mu\text{g}/\text{m}^3$ ) | PM <sub>2.5</sub><br>( $\mu\text{g}/\text{m}^3$ ) | CO<br>( $\text{mg}/\text{m}^3$ ) | NO <sub>2</sub><br>( $\mu\text{g}/\text{m}^3$ ) | SO <sub>2</sub><br>( $\mu\text{g}/\text{m}^3$ ) |
|-------------|------------------------------|--------------------------------------------------|---------------------------------------------------|----------------------------------|-------------------------------------------------|-------------------------------------------------|
| AAQMpt-6    | Gio Town                     | 110                                              | 46                                                | 1.7                              | 22                                              | 7                                               |
| AAQMpt-7    | Zahnto Town<br>(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 <sub>2.5</sub> | 24-hour          | 15 $\mu\text{g}/\text{m}^3$ (WHO, 2021)   |
| PM <sub>10</sub>  | 24-hour          | 45 $\mu\text{g}/\text{m}^3$ (WHO, 2021)   |
| NO <sub>2</sub>   | 24-hour          | 25 $\mu\text{g}/\text{m}^3$ (WHO, 2021)   |
| SO <sub>2</sub>   | 24-hour          | 40 $\mu\text{g}/\text{m}^3$ (WHO, 2021)   |
| CO                | 24-hour          | 4 $\text{mg}/\text{m}^3$ (WHO equivalent) |

## ■ Interpretation of Results

- **Particulate Matter (PM<sub>10</sub> & PM<sub>2.5</sub>):**  
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<sub>10</sub> and PM<sub>2.5</sub>) 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<sub>2</sub>):**  
Values are moderate, with slight elevations near settlements and high-traffic areas but generally close to guideline thresholds.
- **Sulfur Dioxide (SO<sub>2</sub>):**  
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<sub>10</sub> and PM<sub>2.5</sub>), 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<sub>x</sub>), 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<sub>10</sub> and PM<sub>2.5</sub>):**  
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 rapidly 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.

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<sub>10</sub> and PM<sub>2.5</sub> as the primary pollutants of concern.
- Gaseous pollutants (CO, NO<sub>2</sub>, SO<sub>2</sub>) 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 River Cess Counties.

The assessment was conducted in line with the requirements of the Environmental Protection Agency (EPA) of Liberia and the African Development Bank (AfDB) Integrated Safeguards System (ISS), 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 minute intervals to capture representative conditions.
- Measurements were conducted during both:
  - 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
- WHO Environmental Noise Guidelines
- AfDB ISS Environmental and Social Assessment Guidance

*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 |



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 dBA | Nighttime Leq dBA | 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      |

| Sample Code | Location                       | Daytime Leq dBA | Nighttime Leq dBA | Observation                          |
|-------------|--------------------------------|-----------------|-------------------|--------------------------------------|
| ANMPt-4     | David Town                     | 47 – 53         | 37 – 42           | Low noise, rural settlement          |
| ANMPt-5     | Gio Town                       | 49 – 55         | 39 – 45           | Typical village environment          |
| ANMPt-6     | Zahnto Town<br>(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<br>(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 dBA).
- 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 ( $\leq 45$  dBA), 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
  - 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**

➤ **Construction Phase Mitigation**

✓ **General Measures:**

- Restrict noisy activities to daytime hours (06:00 a.m–6:00 p.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
  - 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
- **Operational Phase Mitigation**
  - 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        |
| 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        |

| Time  | Leq dB(A) | Time  | Leq dB(A) |
|-------|-----------|-------|-----------|
| 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        |
| 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: Yarp Leah 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        |

*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. across all locations
- Lowest Noise Period: 02:00 a.m.–04:00 a.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.
  - 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 River Cess 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 supporting 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.

The entire 250 m direct Aol along the existing road is classified as **modified habitat**, having been impacted by decades of road operation, settlement expansion, agriculture and resource use. No natural or critical habitats are located within the direct Aol; however, IBAT screening identified two Key Biodiversity Areas (KBAs) – **Cestos–Senkwen** and **Weeni Creek and associated hydro-basin** – within a 1 km buffer of the road, hosting at least 160 IUCN Red List species.

These KBAs constitute critical ecological assets in the broader landscape; although outside the 250 m direct Aol, they fall within the indirect biodiversity Aol and require careful consideration under AfDB OS6.

### ii. Flora

Vegetation surveys along the corridor identified a range of plant communities' representative of secondary forest, degraded bush, agricultural plots and wetland vegetation. Key observations include:

- **Secondary forest and old fallow:** Dominated by tree and shrub species such as *Alchornea cordifolia* (Christmas bush), *Hevea brasiliensis* (rubber, in plantations), *Elaeis*

*guineensis* (oil palm), *Mangifera indica* (mango) and a variety of native hardwoods used for timber, poles and fuelwood.

- **Agricultural/degraded areas:** Mixed crops of cassava (*Manihot esculenta*), plantain (*Musa paradisiaca*), maize, and vegetables interspersed with fallows dominated by grasses (*Imperata cylindrica*, *Panicum repens*) and shrubs, often colonized by invasive species such as *Chromolaena odorata*, which is present in many roadside and fallow areas and poses a biodiversity threat.
- **Wetlands and riparian zones:** Vegetation includes swamp ferns (*Acrostichum aureum*), sedges (*Scleria* spp.), soft grasses and scattered mangrove species (e.g. *Rhizophora harrisonii*) in low-lying brackish areas near the coast.

Flora species recorded during field surveys were predominantly classified as Least Concern under the IUCN Red List, with no confirmed occurrence of globally threatened plant species within the 250 m Aol.

Consistent with the user's note and field confirmations, no sensitive or threatened flora species were observed within the direct 250 m corridor. Nevertheless, the presence of Key Biodiversity Areas (KBAs), *Ambusa vulgaris* (bamboo), other native tree and understorey species, and the broader forest and mangrove landscape means that careful management of vegetation clearance, mitigation of edge effects, and control of indirect impacts, such as increased access, bushmeat hunting, and potential habitat fragmentation, remains essential to safeguard biodiversity and ecosystem functions.

### iii. Fauna

The fauna baseline combines direct field observations and community knowledge. Key findings:

- **Mammals:**
  - Commonly reported species include cane rat (*Thryonomys swinderianus*), squirrels, quikers, 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.
- **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 Aol, 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.

#### iv. 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 localised 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.

#### v. Protected Areas and Critical Habitats

There are **no designated national parks, nature reserves or formally protected areas** intersecting the project's 250 m Aol. 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 AfDB OS6
- The project, therefore, lies within the sphere of influence of internationally important biodiversity areas, even though the immediate corridor is classified as modified habitat.

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.

#### vi. **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:**
  - Sites for traditional practices and secret societies (Poro and Sande).
  - Sacred groves, community gathering areas near large trees, and water bodies with cultural significance.

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**

#### vii. **Administrative and Political Context**

The project traverses **Grand Bassa County** (western segment) and **River Cess County** (eastern segment). Local governance structures include county superintendents, district

commissioners, clan and town chiefs, community elders, and women's and youth leaders. Traditional authorities play a critical role in land allocation, dispute resolution, and cultural affairs, particularly in rural towns.

The road links:

- The port city of **Buchanan** (a key commercial and administrative centre) with
- Numerous smaller towns (44 settlements) and the town of **Cestos Junction**, which serves as the main hub for River Cess County.

This administrative setting is important for stakeholder engagement, grievance redress, and implementation of resettlement and livelihood restoration measures.



*Figure 13: Partial View of the Existing Corridor*

#### viii. Demographic Profile of Aol Communities

The socio-economic baseline survey conducted in January 2025 covered 120 households across 44 communities and included data on 894 individuals. Key demographic features:

- **Household size:** Average household size is 7.5 persons, with about 8 persons per household in urban areas and 6 in rural towns.
- **Gender structure:**
  - 53% of household heads were female and 47% male.
  - The overall population is female-skewed, with an approximate sex ratio of 1:1.5 (male: female).
- **Age structure:**
  - Children (0–15 years) represent about 35.7% of the population (N = 320), followed by youth and young adults (16–31 years), indicating a **very young population**.

*Table 44: Summary Demographic Characteristics (SEBS, 2025)*

| Indicator                     | Value / Observation           |
|-------------------------------|-------------------------------|
| Number of households surveyed | 120                           |
| Total individuals             | 894                           |
| Average household size        | 7.5 persons                   |
| Female household heads        | 53%                           |
| Male household heads          | 47%                           |
| Population 0–15 years         | 35.7% of the total population |
| Dominant ethnic group         | Bassa                         |

#### ix. Land Use, Tenure and Natural Resource Use

Land along the corridor is used primarily for:

- Smallholder agriculture (upland and swamp rice, cassava, plantain, vegetables, tree crops).
- Rubber and oil palm plantations.
- Settlements and associated gardens.
- Informal extraction of timber, fuelwood and NTFPs from forest and bush areas.

Land tenure is a mix of **customary family and community ownership**, with increasing formalization under the Liberia Land Rights Act. Land transactions are often mediated by elders and town chiefs. As road access improves, land values are expected to rise, with potential benefits (collateral for credit, investment) but also risks of dispossession of poorer households by wealthier outsiders if safeguards are not effectively implemented.

Approximately 30% of surveyed households reported direct access to forest or “bush” areas, used for firewood, charcoal production, hunting, palm wine tapping, harvesting of oil palm and other wild products.

#### x. Livelihoods and Economic Activities

Livelihoods in the Aol are diversified and largely rural:

- **Agriculture:** Main source of income and subsistence. Upland rice, cassava, plantain, vegetables and tree crops (rubber, oil palm) are common. Shifting cultivation and poorly managed plantations are still widespread, contributing to forest degradation.
- **Fishing:** Freshwater and coastal fisheries provide food and supplementary income in rivers, creeks and coastal areas.
- **Logging and charcoal production:** Small-scale timber extraction and charcoal making are widely practiced, particularly among poorer households.
- **Petty trade and services:** Roadside trading, small shops, markets, transport services (motorcycles) and informal labour (construction, farm work).
- **Wage employment:** Limited formal employment is available in Buchanan (port, industries, services) and in public institutions (schools, health facilities, government).

Many households engage in multiple income-generating activities to manage risk. Seasonal fluctuations in income are pronounced, particularly during the rainy season when road conditions deteriorate, and transport becomes difficult.

## xi. Infrastructure and Social Services

### Transport and Road Network

The Buchanan–Cestos Junction road is currently an unpaved laterite road that becomes severely degraded and often impassable during the rainy season, causing delays, increased vehicle operating costs, and restricted access to essential services. Motorcycles are the dominant mode of transport due to their ability to negotiate poor road conditions.

### Water Supply

- Buchanan and Cestos Junction have relatively good access to protected water sources, primarily hand pumps installed by NGOs and government programmes.
- Many rural towns rely on a combination of hand pumps, shallow wells and creeks. The SEBS found that 85 households used hand pumps, 24 wells and 11 rivers/creeks as primary water sources (households may use more than one source).

### Sanitation

- Around 79% of households reported having access to a toilet facility, most of which are simple pit latrines located outside the dwelling and often shared among neighbours.
- In communities without latrines, open defecation in the bush remains common.

### Health Services

- Health facilities are unevenly distributed; Buchanan, Yarpah Town, Gbediah Town and Cestos Junction host hospitals or clinics serving the surrounding areas.
- Many smaller towns lack nearby health facilities; during the rainy season, poor road conditions limit access and patients rely on traditional healers.

### Education

- Most towns have at least an elementary school; larger towns host several elementary schools and a few junior/senior high schools. Buchanan and Cestos Junction provide full K–12 education, but rural students frequently travel long distances or live with relatives in towns to continue schooling.
- All surveyed households reported having children attending school, with an average of three students per household.

### Energy and Power

- Buchanan and parts of the project area are supplied by Liberia Electricity Corporation (including via the CLSG interconnection). Cestos Junction and some surrounding towns receive cross-border electricity from Côte d'Ivoire.
- Many communities rely on small private generators for commercial uses (video clubs, phone charging), while households mostly use charcoal and firewood for cooking.

**Financial Services:** Buchanan is the only location along the corridor with formal banking facilities; access to credit in rural areas is limited and often relies on informal savings and loan groups.

## xii. Community Health Profile

The health profile of communities along the corridor is shaped by limited access to services, high exposure to waterborne and vector-borne diseases, and poverty-related conditions. Key features include:

1. **Common illnesses:** Malaria, respiratory infections, diarrheal diseases, and skin infections are frequently reported.
2. **Health-seeking behaviour:** Over a six-month recall period, many respondents reported episodes of illness treated with home remedies or herbal medicine; only a portion visited clinics or hospitals due to distance, cost, and poor road conditions.
3. **Mortality:** During the same period, a small proportion of households reported a family death; causes included accidents and prolonged illnesses.
4. **Water, Sanitation and Hygiene (WASH):** Limited access to improved water and sanitation contributes to diarrhea disease risk, especially where households rely on creeks and open defecation.
5. **STDs/STIs and HIV/AIDS:** HIV prevalence in Liberia is moderate but concentrated in urban centres and among high-risk groups; along the corridor, awareness exists, but stigma and limited testing remain challenges. Increased road connectivity can influence the spread of STDs/STIs, highlighting the need for targeted HIV/GBV awareness and services during construction.

## xiii. Education, Culture and Social Organization

- **Education:** As noted above, access to full secondary education is constrained in rural towns; however, enrolment in primary education is high, with all surveyed households reporting school-going children.
- **Social organization and social capital:**

- The traditional “**kuu**” system of collective labour remains widespread, particularly in agriculture, combining mutual assistance and paid labour. Women constitute a large share of kuu participants.
- Over 90% of households participate in community groups such as village savings and loan associations (VSLA), women’s groups and church fellowships; around 95% attend town meetings when called, indicating strong social cohesion.
- **Religious and cultural practices:**
  - Christianity is the dominant religion along the road, with a small Muslim minority (notably in Cestos Junction).
  - Traditional **Poro and Sande societies** remain important in most towns (except urban Buchanan), serving as systems of social instruction, initiation and local governance. These are considered sacred and details are rarely discussed openly.

#### xiv. **Gender, Vulnerable and Marginalized Groups**

Gender dynamics and vulnerability patterns relevant to AfDB OS7 include:

- **Women:**
  - Women head more than half of households and play central roles in farming, petty trade, marketing, food processing and care work.
  - Women are heavily involved in cross-border and inter-county trade, which often requires relocation and frequent travel. They also dominate kuu labour groups in many communities.
  - Constraints include limited access to land titles, credit, formal employment and decision-making forums, as well as exposure to GBV, particularly in isolated areas and in the context of labour influx.
- **Youth:**
  - The population is youth-dominated, with high proportions of children and young adults. Many youth are under-employed or involved in precarious livelihoods (e.g., motorcycle taxi, casual labour), which could make them both primary beneficiaries of project employment and susceptible to social risks (drug use, risky sexual behaviour, conflict with workers).
- **Other vulnerable groups:**
  - Elderly people living alone, persons with disabilities, female-headed households without support, and very poor households relying on marginal land or informal settlements near the road.

- Highly vulnerable rural minorities or in-migrant groups may have weaker tenure security and less voice in local decision-making.

These groups will be given specific attention in stakeholder engagement, impact assessment and the design of mitigation and livelihood restoration measures.

#### xv. Security and Human Rights Context

The project area has been peaceful in recent years, with no active armed conflict. Liberia's constitution and legal framework provide for basic human rights, including rights to property, association and freedom from discrimination.

Key contextual points:

- Local policing is provided by the Liberia National Police, with posts in major towns such as Buchanan and Cestos Junction.
- Security concerns reported by communities relate mainly to petty crime, domestic violence, land disputes and occasional conflicts over natural resources (timber, farmland).
- There is heightened national and international concern regarding **gender-based violence (GBV)**, including intimate partner violence and sexual exploitation and abuse, especially in contexts of labour influx and weak oversight.

#### 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 national heritage legislation.

## 5.9 SUMMARY OF KEY ENVIRONMENTAL AND SOCIAL SENSITIVITIES

Based on the above baseline description, the main environmental and social sensitivities relevant to impact assessment are summarized in Table 45.

*Table 45: SUMMARY OF KEY ENVIRONMENTAL AND SOCIAL SENSITIVITIES*

| Receptor / Issue                                                             | Location / Extent                                                 | Sensitivity / Concern                                                                                                                                     |
|------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rivers and creeks (Timbo, Gbowee, New Cess, smaller streams)                 | Along the entire corridor, multiple crossings                     | Essential for domestic water, fishing and cultural uses; at risk from sedimentation, pollution and altered drainage.                                      |
| Water quality (surface and groundwater)                                      | Sampled at 12 locations plus community hand pumps/wells           | Generally good quality; local exceedances of turbidity and Cr(VI) in some surface and ground waters require careful pollution control and monitoring.     |
| Highly erodible lateritic soils                                              | Cut/fill slopes, borrow pits, unprotected surfaces                | Susceptible to erosion and gulying under heavy rainfall; risk of sedimentation of watercourses and infrastructure damage.                                 |
| KBAs and broader biodiversity (Cestos–Senkwen, Weeni Creek)                  | Within ~1 km of alignment (indirect Aol)                          | High conservation value with at least 160 IUCN Red List species; potential critical habitat under AfDB OS6.                                               |
| Secondary forests, wetlands and riparian habitats                            | Scattered patches along the corridor and in the broader landscape | Provide important ecosystem services, biodiversity and carbon storage; vulnerable to clearance, fragmentation and edge effects.                           |
| Roadside settlements and social infrastructure                               | 44 towns and two cities along 60.9 km                             | High exposure to construction nuisance, traffic safety risks, and land acquisition; strong dependence on the road for access to services and markets.     |
| Vulnerable groups (women, youth, poor households, persons with disabilities) | Throughout Aol, particularly in poorer rural towns                | At risk of exclusion from benefits, economic displacement, GBV/SEAH, and other social harms if not specifically targeted in mitigation.                   |
| Community health and WASH                                                    | Rural communities with limited facilities                         | Burden of malaria, diarrhea, and limited access to health services; potential for increased disease transmission during construction.                     |
| Cultural heritage                                                            | Many towns along the road; precise locations often undisclosed    | High spiritual and social significance; risks from land take, vibration, and access changes; requires close engagement and robust chance finds procedure. |
| Climate and natural hazards                                                  | Entire corridor, especially low-lying and coastal sections        | Exposure to heavy rainfall, flooding, erosion, and climate change impacts requires climate-resilient road and drainage design.                            |

## 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 Environmental and Social Standards/Operational Safeguards (OS1–OS10). 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, 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 decision-makers 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 impacts along the 60.9 km Buchanan–Cestos Junction corridor, based on defined assessment criteria, and to develop and describe mitigation measures to avoid or minimize adverse effects while enhancing potential benefits.

The impacts of the proposed project were identified using multiple sources of information, including the findings of the field site assessment, stakeholder consultations, existing baseline conditions, proposed project activities, and the professional expertise of the consultants. Impacts are initially categorized as either positive or negative (see Section 5).

The assessment covers cross-sectoral impacts along the corridor, including:

1. Health and safety of workers and communities
2. Air quality, particularly dust generation
3. Waste management practices
4. Social aspects, including resettlement and temporary displacement of formal and informal business operators

5. Traffic management along the project road
6. Potential impacts on select public utilities

This methodology provides a structured approach for evaluating the effects of the project along the corridor and informs the design of appropriate mitigation and enhancement

For the quantitative risk assessment, likelihood and consequence are scored from 1 (low) to 5 (very high), and the risk score is calculated as likelihood  $\times$  consequence. Scores of 1–4 are Low (green), 5–9 Moderate (light amber), 10–16 Substantial (amber), and 17–25 High (red). Impact significance is determined by combining magnitude and receptor sensitivity using the significance matrix below.

The assessment followed a **structured, transparent, and quantitative process**:

- a) **Review of project design and alternatives.**
- b) **Baseline data collection** – primary field measurements and secondary sources.
- c) **Identification of potential impacts and risks** using systematic tools.
- d) **Quantitative evaluation of impact significance** based on magnitude, extent, duration, reversibility, likelihood, and receptor sensitivity.
- e) **Development of mitigation measures** following the mitigation hierarchy: avoid  $\rightarrow$  minimize  $\rightarrow$  restore  $\rightarrow$  offset.
- f) **Integration of cross-cutting themes**, including climate change, disaster risk, and human rights considerations.

### Impact Identification Tools

1. **Checklists:** Structured checklists grouped by environmental and social 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 was evaluated against a set of criteria to determine its significance. The main criteria include magnitude, extent, duration, reversibility, likelihood, and receptor sensitivity or vulnerability. While the assessment remains primarily based on professional judgment, available project-specific quantitative indicators were used wherever possible to improve consistency and transparency.

- **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. |

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).
- **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 in order to support the identification of key environmental and social risks requiring mitigation and monitoring.

*Table 47A: Quantitative Environmental and Social Risk Assessment*

| Risk ID | Risk Event / Potential Consequence                                                           | Likelihood (1–5) | Consequence (1–5) | Score | Rating      | Basis                                                                                                    |
|---------|----------------------------------------------------------------------------------------------|------------------|-------------------|-------|-------------|----------------------------------------------------------------------------------------------------------|
| R-01    | RAP non-compliance, delayed compensation or livelihood disruption 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                                           | 3                | 5                 | 15    | Substantial | Exposure is corridor-wide and consequences may include serious                                           |

| Risk ID | Risk Event / Potential Consequence                                                            | Likelihood (1-5) | Consequence (1-5) | Score | Rating      | Basis                                                                                             |
|---------|-----------------------------------------------------------------------------------------------|------------------|-------------------|-------|-------------|---------------------------------------------------------------------------------------------------|
|         | vulnerable road users                                                                         |                  |                   |       |             | injury or fatality.                                                                               |
| 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    | Chance find or disturbance of graves, shrines, sacred trees or other cultural heritage        | 2                | 5                 | 10    | Substantial | Likelihood is lower, but consequences may be severe for affected communities.                     |

| Risk ID | Risk Event / Potential Consequence                                                     | Likelihood (1–5) | Consequence (1–5) | Score | Rating      | Basis                                                                      |
|---------|----------------------------------------------------------------------------------------|------------------|-------------------|-------|-------------|----------------------------------------------------------------------------|
| R-09    | Induced access facilitating illegal logging, hunting or longer-term habitat conversion | 3                | 4                 | 12    | Substantial | Improved access may increase pressure beyond the direct project footprint. |

Table 47B: Quantitative Environmental and Social Impact 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                                                              | 3               | 3                 | Moderate     | The effect is likely to be temporary and                                                                            |

| Impact ID | Direct Impact                            | Quantitative Extent / Receptor                                                                                         | Magnitude (1–4) | Sensitivity (1–4) | Significance           | Basis                                                                     |
|-----------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|------------------------|---------------------------------------------------------------------------|
|           |                                          | watercourses may experience localized sediment loading during earthworks                                               |                 |                   |                        | 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 m <sup>3</sup> /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;                                                                                | 3               | 3                 | Moderate–High Positive | The project provides long-term                                            |

| Impact ID | Direct Impact | Quantitative Extent / Receptor              | Magnitude (1-4) | Sensitivity (1-4) | Significance | Basis                                            |
|-----------|---------------|---------------------------------------------|-----------------|-------------------|--------------|--------------------------------------------------|
|           |               | improved access for 44 corridor communities |                 |                   |              | connectivity, trade and service-access benefits. |

### 6.3 MITIGATION MEASURES

The table below summarizes **feasible mitigation measures** addressing each significant and moderate impact and risk.

*Table 47C: Mitigation Measures for Environmental and Social Risks and Impacts, Associated Risks, and Management Actions*

| Impact (Direct Effect)                                             | Risk (Potential Consequence)                                                                | Mitigation Measures                                                                                                                                                                                     |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Loss of households, assets, and livelihoods                        | Non-compliance with RAP commitments, livelihood disruption, and social grievance            | Implement RAP; provide fair compensation; deliver livelihood restoration support; ensure targeted assistance to vulnerable groups; maintain an accessible grievance redress mechanism                   |
| Forest clearance and habitat disturbance                           | Biodiversity loss, habitat fragmentation, edge effects, and invasive species spread         | Limit clearing to the approved right-of-way; implement replanting and restoration measures; apply offsets where required; avoid sensitive habitats and Key Biodiversity Areas; monitor invasive species |
| Increased sediment load and localized water quality deterioration  | Degradation of aquatic habitats, downstream siltation, and reduced water usability          | Install silt fences, sediment traps, and buffer zones; schedule work to reduce exposure during peak rains; stabilize exposed areas rapidly; monitor water quality                                       |
| Increased noise and vibration during construction                  | Temporary disturbance, stress, nuisance, and possible sleep disruption for nearby receptors | Restrict construction hours; maintain equipment; use silencers and noise barriers near sensitive receptors where necessary; inform communities in advance of disruptive works                           |
| Increased traffic, accident exposure, and vehicle emissions        | Road safety incidents, community injury, and local air quality deterioration                | Install signage, speed controls, and pedestrian crossings; undertake community road safety awareness campaigns; enforce traffic management plans; monitor accident trends periodically                  |
| 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      |

### 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                                                                                                    |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Pre-construction</b>         | 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                        |
| <b>Construction</b>             | Vegetation clearance, earthworks, drainage works, pavement and structures, operation of camps and workshops, haulage of materials, traffic diversions | 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 |
| <b>Operation</b>                | 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    |
| <b>Decommissioning (if any)</b> | Removal of temporary works and facilities, rehabilitation of sites                                                                                    | Soils, watercourses, communities                                                                | Waste generation, local disturbance, short-term OHS risks, opportunities for site restoration                           |

#### **BIOPHYSICAL IMPACTS (OS1, OS3, OS6)**

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**

##### **• Construction Phase**

- 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.
- **Operation Phase**
  - 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 traps, check dams, contouring, rip-rap, 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 culvert 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.
  - 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 traps where appropriate; maintain drainage structures regularly.
- Proper design and management of camp sanitation systems (septic tanks, soakaways, 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 localised and largely reversible if drainage and maintenance are properly implemented.

#### **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 centres and markets.

### Potential Impacts

- **Construction Phase**
  - Dust emissions from earthworks, traffic on unpaved access roads, material handling, and stockpiles.
  - Exhaust emissions (NO<sub>x</sub>, SO<sub>x</sub>, 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.

**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 (OS6)

**Baseline Context:** The **direct Area of Influence (Aoi)** considered for the Project is a 250 m corridor on each side of the existing road. 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 critical habitats or legally protected areas have been identified within the 250 m Aoi. Field surveys and consultations did not record sensitive or endangered species within the immediate corridor. However, broader landscapes beyond the Aoi may support more natural habitats and mobile species (e.g., birds, small mammals, reptiles).

**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
  - 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 Aol 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.

#### **SOCIO-ECONOMIC IMPACTS (OS1, OS5, OS7, OS10)**

##### 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 RAP 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 (RAP) / Abbreviated RAP (ARAP)**. The 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 RAP/ARAP in line with OS5 and national law, 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 redress mechanism for resettlement issues, accessible and well-publicized.

**Residual Impact (With Mitigation):** Where RAP/ARAP 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 centres 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 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.
- 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 behaviour 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).

## LABOUR AND WORKING CONDITIONS (OS2)

i. **Terms of Employment, Labour Rights, Non-Discrimination**

The Project will employ direct 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.

Mitigation measures include:

- Ensuring all workers receive written contracts, transparent terms, and benefits consistent with national law and OS2.
- Prohibiting forced labour and child labour; verifying the age of workers.
- Enforcing non-discrimination and equal opportunity policies; providing training on labour 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.

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, labour 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 (OS3)**

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 leading 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.
- 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.

#### COMMUNITY HEALTH, SAFETY, AND SECURITY (OS4)

### i. Traffic and Road Safety

#### Construction Phase

- Increased movement of heavy vehicles and machinery through villages and towns.
- Temporary diversions and road closures are creating confusion and risk of accidents for pedestrians, cyclists, and vehicles.

#### Operation Phase

- Higher speeds and traffic volumes are increasing accident risk, particularly for pedestrians and non-motorized users, children, and other vulnerable groups.

Mitigation measures:

- Traffic Management Plan including signage, speed limits, speed calming, flaggers, and segregation of pedestrian routes where possible.
- Engagement with communities, schools and transport operators on road safety.
- Design features such as speed humps, zebra crossings, bus stops/lay-bys, visibility at junctions and safe school crossings in populated areas.
- Enforcement support, e.g. coordination with traffic police.

### ii. Public Health Risks

Construction and operation may influence public health through:

- Exposure to dust and noise.
- Changes in access to health services (positive and negative) due to road works.
- Increased risk of communicable diseases, including STDs/STIs and HIV/AIDS, due to influx of workers and mobile populations.
- Potential for vector-borne diseases (e.g. malaria) if stagnant water accumulates in borrow pits and drainage structures.

#### Mitigation measures:

- Health education programmes in collaboration with local health authorities, targeting both workers and communities.
- Provision of condoms and voluntary testing services for workers; codes of conduct addressing sexual behaviour.
- Drainage design and maintenance to minimize stagnant water; rehabilitation of borrow pits.

#### iii. Interaction with Security Forces; Use of Force

Where security personnel (public or private) are engaged to protect assets:

- Risks of excessive or inappropriate use of force, harassment, or abuse may arise.

Mitigation measures:

- Adoption of a **Security Management Plan** aligned with OS4 and human rights principles.
- Training of security personnel in proportional use of force, respect for human rights, cultural sensitivity and GBV/SEA/SH prevention.
- Clear protocols and oversight by Project management; a mechanism for reporting and addressing abuses.

#### iv. GBV, SEA/SH and Modern Slavery Risks

The presence of a largely male, mobile workforce and increased economic activity may increase risks of:

- Gender-based violence (GBV).
- Sexual exploitation and abuse (SEA) and sexual harassment (SH).
- Trafficking, child labour and other forms of modern slavery.

Mitigation measures:

- Development and implementation of a **GBV/SEA/SH Action Plan**, including:
  - Codes of conduct for all workers with clear sanctions.

- Training and awareness for workers and communities.
- Survivor-centred, confidential reporting and referral pathways, in partnership with local service providers.
- Strict prohibition and monitoring of child labour, forced labour and trafficking in the supply chain.
- Inclusion of GBV/SEA/SH clauses in all contracts and monitoring of compliance.

#### **LAND ACQUISITION, RESTRICTIONS ON LAND USE AND RESETTLEMENT (OS5)**

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 RAP.

- **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 **RAP/ARAP** 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 (OS6)**

In line with OS6, the Project has been screened for **natural** and **critical habitats**:

- No critical habitats have been identified within the direct Aol.
- Remaining natural habitat pockets (e.g. riparian strips, small wetlands, tree clumps) are limited but locally important for ecosystem services and species.

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 (OS7)**

OS7 requires 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.
- Poor households with limited assets or alternative livelihood options.
- Elderly persons, persons with disabilities, and chronically ill individuals.
- Children and youth.
- Residents in remote or marginalized settlements along the corridor.

#### **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 RAP/ARAP (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.
- 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 (OS8)**

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).

Residual impacts on cultural heritage are expected to be **Low**, provided avoidance and chance find procedures are strictly implemented.

### STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE (OS10)

Stakeholder engagement has been an integral part of the ESIA process and is aligned with OS10 and national requirements.

### Key ESIA-Stage Issues Raised

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 ESMP.
- Development of the RAP/ARAP to address resettlement and compensation issues.
- Incorporation of design measures for road safety and access.
- Establishment of a Project Grievance Redress Mechanism (GRM) 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).

### 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                                                | Low–Moderate (household-level significance remains noticeable but mitigated through RAP) |
| Livelihoods and businesses        | Short-term disruption during construction; long-term enhanced market access                                             | Negative residual: Low; Positive residual: Moderate–High                                 |

| Impact Area                 | Residual Nature                                                                          | Residual Significance                                              |
|-----------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Vulnerable groups           | Residual sensitivity to change and unequal benefit capture                               | Low–Moderate (subject to full implementation of targeted measures) |
| Community health and safety | Residual accident risk and health risks associated with road use and induced development | Moderate (requires ongoing enforcement and awareness)              |
| Cultural heritage           | Minor risk of disturbance through inadvertent finds                                      | Low (with Chance Finds Procedure)                                  |

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:

- The mitigation measures and management plans (ESMP, RAP/ARAP, 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.

## 7.0 E&S IMPLEMENTATION CAPACITY

---

This section assesses the institutional, technical, and operational capacity of public entities responsible for Environmental and Social (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 African Development Bank (AfDB) Integrated Safeguards System (ISS), which emphasizes the need to evaluate borrower capacity to effectively implement and monitor Environmental and Social Management Plans (ESMPs).

### 7.1 INSTITUTIONAL AND REGULATORY FRAMEWORK

Environmental and social 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 Environmental and Social Impact Assessments (ESIAs);
- Issue environmental permits and licenses;
- Monitor compliance with approved ESMPs;
- 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 ESMP implementation and ensuring compliance with both national regulations and AfDB safeguard 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)
- 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., River Cess 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 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.
- 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 DECAs 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 ESMP 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.

#### 7.4 CAPACITY AT PROJECT LEVEL (PIU AND CONTRACTORS)

The Project Implementation Unit (PIU) within the Ministry of Public Works is expected to:

- Oversee ESMP implementation;
- Supervise contractors' compliance with E&S requirements;
- Coordinate with EPA and other regulatory bodies;
- Ensure reporting in line with AfDB requirements.

However, the PIU may require:

- Dedicated Environmental and Social Safeguards Specialists;
- Training on AfDB Operational Safeguards (OS1–OS5);
- Strengthened monitoring and reporting systems;
- Support for contractor supervision and compliance audits.

Contractors and supervising engineers will also require adequate E&S staffing, including Environmental, Health, and Safety (EHS) Officers, and adherence to the approved Contractor's ESMP (C-ESMP).

### **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, ESMP implementation, AfDB safeguards, climate risk management, and social inclusion.
- 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 grievance redress mechanisms (GRM) and participatory monitoring.

#### **7.5.1 DECENTRALIZED ESA OVERSIGHT AND CAPACITY STRENGTHENING IN GRAND BASSA AND RIVER CESS COUNTIES**

The effective implementation of the ESMP will require not only central-level oversight by MPW/IIU, EPA and AfDB, but also functional coordination with decentralized institutions in Grand Bassa and River Cess Counties. These local actors are important because most construction impacts, community grievances, traffic safety risks, labour influx issues, access disruptions, land-related complaints, public health concerns and site-level compliance issues

will arise within county, district and community jurisdictions. The capacity assessment therefore considers the roles, gaps and support needs of decentralized institutions that will participate in ESA enforcement, monitoring, grievance management and community-level oversight during project implementation.

*Table 53: Decentralized ESA Oversight and Capacity Strengthening Arrangements in Grand Bassa and River Cess Counties*

| Decentralized Actor / Institution                                           | Expected Role in ESMP Implementation                                                                                                                                                                         | Identified Capacity Gaps                                                                                                                                                                                                                          | Required Support / Strengthening Measure                                                                                                                                                                                                                      | Responsibility / Timing                                                 |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>EPA county/regional representation or designated EPA inspection team</b> | Conduct regulatory compliance inspections, verify implementation of permit conditions, review environmental monitoring results, and participate in investigation of significant pollution or incident cases. | Limited frequency of field inspections due to logistics, staffing and transport constraints; limited access to real-time site monitoring data; possible delay in follow-up inspections for borrow pits, quarries, camps and waste disposal sites. | Provide EPA with the approved ESIA/ESMP, CESMP, monitoring reports and project schedule; facilitate joint inspections; include EPA in quarterly compliance review meetings; support field access where required without compromising regulatory independence. | MPW/PIU and Contractor before mobilization and throughout construction. |
| <b>Grand Bassa and River Cess County Administrations</b>                    | Support county-level coordination, stakeholder engagement, disclosure of project information, escalation of unresolved community concerns, and coordination with line ministries and district authorities.   | Limited technical knowledge of AfDB ISS requirements, ESMP monitoring tools and contractor compliance obligations; limited resources for regular participation in field monitoring.                                                               | Conduct orientation on ESMP commitments, RAP provisions, GRM procedures, traffic safety and community health risks; provide simplified                                                                                                                        | MPW/PIU during pre-construction and quarterly during implementation.    |

| Decentralized Actor / Institution                                               | Expected Role in ESMP Implementation                                                                                                                                      | Identified Capacity Gaps                                                                                                                                                                               | Required Support / Strengthening Measure                                                                                                                                                          | Responsibility / Timing                                              |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|                                                                                 |                                                                                                                                                                           |                                                                                                                                                                                                        | monitoring checklists and reporting channels.                                                                                                                                                     |                                                                      |
| <b>District authorities and local government structures</b>                     | Support access to communities, community notification, local dispute resolution, identification of vulnerable persons, and monitoring of contractor-community relations.  | Limited documentation systems for recording community concerns; limited familiarity with environmental and social safeguards requirements; risk of informal grievance handling without proper records. | Train district authorities on GRM intake, documentation, referral and escalation; provide standard grievance forms and community notification templates.                                          | PIU Social Safeguards Team before works commence in each district.   |
| <b>MPW County Engineers / local road sector representatives</b>                 | Provide technical support on road works, traffic diversions, drainage, public safety, access restoration and coordination with the Contractor and Supervision Consultant. | Safeguards monitoring may not be fully integrated into routine engineering supervision; limited capacity to document E&S non-compliance beyond technical defects.                                      | Orient MPW county engineers on ESMP requirements, traffic management, borrow pit reinstatement, drainage-related erosion risks and incident reporting; include them in joint monitoring missions. | MPW/IIU and Supervision Consultant before and during construction.   |
| <b>Liberia Land Authority county representatives/land administration actors</b> | Support land verification, land-related dispute resolution, confirmation of land claims, and coordination on RAP-related grievances.                                      | Potential limitations in documentation of customary land claims, boundary disputes, and verification of affected assets; limited resources for timely field verification.                              | Provide RAP summary, entitlement matrix, PAP verification procedures and grievance escalation protocol; involve LLA in                                                                            | PIU RAP/Social Team before land entry and during RAP implementation. |

| Decentralized Actor / Institution                                           | Expected Role in ESMP Implementation                                                                                                                                      | Identified Capacity Gaps                                                                                                                                                 | Required Support / Strengthening Measure                                                                                                                                                                                               | Responsibility / Timing                                                                           |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
|                                                                             |                                                                                                                                                                           |                                                                                                                                                                          | land-related grievance reviews and difficult ownership disputes.                                                                                                                                                                       |                                                                                                   |
| <b>Ministry of Gender, Children and Social Protection county structures</b> | Support GBV/SEA/SH referral pathways, vulnerable group protection, child protection, survivor-centred response and monitoring of gender-related risks.                    | Limited resources for confidential case referral, survivor support and follow-up; possible weak coordination between project GRM and county-level GBV service providers. | Map GBV/SEA/SH service providers; establish confidential referral pathway; train GRCs, Contractor and CLOs on survivor-centred handling, non-retaliation and protection of minors.                                                     | PIU Social/GBV Focal Point and Contractor before worker mobilization and throughout construction. |
| <b>County and district health offices / local health facilities</b>         | Support communicable disease awareness, emergency response coordination, occupational/community health referrals, HIV/STI awareness and response to public health issues. | Limited capacity to absorb additional demand from construction workforce; limited emergency transport and health outreach resources in some corridor areas.              | Establish emergency response coordination with nearby health facilities; include health offices in HIV/STI and public health awareness; ensure Contractor maintains first aid, emergency transport and incident referral arrangements. | Contractor, Supervision Consultant and PIU before camp operation and throughout construction.     |

| Decentralized Actor / Institution                                            | Expected Role in ESMP Implementation                                                                                                                                                                     | Identified Capacity Gaps                                                                                                                                                       | Required Support / Strengthening Measure                                                                                                                                                                                                | Responsibility / Timing                                                          |
|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Liberia National Police / Traffic Police and road safety authorities</b>  | Support traffic control, enforcement of speed limits, management of diversions, accident response, and road safety awareness in settlements and school/market areas.                                     | Limited traffic management equipment and personnel for continuous deployment along multiple work fronts; limited advance information on contractor movement schedules.         | Provide traffic management plan to police/traffic authorities; coordinate deployment at high-risk points; support road safety campaigns; ensure Contractor provides signage, flaggers, barriers and reflective PPE.                     | Contractor and Supervision Consultant before diversions and during active works. |
| <b>Community-level GRCs and local leaders</b>                                | Receive and document grievances, support culturally appropriate dispute resolution, refer serious cases, monitor community concerns, and support communication between the project and affected persons. | Risk of weak documentation, elite capture, limited inclusion of women/youth/vulnerable persons, limited confidentiality for GBV/SEA/SH cases, and unclear escalation channels. | Train GRCs on grievance intake, logging, resolution timelines, referral pathways, confidentiality and escalation; ensure inclusion of women and vulnerable group representatives ; provide grievance registers and reporting templates. | PIU Social Team before civil works in each community and during implementation.  |
| <b>Community Liaison Officers and Contractor site-level safeguards staff</b> | Provide daily community interface, receive complaints, notify communities of works, support implementation of                                                                                            | Risk that complaints may remain at contractor level without PIU oversight; possible conflict of interest if the                                                                | Clarify that the Contractor may receive and document complaints but cannot                                                                                                                                                              | Contractor and PIU from mobilization through demobilization.                     |

| Decentralized Actor / Institution | Expected Role in ESMP Implementation            | Identified Capacity Gaps               | Required Support / Strengthening Measure                                                                                                | Responsibility / Timing |
|-----------------------------------|-------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|                                   | access, safety, labour and GBV/SEA/SH measures. | Contractor controls grievance closure. | unilaterally close project grievances; all grievances shall be entered into the project GRM and reviewed by the PIU/GRC as appropriate. |                         |

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 River Cess 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 ESMP obligations, RAP provisions, GRM 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 AfDB. This arrangement will ensure that local institutions are not treated only as consultees, but as active participants in ESMP implementation, community-level monitoring and safeguards accountability.

#### 7.6 IMPLICATIONS FOR ESMP IMPLEMENTATION

The effectiveness of ESMP 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 AfDB ISS, 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 ESMP and compliance with both national requirements and AfDB safeguard standards.

## 8.0 GRIEVANCE REDRESS MECHANISM

---

The Project will establish and implement a comprehensive Grievance Redress Mechanism (GRM) to ensure that all concerns, complaints, and feedback from affected communities and stakeholders are addressed in a timely, transparent, and effective manner. GRM 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 GRM 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 Contractor will establish and maintain a centralized Complaints Database, which will systematically record all grievances received. 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 the grievance.

A credible, independent, transparent, and culturally appropriate GRM will be implemented, ensuring that all stakeholders, including vulnerable and marginalized groups, can safely and confidently voice their concerns without fear of retaliation. The GRM will also serve as an important management tool to improve project performance, strengthen community relations, and prevent escalation of conflicts.

To operationalize the GRM, the Contractor will establish a Grievance Redress Committee (GRC) responsible for receiving, reviewing, and resolving grievances during project implementation.

### 8.1 GRIEVANCE RESOLUTION COMMITTEE (GRC)

A Grievance Resolution Committee (GRC) will be established at multiple 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;

- 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 GRM**

The effectiveness of the GRM 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 GRM functions, how to submit complaints, and what to expect during the resolution process.

- **Accessibility:**  
The GRM 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 GRM will actively encourage participation from all stakeholders, including vulnerable and marginalized groups.
- **Integration with Existing Systems:**  
The GRM 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**

A dedicated workers' grievance mechanism will be established to address workplace-related concerns. This mechanism will be separate but aligned with the overall GRM and will comply with national labor laws and international labor standards.

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).

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 (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 GRM GOVERNANCE, CONTRACTOR INTAKE ROLE, AND CONFIDENTIAL SEA/SH REFERRAL PATHWAY**

The project GRM 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. 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 GRM 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-centred referral pathway that protects privacy, safety, dignity and informed consent. 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 testimony. Non-identifying information may be recorded only for monitoring and reporting purposes.

The GRM 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 GRM budget of US\$125,250.00 over 48 months is included within the US\$173,750.00 consolidated SEP/GRM line and shall not be added again to the overall ESMP budget as indicated in Table 54.

*Table 54: GRM Governance, Intake, Escalation and Closure Responsibilities*

| GRM 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                          |

| GRM Function                          | Responsible Actor                                                               | Specific Role                                                                                                                                    | Key Control / Requirement                                                                                                      |
|---------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|                                       |                                                                                 |                                                                                                                                                  | 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 GRM 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 MGCSP where relevant | Receive or facilitate confidential referral of SEA/SH-related complaints through survivor-centred channels.                                      | SEA/SH complaints shall not be discussed in public GRC meetings and shall not be 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 GRM will follow a structured step-by-step process:

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);
- Land acquisition and compensation issues;
- Employment-related concerns;
- Perceived lack of transparency or accountability.

Understanding these sources will enable proactive mitigation and conflict prevention.

### **8.7 COMMUNITY EXPECTATIONS**

When grievances arise, community members typically expect:

- Acknowledgment of their concerns;
- Honest and transparent communication;

- Timely and fair resolution;
- Corrective action or compensation where applicable;
- Respectful engagement and, where necessary, an apology.

Meeting these expectations is critical to maintaining trust and social license to operate.

## **8.8 IMPLEMENTATION OF THE GRM**

To ensure effective implementation, the Project will:

- ◊ Build Awareness: Conduct outreach through meetings, workshops, and communication materials to ensure all stakeholders understand the GRM.
- ◊ Provide Accessible Communication Tools: Use posters, leaflets, radio announcements, and community meetings to disseminate information.
- ◊ Train Project Staff: Ensure all staff understand GRM 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 GRM performance and make adjustments as needed.

## **8.9 RESETTLEMENT, LIVELIHOOD RESTORATION AND SOCIAL PROTECTION**

This chapter 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 African Development Bank Integrated Safeguards System, particularly Operational Safeguard 5 (OS5) 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 in this chapter include:

- **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.

While this chapter 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 Resettlement Action Plan (RAP), which forms an integral companion document to this ESIA.

Overall, the objective of these measures is to ensure that affected persons are not worse off as a result of the project and, where possible, experience improved socio-economic conditions consistent with national policies and AfDB safeguard requirements.

#### 8.10 GRM Implementation Budget

To support the effective implementation of the project-level Grievance Redress Mechanism, a dedicated budget has been provided under the ESMP. 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.

*Table 55: Itemized Budget for Implementation of the Grievance Redress Mechanism (GRM)*

| No. | Budget Item                                       | Main Purpose / Items Covered                                                                                                                                                                          | Frequency / Duration       | Estimated Cost (USD) |
|-----|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------|
| 1   | GRM disclosure and sensitization workshops        | Community-level dissemination of the GRM; awareness sessions for PAPs, local communities, and GRC members on submission channels, timelines, escalation options, confidentiality, and non-retaliation | One-off                    | 10,000               |
| 2   | GRM 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, RAP/ESMP interface, SEA/SH referral pathways, and reporting   | Quarterly over 48 months   | 40,000               |
| 5   | GRM registers, forms, and documentation materials | GRM 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   | GRM disclosure through local radio                | Radio announcements and public information broadcasts to support awareness, accessibility, and corridor-wide disclosure of GRM 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               |
|     | <b>Total Estimated GRM Budget</b>                 |                                                                                                                                                                                                       | <b>48 months</b>           | <b>125,250</b>       |

**Note:** The above budget represents the estimated total cost of GRM 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 ESMP implementation budget and cross-referenced accordingly in the overall environmental and social budget summary.

## 9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

---

The detailed ESMP mitigation and monitoring matrices are provided in Appendix 3 and form part of the project's implementation and contractual requirements.

### 9.1 INTRODUCTION

The Environmental and Social Management Plan (ESMP) is designed to ensure that the environmental and social impacts and risks identified during the Environmental and Social Impact Assessment (ESIA) are effectively managed throughout the construction and operational phases of the Project. The ESMP 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 African Development Bank's (AfDB) Integrated Safeguards System (ISS) for environmental and social sustainability.

The primary objectives of the ESMP 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 inform the strategies outlined in this ESMP.

As the Project is expected to be financed by the Government of Liberia (GOL) and the AfDB, overall responsibility for implementing the ESMP 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 AfDB to ensure that Project implementation aligns with this ESMP and meets all agreed environmental and social management standards.

### 9.2 OBJECTIVES OF THE ESMP

The objectives of this ESMP are as follows:

- To outline standards and guidelines for compliance with environmental/social management;
- To communicate the aims and goals of the ESMP 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;
- 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 ESMP in order to prevent long-term environmental degradation.

To ensure consistency between the impact assessment and the ESMP, 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 ESMP measures shall be implemented through the Contractor's C-ESMP and sub-plans, the RAP, the GRM, the environmental and social monitoring plan, and the overall project implementation budget.

### 9.3 ESMP MINIMUM REQUIREMENTS MATRIX

This subsection consolidates the minimum ESMP 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: ESMP Minimum Requirements Compliance Matrix*

| Minimum ESMP requirement                                    | Where addressed                               | Implementation evidence required                                    | Clearance status/condition    |
|-------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------|-------------------------------|
| Project phase, activity, risk and impact                    | Chapter 6; Tables 47A–47C; Appendix 3         | Approved work method, site plan and risk register                   | Included                      |
| Mitigation hierarchy and specific management measure        | Sections 6.3–6.4; Table 47C; C–ESMP sub-plans | Method statement, inspection record and corrective-action log       | Included                      |
| Location and sensitive receptor                             | Sections 5 and 6; Appendix 3                  | GIS/site map, receptor register and photographic baseline           | Included                      |
| Measurable indicator and performance target                 | Tables 57A and 57B; Appendix 3                | Monitoring sheet, laboratory result, incident/GRM record            | Included                      |
| Monitoring method, equipment and frequency                  | Appendix 3; Section 9.8                       | Calibrated equipment, chain-of-custody forms and monitoring reports | Included                      |
| Implementation, supervision and regulatory responsibilities | Sections 7 and 9.4; Tables 53, 57A and 57B    | Staffing records, approved organogram and supervision reports       | Included                      |
| Implementation timing and schedule                          | Table 14; Chapter 3 implementation schedule   | C–ESMP programme linked to the works schedule                       | Included                      |
| Cost, funding source and contract/BOQ linkage               | Chapter 10; Table 59                          | Itemized C–ESMP cost schedule cross-referenced to priced BOQ items  | Mandatory before mobilization |

| Minimum ESMP requirement                                          | Where addressed                               | Implementation evidence required                                         | Clearance status/condition   |
|-------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------|------------------------------|
| Stakeholder engagement, GRM and SEA/SH referral                   | Chapters 8 and 12; SEP; standalone GRM        | Disclosure records, grievance register and confidential referral records | Included; no double counting |
| Incident notification, emergency response and corrective action   | Sections 9.5 and 9.8; Emergency Response Plan | Incident notices, investigation reports and closure evidence             | Included                     |
| Reporting, audit, adaptive management and completion verification | Sections 9.8–9.9; Chapter 10                  | Monthly/quarterly reports, annual audit and completion records           | Included                     |

Table 57A: Impact Management and Implementation Matrix

| ESMP 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 RAP 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; RAP completion audit conducted            | PIU E&S Team / PFMU           | AfDB / Independent Monitor / Supervision Consultant | Before displacement and before civil works in affected sections                                                                   | Cleared RAP budget: USD 5,047,158.69; RAP 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-ESMP; 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 RAP; 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           | AfDB / Independent Monitor / Supervision Consultant | Before clearance of affected farms or trees                                                                                       | RAP budget                                                                                                                                                                |
| I-04                             | [Source: I-03/R-03] Soil erosion, slope instability and sedimentation from earthworks                                 | Stage clearing; install drainage, silt traps, 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 closure before demobilization. | Included in the priced works BOQ and Contractor C-ESMP; cross-reference drainage, erosion, sediment-control, slope-                                                       |

| ESMP 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                                                                                                              |
|----------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  |                                                                                                            |                                                                                                                                                   |                                                                                                         |                               |                                                     |                                                                                                                                  | 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-ESMP; 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-ESMP; 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-ESMP; cross-reference equipment maintenance, barriers, notification and noise-monitoring items.              |
| I-08                             | [Source: I-01/R-01] Physical and economic displacement                                                     | Implement RAP; compensate structures, businesses, crops and affected assets;                                                                      | PAP compensation completed; business/livelihood assistance tracked;                                     | PIU E&S Team / PFMU           | AfDB / Independent Monitor / Supervision Consultant | Before displacement and before civil works in affected sections                                                                  | RAP budget                                                                                                                                                     |

| ESMP 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                                                                                                                        |
|----------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  |                                                                                                     | provide transitional and livelihood support; assist vulnerable PAPs                                                                                 | RAP 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                                                                       | RAP budget and Contractor BOQ/CESMP                                                                                                                                      |
| 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-ESMP 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 after         | PIU communicable-disease awareness allocation plus Contractor C-ESMP obligations                                                                                         |

| ESMP 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                                                                                               |                                                                                                                |                               |                                                  | significant workforce changes.                                                                                                     | included in the priced works BOQ; no duplicate charging.                                                                                                                                |
| 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 GRM allocation covers non-RAP 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                                                                              | ESMP/RAP budget, as applicable                                                                                                                                                          |

| ESMP 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-16                             | [Source: I-05/R-07] Solid, hazardous and camp waste generation                                              | Prepare waste management plan; segregate waste; provide bins and sanitary facilities; use approved disposal sites; manage hazardous waste, oils and used materials through licensed/approved channels | Waste records maintained; no open dumping/burning; hazardous waste stored safely; camp sanitation inspected | Contractor                    | Supervision Consultant / PIV / EPA               | Before camp operation and throughout construction; daily housekeeping, weekly inspection and monthly waste reconciliation. | Included in the priced works BOQ and Contractor Waste and 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 / PIV              | Supervision Consultant / PIV / 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.    |

Table 57B: Risk Management and Implementation Matrix

| ESMP 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, | Bunded storage, spill kits, trained handlers and prohibition | Stop source, contain and recover spill, notify PIV/EPA as | No uncontrolled spill; response initiated immediately; | Contractor HSE Manager | Supervision Consultant / PIV / EPA | Priced works BOQ and approved C-ESMP |

| ESMP Risk Action Code | Risk Event                                                        | Prevention / Control                                                                         | Preparedness / Corrective Action                                                                                   | Indicator / Trigger                                                               | Implementation                             | Oversight                                     | Funding Source                                |
|-----------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------|-----------------------------------------------|
|                       | workshop or water crossing                                        | of refueling near water-courses                                                              | required, investigate and close corrective action                                                                  | closure documented                                                                |                                            |                                               |                                               |
| 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   |
| RM-03                 | [Source: R-03] Uncontrolled erosion or sediment release           | Drainage sequencing, sediment traps, 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-ESMP          |
| 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 / MoG-CSP / AfDB, as applicable           | USD 120,000 GBV/SEA/SH Action Plan allocation |

| ESMP Risk Action Code | Risk Event                                                                                                                | Prevention / Control                                                            | Preparedness / Corrective Action                                                                          | Indicator / Trigger                                         | Implementation           | Oversight                                        | Funding Source                                                |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------|--------------------------------------------------|---------------------------------------------------------------|
| 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 PIV and relevant authorities, and obtain clearance before re-sumption | No unauthorized disturbance; chance-find records maintained | Contractor Site Manager  | PIV / Supervision Consultant / local authorities | Priced works BOQ and approved C-ESMP                          |
| RM-06                 | [Source: Section 6.4 - stakeholder engagement and information disclosure] Community grievance escalation or work stoppage | Accessible GRM, advance notice, community liaison and transparent communication | Register, investigate, agree corrective action and escalate unresolved cases                              | Grievances acknowledged and processed within GRM timeframes | PIV CLO / Contractor CLO | PIV E&S Team / GRC                               | USD 125,250 project-wide GRM allocation within SEP/GRM budget |

Contractor pricing and approval condition: every entry in Tables 57A and 57B identified as Contractor BOQ/C-ESMP shall be financed through the priced civil-works contract. Before mobilization, the Contractor shall submit an itemized C-ESMP 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 ESMP, SEP/GRM, GBV/BAP and cleared RAP allocations. Approval of the C-ESMP and its cost/BOQ linkage schedule is a condition precedent to commencement of the relevant works.

## 9.4 INSTITUTIONAL RESPONSIBILITIES

This section provides details on the overall accountability and responsibilities for the ESMP. Generally, the Contracting Entity is expected to appoint an HSE Manager to oversee the day-to-day environmental and social management of the site. However, the overall responsibility of implementing the ESMP on-site is with the Project Proponent (MPW). To ensure that the Project is compliant with local and international environmental laws and legislation, a team of Environmental and Social Safeguard Specialists should be assembled by the MPW to confirm that the Contracting Entity is compliant with the ESIA and ESMP. Further details on roles and responsibilities are expanded below.

### xvi. Ministry of Public Works (PIU/MPW)

As the Proponent and executor for the Project, the MPW, through its Infrastructure Implementation Unit (IIU) or the Programme Implementation Unit (PIU), will perform the following roles:

- Oversee that all contracting companies tendering for work in the Project-affected area receive a copy of the ESIA, Resettlement Action Plan (RAP), and any other relevant project documents and are assisted in understanding their responsibility to operate within the framework of the measures defined in these documents. When adjudicating tenders, the MPW should confirm that Contracting Entities have made appropriate allowance for management of environmental and social matters and develop their own CESMP (where necessary), which shall be approved.
- Oversee that on appointment, contracting companies shall sign the ESMP component of this ESIA so the ESMP will then become part of the contract and be legally binding on the Contracting Entity. Contracting companies will also receive the required training or be guided to understand their responsibility to operate within the framework of the measures defined in the Project Environmental and Social Safeguard Documents (ESIA & RAP), among others.

- Ensure that the responsibility for implementing and complying with the conditions of the ESMP forms part of the conditions of appointment of all Contracting Entities throughout the life of the project;
- Oversee that independent Environmental and Social Development Experts (supervision consultants) are appointed to audit the implementation of, and compliance with, the ESMP and monitoring plan on an annual basis; and the independent environmental audits, together with other relevant monitoring information, are made available to the public throughout the life of the project.
- Oversee that a formal senior management review of environmental and social management performance is undertaken quarterly for the first one-year, then monthly throughout the lifespan of the project. Senior management responsibility will include the review and approval of any proposed measures to improve environmental and social performance.
- Oversee that training and awareness creation are provided to all Contracting Entities in environmental and social management and the mitigation of impacts, to ensure they are aware of their responsibilities and are competent to carry out their work in an environmentally and socially responsible manner. The MPW should not tolerate transgressions of the provisions of the ESMP; and

Make available human and financial resources needed to conduct all environmental and social management, mitigation, and monitoring activities throughout the project phases.

#### xvii. **Ministry of Transport**

The MOT, in collaboration with the other line ministries and agencies, will serve as the lead road safety stakeholders on the Project. Their role will involve collaborating in the provision of pedestrian safety, temporary road closure and traffic diversion, and raising awareness on any potential road closures and traffic diversions during the construction phase. Similarly, they will also provide training and dissemination of road safety information to road users, especially drivers, as well as provide technical inputs into road design or construction, especially as relates to the installation of safety features. They will also collaborate with the Road Safety and Traffic Division of the LNP in responding to road accidents and providing measures for addressing such issues.

#### xviii. **Contracting Entity**

The Contracting Entity is required to:

- Be responsible for the overall implementation of the ESMP;

- Be conversant with the requirements of this ESMP and ensure that sub-contractors or third parties who carry out all or part of the Contracting Entity's obligation under the contract comply with the requirements of this ESMP;
- Prepare a site-specific Contractor Environmental and Social Management Plan (C-ESMP) and associated monitoring programme for review by the Supervision Consultant and PIU/MPW and for AfDB no-objection where required before mobilization or commencement of the relevant works. The C-ESMP shall explain how the Contractor will comply with the approved ESIA/ESMP, cleared RAP, SEP, LMP, standalone GRM, and applicable permit and contract conditions. It shall include site-specific mitigation measures, measurable targets, monitoring methods and frequencies, staffing, reporting arrangements, emergency procedures, method statements, and an itemized cost schedule cross-referenced to the priced BOQ and accepted bid. The Contractor shall not prepare or revise the cleared RAP/ARAP; any resettlement design change shall be screened and managed by PIU/MPW in consultation with AfDB before works proceed.
- Prepare and implement the C-ESMP in accordance with this ESMP. The C-ESMP shall be implemented subject to approval by the Consulting Engineer.
- Carry out the works in accordance with the CESMP and conduct daily and weekly safeguard inspections of the works to confirm compliance and report the results of these inspections to the Consulting Engineer;
- Proactively update the C-ESMP as construction methodology or other features change;
- Advise the Consulting Engineer of any changes to works or methods that are outside the scope of the ESMP for updating.
- Be responsible for the procurement of relevant environmental permits that are required for the construction and operation of the Project;
- Supply method statements for activities requiring special attention as specified and/or requested by the Project Developer for the duration of the Contract;
- Bear the costs of damages/compensation resulting from non-compliance with the ESMP;
- Be responsible for informing MPW or the Supervision Consultant of foreseeable activities that will require their input on time;
- Appoint a suitably experienced and qualified person to fulfil the role of the HSE Manager as detailed in this ESMP;

- Appoint suitably experienced and qualified persons to fulfil the roles of Environmental Officer and Social Safeguards Officer to support the HSE and oversee the day-to-day implementation of the environmental and social dimensions of this ESMP respectively; Institute strict codes of conduct which should include specific provisions against SEA, SH and GBV for the Contracting Entity and the Contractor's managers and direct and subcontract employees and adequately follow the CESMP for the Project
- Conduct activities in a manner that minimizes or avoids impacts to the environment and affects residents and the public in general.

#### xix. **Consulting Engineer (Supervision Consultant)**

The Consulting Engineer's team shall include at least one qualified and experienced E&S professional who has been involved in updating the ESIA and the development of the CESMP to oversee the implementation of the ESMP. The Consulting Engineer or Supervision Consultant is responsible for:

- Enforcing the environmental, social, health and safety specifications of the project;
- Monitoring compliance with the requirements of the specification;
- Documenting, in conjunction with the Contracting Entity, the state of the site prior to construction activities commencing. This documentation may be in the form of photographs, video recordings, or other appropriate formats.
- Maintaining a high standard of site supervision and operation to reduce risk of damage to environmental, social, health and safety components;
- Daily monitoring of the Contracting Entity's work for compliance with the CESMP and ESMP as per the measures detailed and providing safeguard monitoring results in their monthly reporting to the MPW. As part of their CESMP monitoring responsibilities, the Supervision Engineer will ensure that a suitably qualified and experienced safeguard specialist is resourced to provide at least monthly site inspections to MPW and be available for support at other times to respond to incidents, non-compliances, review of C-ESMP, update of the ESMP and other tasks;
- Managing the review process of the CESMP for approval. The Supervision Engineer would confirm that all current safeguard instruments have been reviewed internally as well as by MPW, and final approval from AfDB has been secured before disclosure.
- Updating the C-ESMP as necessary to reflect changes in the work designs;

- Working with MPW to provide meaningful input and direction into community consultations on the updated versions of the ESMP;
- Enforce that the Contracting Entity institutes a strict code of conduct at the workers' camps and adequately follows the safeguard documents (ESIA, CESMP) for the Project as highlighted in the Contract document and the EPML 2003;
- Managing instances of non-compliance by the Contracting Entity and reporting all instances to MPW; and
- Monitoring recurring instances of non-compliance by the Contracting Entity to MPW/AfDB for action.

#### xx. Health, Safety and Environment (HSE) Manager

The Contracting Entity will procure the appointment of an HSE Manager for the duration of the Project, and the HSE Manager will be responsible for the overall implementation of the ESMP in accordance with the requirements of the contract. There should be an approved HSE Manager on the site at all times, and it is proposed that the HSE Manager be made part of the construction project management team. The HSE Manager will communicate site-specific environmental issues to the Contracting Entity and personnel involved in the Project before construction commences. The CESMP will be kept on-site and made accessible to all personnel.

The HSE Manager is to understand the environmental, social, health, and safety responsibilities as stated in the ESMP and is to ensure that the project is undertaken in an environmentally and socially considerate manner, as prescribed by the ESMP. The HSE Manager will be fully versed in the contents of the ESMP and CESMP and is to ensure that the activities of the contracting team remain in compliance with the code of conduct and site-specific protection measures identified by the ESMP and CESMP.

The HSE Manager will be responsible for all monitoring and reporting activities, such as noise, water, and dust/air quality monitoring. He is to ensure that all monitoring records are available for review by the competent authority when needed. The HSE Manager will coordinate all specialists that are required on site, if and when required.

Specific roles/activities to be performed by the HSE Manager are outlined below:

- Enforce site protection measures on-site.
- Ensure that all the environmental authorizations and permits required in terms of the applicable legislation have been obtained;
- Monitor and verify compliance with the ESMP and contract and keep records of compliance/non-compliance, and make them available to the external auditor;

- Monitoring and verifying that environmental and social impacts are kept to a minimum;
- Reviewing and approving construction method statements with input from the Contracting Entity, where needed, so that the environmental specifications contained within the ESMP are adhered to;
- Keeping accurate and detailed records of all activities on-site;
- Monitoring the undertaking by the Contracting Entity of environmental, social, health and safety awareness training for all new personnel on-site;
- Assess the Contracting Entity's environmental, social, health and safety performance from which a brief monthly statement of environmental, social, health and safety performance is drawn up for record purposes;
- Enforce that third parties who carry out all or part of the Contracting Entity's obligations under the Contract are conversant with the requirements of the ESMP and the site protection measures;
- Enforce that the Contracting Entity complies with every applicable legislation;
- Maintain a register of complaints and queries by members of the public at the site office and the actions taken in response to these complaints;
- Recommend that the Contracting Entity suspend any or all works on-site if the third parties who carry out all or part of the Contracting Entity's obligations under the Contract fail to comply with the said specifications.

#### xxi. **Health and Safety Officer (HSE Officer)**

The HSE officer will be a designated person appointed by the Contracting Entity to work and report to the HSE Manager on the day-to-day implementation of the ESMP at construction sites. The HSE Officer(s) must possess effective communication, organization, analytical, public and leadership skills, and will have the following responsibilities:

- Monitor incidents of injury, illness, and other situations within a construction area;
- Write reports detailing daily, weekly, and monthly health and safety activities and incidents;
- Work with the HSE Manager to design strategies to reduce incidents of illness, environmental accidents, and other issues that may affect Project workers and general public safety;
- Investigate environmental incidents and other public safety concerns within the particular area where construction will be ongoing;

- Assist the HSE Manager in designing training programs to provide safety awareness education.
- Offer presentations about current safety hazards based on the Project to educate Project workers on avoiding health, safety, and environmental hazards; and
- Assess risks associated with tools and equipment, jobsites, and work environments.

#### xxii. External /Third Party Consultant

The development of a CESMP for a project is an important and necessary task that is aimed at assigning responsibilities and mitigation options to a variety of activities. However, it can be an ineffective tool in the absence of auditing or monitoring activities. Auditing or monitoring activities involve the structured observation, measurement, and evaluation of environmental data over a period of time.

As such, an external environmental and social consultancy firm will be appointed by the Contracting Entity. The External Consultant will implement an environmental and social monitoring program that will include the following, as a minimum:

- Comprehensive environmental and social monitoring to be undertaken every three (3) months during the construction phase, to verify compliance with the project safeguard documents and applicable environmental legislation. The report should contain recommendations on environmental and social management activities that need to be implemented. The external consultant should report concurrently to the Contracting Entity, MPW and/or the Supervision Consultant.
- A comprehensive environmental and social monitoring closure report to be undertaken at the completion of the construction phase, to verify compliance with the various environmental and social safeguard documents for the project and applicable environmental legislation. The monitoring report will contain recommendations on environmental and social management activities that need to be implemented within the operation and maintenance phases. The External Consultancy firm will report concurrently to the Contracting Entity, MPW and/or the Supervision Consultant.

#### xxiii. **Community Liaison Officer (CLO)**

For this document, the term 'CLO' refers to the representative on the Implementing Entity's team tasked with assisting in community communication and notification procedures. The CLO will be based on-site to deal with and respond to any public concerns.

The CRO will be part of the Contracting Entity's team and will be responsible for liaising with the Project communities because the Contracting Entity must maintain communication with local communities and other local stakeholders during construction. The CLO will also oversee the Project's GRM in documenting complaints, enquiries, recommendations, or concerns that are received by any member of the public.

The CLO will have procedures in place to notify I&APs of any potential impacts of construction activities on the surrounding area, e.g., notifying I&APs of activities that may generate excessive noise.

The CLO will also coordinate and liaise with the Environmental and Social Safeguards Team or any social specialist sub-consultants that are required on site and assist with implementing the social aspects of the ESIA and ESMP during the construction, rehabilitation, and operational phases of the project.

#### xxiv. Contracting Entity Project Manager

The person or representative on the Contracting Entity's team responsible for coordinating and integrating activities across multiple functional lines. The Project Manager will coordinate all activities, including ensuring the implementation of the CESMP.

The primary role of the Project Manager is to ensure that the Contractor and Contracting Authority's staff comply with the environmental specifications in the ESMP. The PM shall further:

- Oversee the general compliance of the Contractor with the ESMP and other pertinent site specifications; and
- Liaise with the Contractor and HSE Manager on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.

In addition, the PM shall:

- Designate or appoint a suitably qualified Environmental Manager (EM) who will manage all environmental aspects on behalf of the PM and the Project Proponent;
- Review and approve Method Statements produced by the Contractor in connection with the ESMP;
- Assume overall responsibility for the effective implementation and administration of the ESMP;
- Be familiar with the contents of the ESMP, and his/her role and responsibilities as defined therein;
- Ensure that the ESMP is included in the Contractor's contract;

- Communicate to the Contractor, verbally and in writing, the advice of the HSE Manager and the contents of the HSE reports;
- In conjunction with the Construction Supervisor, undertake regular inspections of the Contractor's site as well as the installation works to check for compliance with the ESMP in terms of the specifications outlined therein. Inspections shall take place at least once a week and copies of the monitoring checklist shall be contained in the file;
- Review and approve drawings produced by the Contractor or professional team in connection with, for example, the construction site layout, access/haul roads, etc.;
- Issue site instructions giving effect to the HSE requirements where necessary;
- Keep a register of all complaints and incidents (spills, injuries, legal transgressions, etc.) and other documentation related to the ESMP;
- Report to the HSE Manager any problems (or complaints) which cannot first be resolved in cooperation with the Contractor(s);
- Implement recommendations for possible monitoring.
- Implement Temporary Work Stoppages as advised by the HSE Manager, where serious environmental infringements and non-compliances have occurred;
- Facilitate proactive communication between all role-players in the interests of effective environmental management; and
- Ensure that construction staff is trained in accordance with the requirements of the ESMP.

## xxv. The EPA

As the lead environmental regulator in Liberia, the EPA will decide on project screening, guide the review of ESIA studies and grant environmental approval through the issuance of a permit for the project to commence.

The EPA will also monitor the implementation phase of the project to ensure compliance with approval conditions, mitigation measures and other environmental commitments and quality standards. The EPA will also provide technical review of project environmental monitoring reports as well as ensuring the following:

- Exercise general supervision and co-ordination over all matters relating to the environment.
- Be the principal instrument of Government in the implementation of all policies relating to the environment; and
- Ensure that all mitigation measures proposed are implemented.

The Project is expected to be financed by the AfDB and by the Government of Liberia through the National Road Fund (NRF) for the Project. AfDB will provide monitoring of the implementation of the project through its own Environmental and Social Experts.

#### **9.5 C-ESMP REQUIREMENTS**

In Addition to the above mitigation measures for different impacts from the project activities, the Contracting Entity or the Contractor will prepare a Contractor Environment and Social Management Plan (CESMP) 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 requirements and the AfDB's ISS. Below, an indicative guideline is stated for the preparation of a CESMP 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 environmental, social, health, and safety (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 ESHS risks.

The key management strategy and implementation plans that will comprise the CESMP 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
- 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-Centred Referral Plan
- Security Management Plan
- Chance Finds Procedure
- Site Restoration, Demobilization and Closure Plan
- C-ESMP 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.

The following Sections present the specific management plans as part of the C-ESMP foreseen for construction and operations, based on the outcomes of the impact assessment.

#### 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
- 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**

The Emergency Response Plan (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 the 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

- Preliminary description of training activities and the arrangement for training response teams and for testing emergency systems and procedures.

Finally, the Plan 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;
- 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
- 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 scraps, 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
- 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 labour 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.

The contractor will ensure a contractual commitment on the part of Labor providers to comply with all relevant aspects of Liberian national labour 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 labour standards requirements placed by project financiers on the Project Proposer and thereby designate a manager who is responsible for ensuring labour and health and safety legislation is complied with, both in the direct and indirectly-employed workforce (namely, subcontracted labour);
- 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 labour);
- 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 payslips for direct and sub-contracted workers, indicating payment of wages and social security contributions.

The Labour Management Plan 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 behaviour, 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;
- Respect at the workplace, including respect for other Project workers as well as the local community members; ☐ Protection of Project property; ☐ Professionalism:
  - Working hours,
  - Personal appearance,
  - Leave policy,
  - Absenteeism and tardiness,
  - Conflict of Interest,
  - Pronouncement on giving and receiving gifts,
  - Confidentiality, and - Communication.
- 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

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 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 ESMP 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:

- 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 ESMP. 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.                                                                                                |

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 ESMP 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 ESMP 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 ESMP.

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.
- 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 Environmental and Social 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 Consulting Engineer (Supervision Consultant) simultaneously with such filing.

#### **9.6 CHANCE FINDS PROCEDURE**

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 Chance Finds Procedure (CFP) shall be implemented throughout all phases of project construction to ensure that any such discoveries are properly managed, protected, and reported in accordance with national regulations and international best practices.

### 1. Objective

The objective of the Chance Finds Procedure 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 environmental and social 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.
- Project Implementation Unit (PIU): 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:

##### Step 1: Work (Immediate Suspension of Activities)

- All construction activities in the immediate vicinity (minimum 20–50 meters radius) 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 photographs, 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

#### Step 7: Resumption of Work

- Construction activities shall only resume upon receiving written clearance from the relevant authority.

#### 5. Training and Awareness

- 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 works
- Legal penalties under national law

### 9.7 LEGAL AND POLICY FRAMEWORK

Implementation of the ESMP shall be undertaken in accordance with the applicable national legal and institutional framework of Liberia, the African Development Bank's safeguard requirements, and relevant international good practice. In particular, the ESMP shall be implemented in line with:

1. The **Environmental Protection and Management Law (EPML) 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. The **EPA ESIA Procedural Guidelines (2022)**, which set out requirements for screening, scoping, impact assessment, public participation, review, decision-making, and follow-up, and define the required contents and format of ESIA reports for environmental permitting.
3. The **EPA Act** and other relevant sector laws and regulations applicable to roads and associated facilities, including laws relating to land, water, forestry, public health, labour, cultural heritage, occupational health and safety, and gender-based violence.
4. The **AfDB Integrated Safeguards System (Updated ISS, 2023)**, including the Environmental and Social Policy and the applicable Operational Safeguards, which establish the Bank's requirements for assessment and management of environmental and social risks and impacts in Bank-financed operations.
5. Relevant **international standards and Good International Industry Practice (GIIP)**, including the IFC Performance Standards on Environmental and Social Sustainability and the World Bank Group Environmental, Health and Safety Guidelines, where applicable to project activities and mitigation measures.

#### **9.8 ESMP MONITORING AND REPORTING**

Implementation of the ESMP shall be supported by a structured monitoring and reporting system to ensure that mitigation measures are applied effectively, emerging risks are identified on time, and corrective actions are implemented where required. Monitoring shall cover environmental, social, health, safety, resettlement, livelihood restoration, and community grievance indicators throughout the pre-construction, construction, and defects-liability periods. The Contractor shall undertake routine site-level monitoring and reporting through the CESMP, while the Supervision Consultant shall verify compliance and submit periodic safeguard monitoring reports to the PIU. The PIU shall consolidate these reports and prepare monthly, quarterly, semi-annual, and annual environmental and social performance reports for management, the EPA, and the AfDB, as required. Monitoring shall include, at a minimum, compliance with mitigation measures, status of corrective actions, implementation of RAP

commitments, functioning of the GRM, occupational health and safety performance, stakeholder engagement, and any incidents or non-compliances requiring follow-up.

#### 9.9 E&S PERFORMANCE AND RAP COMPLETION AUDITS

Annual Environmental and Social Performance Audits shall be undertaken during project implementation to assess overall compliance with the ESMP, RAP, permit conditions, contractual obligations, and applicable safeguard standards. These audits shall review the effectiveness of mitigation measures, implementation of corrective actions, institutional performance, contractor compliance, GRM functionality, stakeholder engagement, and occupational and community health and safety management. In addition, a RAP Implementation Completion Audit shall be undertaken following completion of compensation, livelihood restoration, and related resettlement activities to verify whether all entitlements have been delivered in accordance with the approved RAP and whether affected persons have been restored, or are on a demonstrable path toward restoration, in line with project commitments. Audit findings shall be documented and used to guide any required remedial actions. The cost of these audits is included within the broader RAP and PIU ESMP implementation allocations presented in the ESMP budget summary below.

## 10.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

---

### 10.1 ESMP BUDGET AND FINANCING

The implementation of the Environmental and Social Management Plan (ESMP) 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 ESMP 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 ESMP include, but are not limited to: overall ESMP coordination and management; implementation of the Stakeholder Engagement Plan (SEP); Gender-Based Violence (GBV) prevention and response measures; establishment and operation of the Grievance Redress Mechanism (GRM); 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 Resettlement Action Plan (RAP), including compensation payments, acquisition of necessary permits and licenses, and the implementation of ESMP, GBV, BAP, and GRM 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 RAP and PIU-managed ESMP/SEP/GRM/GBV/BAP allocations. Contractor site-level C-ESMP 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/RAP total. Before mobilization, the Contractor shall submit an itemized C-ESMP 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/RAP total excludes the USD

100,000 RAP monitoring provision already included in the cleared RAP budget, thereby preventing double counting across instruments.

*Table 59: Detailed ESMP Implementation Budget*

| No.         | Activity                                                                                                                                                                                                                                                                                                                                                                               | Timeframe                                                                                               | Cost \$ (USD) | Responsibility / Source of Funds                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------|
| <b>ESMP</b> |                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                         |               |                                                                 |
| 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 ESMP/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 ESMP 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           | RAP monitoring (included in cleared RAP Budget Item B.2; no additional ESMP cost)                                                                                                                                                                                                                                                                                                      | As required and when required after RAP compensation                                                    | 0.00          | PIU/MPW/PFMU; included in cleared RAP Budget Item B.2           |
| 5           | Implementation of ROW clearance                                                                                                                                                                                                                                                                                                                                                        | After RAP compensation                                                                                  | 35,000.00     | PIU/MPW; project implementation allocation                      |

| No.                                                                                             | Activity                                                                                                                                                                                 | Timeframe                                                                                                                                                                                            | Cost \$ (USD)                                                                                      | Responsibility / Source of Funds                                                             |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| ESMP                                                                                            |                                                                                                                                                                                          |                                                                                                                                                                                                      |                                                                                                    |                                                                                              |
| 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 USD 12,500.00 per year for four years.                                                                           | Annually throughout the four-year Project implementation period; each report shall be submitted within ninety (90) days after the end of the reporting year or by another date agreed with the Bank. | 50,000.00                                                                                          | PIU/MPW through an independent, qualified and EPA-certified evaluator/auditor; project funds |
| 7A                                                                                              | RAP Implementation Completion Audit: one-time independent audit after completion of compensation, livelihood-restoration and related resettlement activities and before project closure. | After completion of RAP implementation and before project closure                                                                                                                                    | 0.00 (included within the cleared USD 100,000 RAP monitoring allocation under RAP Budget Item B.2) | PIU/MPW/PFMU through an independent qualified auditor; cleared RAP 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 GRM                                                                                                                                                    | Throughout Project Implementation                                                                                                                                                                    | 173,750.00                                                                                         | PIU/MPW; consolidated SEP and project-wide GRM allocation                                    |
| 10                                                                                              | BAP                                                                                                                                                                                      | Quarterly throughout Project Implementation                                                                                                                                                          | 210,375.00                                                                                         | PIU/MPW/independent biodiversity specialist; BAP allocation                                  |
| 11                                                                                              | RAP                                                                                                                                                                                      | Prior to the start of Construction                                                                                                                                                                   | 5,047,158.69                                                                                       | Bank/MPW/MFDP/Government of Liberia, as applicable; cleared RAP budget                       |
| Total quantified PIU/RAP safeguards allocation (excluding contractor BOQ-embedded C-ESMP costs) |                                                                                                                                                                                          |                                                                                                                                                                                                      | 6,251,533.69                                                                                       | Bank/MPW/MFDP                                                                                |

Budget control note: the USD 6,251,533.69 total is the quantified PIU/RAP safeguards allocation. It shall not be interpreted as excluding or waiving the Contractor's contractual E&S obligations. C-ESMP 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 ESMP Budget*

| Summary ESMP Budget                                   |                                                      |                                                                       |
|-------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------|
| No                                                    | Instruments                                          | Total (USD)                                                           |
| 1                                                     | ESMP Implementation                                  | 700,250.00                                                            |
| 2                                                     | Consolidated SEP and Project-wide GRM Implementation | 173,750.00                                                            |
| 3                                                     | GBV Implementation                                   | 120,000.00                                                            |
| 4                                                     | BAP Implementation                                   | 210,375.00                                                            |
| 5                                                     | Contractor C-ESMP and Site-Level Mitigation Measures | Included in priced civil-works BOQ/accepted bid; not added separately |
| 6                                                     | RAP Implementation                                   | 5,047,158.69                                                          |
| <i>Total quantified PIU/RAP safeguards allocation</i> |                                                      | <i>6,251,533.69</i>                                                   |

The quantified PIU/RAP 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 RAP and PIU-managed ESMP/SEP/GRM/GBV/BAP allocations. Contractor site-level C-ESMP 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/RAP allocation plus the verified C-ESMP amounts embedded in the civil-works contract.

## 11.0 RAP/ARAP PLANNING AND IMPLEMENTATION FRAMEWORK

---

The applicable national and AfDB OS5 legal and policy requirements have been consolidated in Section 2.8. This chapter retains the project-specific RAP/ARAP principles, eligibility, entitlements, livelihood restoration, implementation, grievance and monitoring provisions.

### 11.1 PRINCIPLES AND OBJECTIVES OF THE RAP/ARAP

The RAP/ARAP for the Buchanan–Cestos Junction Road is guided by the following principles:

1. **Avoidance and minimization of displacement** through alignment/design optimization, re-use of the existing corridor and careful siting of ancillary facilities.
2. **Improvement or restoration of livelihoods and living standards** of PAPs to at least pre-project levels, with a development orientation where feasible.
3. **Equity and fairness** – all PAPs will be treated in a fair, transparent and consistent manner; compensation will be at full replacement cost without depreciation.
4. **Inclusive participation and informed consent** – PAPs and host communities participate in planning, decision-making and implementation, using culturally appropriate methods and languages.
5. **Protection of vulnerable groups** – women, children, the elderly, persons with disabilities and other vulnerable groups receive additional support and protection.
6. **Security of tenure at resettlement sites** – replacement housing and land will be provided with secure tenure arrangements in line with the Land Rights Act.
7. **Grievance redress and accountability** – accessible, gender-sensitive GRM for all resettlement-related complaints, integrated with the project-wide GRM.
8. **Compliance with national law and AfDB OS5** – where standards differ, the higher (more protective) standard is applied.

The specific objectives of the RAP/ARAP are to:

- Identify and census all PAPs and affected assets (land, structures, crops, businesses, graves and community resources).
- Establish clear eligibility criteria and cut-off dates.
- Define compensation strategies and rates for each type of loss.
- Design and implement livelihood restoration programmes, with a focus on vulnerable PAPs.
- Provide resettlement assistance, including transitional housing, transport and support services.
- Establish arrangements for implementation, financing, monitoring and evaluation of resettlement and livelihood restoration.

### 11.2 SUMMARY OF SOCIO-ECONOMIC SURVEY OF PAPs

The RAP/ARAP builds on the Socio-Economic Baseline Survey (SEBS) carried out across 44 communities along the Buchanan–Cestos corridor in January 2025, complemented by additional surveys targeted at PAP households within the RoW.

## Survey design and sample

- 120 households surveyed along the corridor, yielding 894 individuals.
- Household survey using Kobo-based questionnaires; complemented by key informant interviews (KIIs), focus group discussions (FGDs), and observation.
- The survey captured demography, education, livelihoods, access to services, housing conditions, health, and perceptions of the project.

Key socio-economic characteristics of corridor households (broadly reflective of PAPs) include:

- **Household structure and gender**
  - Average household size: 7.5 persons (approx. 8 persons in cities and 6 persons in towns).
  - Female-headed households: 53%; male-headed: 47%.
  - Women form around 61% of the population in surveyed households, indicating a strongly feminized population structure.
- **Ethnicity and social organization**
  - Bassa are the dominant ethnic group along the corridor, with some mixed ethnicity in urban centres such as Buchanan, Yarpah Town and Cestos Junction.
  - Strong social capital through community organizations, church groups, savings and loans groups, and traditional labour “kuu” groups.
- **Livelihoods and income**
  - Main livelihoods: subsistence and small-scale agriculture, fishing, small trade, petty commerce, charcoal production, and services.
  - Many households combine farming with petty trade or seasonal work; income levels are generally low and vulnerable to seasonality and road conditions.
- **Education and skills**
  - 100% of households reported that at least one child is in school; an average of about three students per household.
  - Education level of household heads: 36.7% junior high, 30% senior high, 17.5% elementary; less than 1% have vocational training.
  - Skills include carpentry, masonry, welding, bamboo construction, food processing, soap-making, baking and small enterprise management – offering opportunities for targeted livelihood restoration.
- **Access to services**
  - Many towns lack nearby health facilities; access is particularly difficult during the rainy season due to poor road conditions.

- Water sources include hand pumps, wells and creeks, with hand pumps being the main source in cities and many towns.

*Table 61: Socio-Economic Profile of Corridor Households (Indicative for PAPs)*

| Indicator                      | Value / Description                                                                   |
|--------------------------------|---------------------------------------------------------------------------------------|
| Total households surveyed      | 120 HHs                                                                               |
| Total individuals              | 894 persons                                                                           |
| Average household size         | 7.5 persons (≈8 in cities, 6 in towns)                                                |
| Female-headed households       | 53% of HHs                                                                            |
| Dominant ethnic group          | Bassa                                                                                 |
| Main livelihood activities     | Subsistence farming, cash crops, fishing, petty trade, small services                 |
| Education of household heads   | 36.7% junior high; 30% senior high; 17.5% elementary                                  |
| Main sources of drinking water | Hand pumps, wells, creeks                                                             |
| Access to health facilities    | Limited in many towns; better in Buchanan, Yarpah Town, Gbediah Town, Cestos Junction |

The RAP/ARAP uses these data, together with the PAP census, to tailor entitlements and livelihood support measures to the actual needs and vulnerabilities of affected households.

### 11.3 ELIGIBILITY AND ENTITLEMENTS

#### Eligibility

Eligibility is determined by:

- Inclusion in the PAP census and asset inventory conducted along the RoW and at ancillary sites, and/or
- Evidence of legitimate interest in the affected asset (formal title, customary rights, tenancy agreements, long-term occupation), and
- Presence in the project area prior to the publicly announced **cut-off date** (date of completion of the PAP census).

The following categories of PAPs are recognized:

*Table 62: Eligibility Categories*

| Category | Description                                                                                                                                  |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------|
| A        | PAPs with formal legal rights to land (freehold, leasehold or registered title).                                                             |
| B        | PAPs with customary or traditional rights recognized under the Land Rights Act (customary land holders, communal land users).                |
| C        | PAPs without recognizable legal rights but with legitimate claims to land or structures (long-term occupants, those awaiting formalization). |
| D        | Tenants (residential or business), including sub-tenants, with or without written agreements.                                                |
| E        | Business owners and operators (formal and informal), including mobile and seasonal vendors.                                                  |
| F        | Users of community resources (e.g. communal land, markets, fishing spots, sand mining sites).                                                |

| Category | Description                                                                                                                                                               |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| G        | Vulnerable PAPs in any of the above categories (e.g. female-headed households, widows, the elderly, persons with disabilities, orphans, chronically ill, extremely poor). |

## Entitlement framework

The entitlement framework is designed to ensure that:

- All affected assets are compensated at **full replacement cost**, including transaction costs.
- Loss of income and livelihood is offset through transitional allowances and livelihood restoration support.
- Tenants and informal occupants receive assistance even if they are not compensated for the land.
- Vulnerable households receive additional social protection measures (top-up assistance, priority access to livelihood programmes, tailored support).

A full entitlement matrix is contained in the RAP/ARAP. A summary is presented in Table 63.

*Table 63: Summary Entitlement Matrix*

| Type of loss/impact                                                     | Entitled persons      | Main entitlements                                                                                                                                                                                                                     | Key implementation notes                                                                                                                                                          |
|-------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Permanent land acquisition within RoW</b>                            | Categories A, B, C    | Cash compensation at full replacement cost for land, or land-for-land of equal or better productive value where feasible; compensation for any improvements; registration/transaction costs covered.                                  | Where customary land is acquired, compensation is shared in a transparent manner between the community and individual land users, with oversight from the Liberia Land Authority. |
| <b>Loss of residential structure (full or partial)</b>                  | Categories A, B, C, D | Cash compensation at replacement cost for structures (materials, labour, transport); relocation assistance (transport; moving allowance); transitional housing support; assistance with securing tenure at relocation site.           | No deduction for depreciation; salvaged materials remain the property of PAP. Tenants receive assistance for securing alternative housing and transport.                          |
| <b>Loss of commercial structure and/or business premises</b>            | Categories A–E        | Compensation for affected structure at replacement cost; disturbance allowance; business income restoration allowance (for period of disruption); support to re-establish at new site (permits, basic infrastructure where possible). | Special arrangements for roadside kiosks and mobile vendors, including the provision of designated vending areas where feasible.                                                  |
| <b>Temporary loss of access to land or business during construction</b> | Categories A–F        | Compensation for temporary loss of income (based on average earnings); restoration of access; reinstatement of land to pre-project condition or better.                                                                               | Contractor to coordinate with RAP team to avoid unnecessary disruptions and to implement a Community Access Plan.                                                                 |

| Type of loss/impact                                                       | Entitled persons                                  | Main entitlements                                                                                                                                                         | Key implementation notes                                                                                  |
|---------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Loss of crops and trees                                                   | Land users (including tenants and informal users) | Cash compensation for crops and trees at market value or yield-based valuation; assistance in obtaining replacement seedlings and inputs; agricultural extension support. | Cut-off date announced; compensation paid prior to clearance.                                             |
| Loss of graves/cemetery                                                   | Affected families and customary authorities       | Costs of exhumation, reburial and ceremonies at culturally acceptable sites; psychosocial support if required.                                                            | All activities are carried out in close consultation with families and traditional and religious leaders. |
| Loss of community assets (schools, markets, religious and cultural sites) | Community and relevant authorities                | Provision of replacement facilities of equal or better standard at appropriate locations; support for transitional arrangements; assistance with replacement equipment.   | Implemented in consultation with communities and relevant ministries.                                     |
| Vulnerability-related impacts                                             | Category G (vulnerable PAPs)                      | Top-up cash assistance; priority in employment and livelihood programmes; additional support for accessing services and documentation; social work support.               | A Vulnerability Support Plan is part of the RAP.                                                          |
| Transaction costs                                                         | All PAPs are entitled to compensation             | Coverage of registration fees, stamp duties and other costs related to replacement assets.                                                                                | Paid in addition to compensation.                                                                         |

#### 11.4 LIVELIHOOD RESTORATION AND DEVELOPMENT MEASURES

Given the high number of affected businesses, farms and vulnerable persons, livelihood restoration is a central element of the RAP/ARAP. Measures are tailored to the main livelihood groups and build on existing skills and opportunities identified in the socio-economic baseline.

Key measures include:

- **Agricultural support** – provision of improved seeds/seedlings, tools, extension services, and training in climate-smart agriculture; support to restore and, where possible, improve productivity on replacement land.
- **Micro and small enterprise support** – business development training, facilitation of access to micro-credit or savings groups, start-up kits for petty traders and small service providers.
- **Skills development and employment** – targeted vocational training (carpentry, masonry, mechanics, catering, etc.), linked to project employment and wider labour market opportunities; priority hiring of eligible PAPs for construction jobs.
- **Support to women and youth** – tailored capacity building in entrepreneurship, food processing, soap-making, hairdressing, catering, and financial literacy; facilitation of participation in savings and loans groups and cooperatives.
- **Targeted support for vulnerable PAPs** – top-up grants, home visits by social workers, linkages with Government social protection programmes and NGOs.

- **Community development initiatives** – support for community-led projects (e.g. market improvements, storage facilities, small irrigation schemes) in highly affected communities.

*Table 64: Example Livelihood Restoration Measures by PAP Group*

| PAP group / main livelihood                                            | Key livelihood risks                                                   | Proposed measures                                                                                                                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Smallholder farmers &amp; tree-crop producers</b>                   | Loss of farmland; loss of tree crops; temporary disruption to access   | Replacement land; compensation for crops and trees; provision of improved planting materials; agricultural extension support; farmer field schools.                               |
| <b>Petty traders &amp; market vendors</b>                              | Loss of stall location; reduced customer access during works           | Priority allocation of trading spaces in redesigned roadside markets; business continuity grants; training in financial management and merchandising.                             |
| <b>Roadside service providers (mechanics, food stalls, etc.)</b>       | Loss of business premises; disruption from road works                  | Replacement premises in designated service areas; transitional income support; linkages with microfinance; marketing support.                                                     |
| <b>Tenants and lodgers</b>                                             | Loss of rental housing/business space; increased rent                  | Rental assistance for a defined transition period; facilitation of new leases; linkage with landlords to ensure fair tenancy terms.                                               |
| <b>Vulnerable households (elderly, female-headed, PWDs, very poor)</b> | High sensitivity to income loss; food insecurity, and limited mobility | Cash top-up; priority access to livelihood programmes; home-based livelihood options; linkages to social welfare and health services; accompaniment in administrative procedures. |

## 11.5 IMPLEMENTATION ARRANGEMENTS, SCHEDULE AND BUDGET

### i. Institutional arrangements

Implementation of the RAP will involve the following key actors:

1. **Ministry of Public Works (MPW) / Infrastructure Implementation Unit (IIU) / Project Implementation Unit (PIU)** – overall responsibility; ensures RAP financing and implementation; liaises with AfDB and EPA; supervises contractor.
2. **RAP Implementation Team (RIT)** within PIU – specialist team (resettlement specialist, sociologist, surveyors, valuers, community liaison officers, legal advisor) responsible for day-to-day RAP execution.
3. **Liberia Land Authority (LLA)** – supports land tenure verification, valuation review and dispute resolution.
4. **Environmental Protection Agency (EPA)** – oversees compliance with ESIA approval conditions and monitors resettlement implementation, in coordination with MPW.
5. **County and District Authorities / Traditional Leaders** – support identification of PAPs, validation of asset records, allocation of replacement land, and mediation of local disputes.

6. **Contractor and Supervision Consultant** – cooperate with the RIT to sequence works, avoid unnecessary displacement, and implement the Community Access Plan and livelihood-related opportunities (local employment, use of local services).
7. **Civil society organizations / NGOs** – may be engaged to support livelihood programmes, GBV/SEA/SH prevention, and social protection activities.
8. **PAP Committees and Community Resettlement Committees** – represent PAPs, participate in decision-making, disseminate information and facilitate GRM.

## ii. Implementation schedule

Resettlement activities will be completed **prior to physical displacement** and commencement of civil works in the affected sections, in line with OS5. A detailed schedule is provided in the RAP/ARAP; a high-level outline is shown below.

*Table 65: Outline RAP/ARAP Implementation Schedule*

| Phase / Activity                                                                       | Timing (relative to civil works)                             |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Finalization of RAP/ARAP, disclosure and approval                                      | At least 6 months before start of works in affected sections |
| Establishment and training of RAP Implementation Team and Grievance Committees         | 5–6 months before works                                      |
| Verification and update of PAP census and asset inventory; validation with communities | 4–5 months before works                                      |
| Valuation and agreement of compensation packages; signing of compensation contracts    | 3–4 months before works                                      |
| Payment of compensation; provision of relocation and transition assistance             | At least 1–2 months before displacement                      |
| Physical relocation of PAPs; re-establishment of businesses and community assets       | Prior to start of works in each section                      |
| Implementation of livelihood restoration and social protection measures                | Commencing pre-displacement and continuing for 2–4 years     |
| Ongoing monitoring and evaluation; corrective actions                                  | Throughout construction and initial operation phase          |

## iii. Budget

A dedicated RAP/ARAP budget will be prepared and included in the overall project costs. It will cover, at a minimum:

- Compensation for land, structures, crops and trees.
- Compensation for businesses and loss of income.
- Relocation and transitional allowances.
- Livelihood restoration programmes.
- Vulnerability assistance and social protection measures.

- Community development initiatives.
- Administrative costs (staffing, logistics, legal support).
- Monitoring and evaluation.
- Contingency (typically 10–15%).

The RAP/ARAP will present detailed cost estimates by line item and funding sources (GoL counterpart funding and/or project funds) to ensure that all commitments can be fully honored.

#### 11.6 GRIEVANCE REDRESS FOR RESETTLEMENT-RELATED ISSUES

A **project-wide Grievance Redress Mechanism (GRM)** is being established as part of the ESMP, including a Grievance Redress Committee (GRC) formed through the public consultation process. The RAP builds on this GRM and specifies additional procedures for land acquisition and resettlement-related grievances.

Key features include:

- **Multiple entry points** – complaints can be lodged verbally or in writing through community leaders, PAP Committees, the Contractor, the RIT or directly at MPW/IIU offices.
- **Accessible and culturally appropriate** – procedures use local languages; can be used by illiterate PAPs; special attention is paid to accessibility for women and vulnerable persons.
- **Defined steps and timelines**, for example:
  1. Receipt and registration of complaint at the community or project level (Day 0–3).
  2. Investigation and proposal of resolution by local GRC (within 14 days).
  3. Escalation to the County-level GRC / MPW-IIU, where unresolved (within an additional 14 days).
  4. Final appeal to national authorities and/or courts, without prejudice to PAPs' legal rights.
- **Confidential handling of sensitive cases**, including GBV/SEAH-related complaints, in line with the GBV/SEAH Action Plan; such cases follow survivor-centred referral pathways and are not handled in open public forums.
- **Monitoring and reporting** – GRM statistics (number, type, resolution rate, time to resolve, satisfaction levels) are included in RAP and ESMP monitoring reports.

#### 11.7 MONITORING AND EVALUATION OF RAP 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 ESMP monitoring system.

#### Types of monitoring

- **Process monitoring** – tracks whether RAP 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.

*Table 66: Indicative RAP Monitoring and Evaluation Indicators*

| Aspect                                | Indicator                                                                                                   | Baseline source            | Target/benchmark                                    | Frequency                       | Responsibility              |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------|---------------------------------|-----------------------------|
| <b>Compensation</b>                   | % of PAPs paid full compensation before displacement                                                        | PAP census & RAP records   | 100% before civil works in their section            | Quarterly                       | RIT / MPW–IIU               |
| <b>Relocation</b>                     | % of physically displaced households provided with replacement housing/plots and relocation assistance      | RAP database               | 100% before demolition                              | Quarterly                       | RIT with County Authorities |
| <b>Livelihood restoration</b>         | % of economically displaced PAPs participating in at least one livelihood programme                         | RAP & SEBS                 | ≥ 80% of eligible PAPs                              | Semi-annual                     | RIT / Livelihood partners   |
| <b>Income recovery</b>                | % of sample PAP households whose income is at or above the pre-project level                                | SEBS & follow-up surveys   | ≥ 80% within 2–4 years after displacement           | Annual                          | Independent evaluator / RIT |
| <b>Vulnerable PAP support</b>         | % of identified vulnerable PAPs receiving additional assistance                                             | RAP vulnerability register | 100%                                                | Semi-annual                     | RIT / Social welfare        |
| <b>GRM performance</b>                | Number of resettlement-related grievances received; % resolved within specified timeframe; PAP satisfaction | GRM register               | ≥ 90% resolved within timeframe; ≥ 80% satisfaction | Quarterly                       | GRC / RIT                   |
| <b>Social cohesion &amp; conflict</b> | Qualitative assessment of community tensions/conflict linked to resettlement                                | KIIs, FGDs                 | No serious unresolved conflicts                     | Annual                          | Independent evaluator       |
| <b>Compliance</b>                     | EPA and AfDB supervision missions' ratings on RAP compliance                                                | Supervision reports        | "Satisfactory" or better                            | As per the supervision schedule | MPW / EPA / AfDB            |

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.

## 12.0 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 Environmental Protection and Management Law (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.
- The AfDB Updated Integrated Safeguards System (ISS), specifically OS1 and OS10, which require 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. ([African Development Bank](#))

**Overall objectives** of stakeholder engagement are to:

- Ensure that project-affected persons (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 vulnerable and marginalized 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 requirements and AfDB ISS 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. ([African Development Bank](#))

- **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.
- **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.

## 12.2 REGULATORY CONTEXT FOR PUBLIC PARTICIPATION

Stakeholder engagement under this project is anchored in both Liberian legislation and AfDB's ISS:

1. **Liberia ESIA and public participation framework**
  - The EPA Act and the ESIA Procedural Guidelines (2022) require public participation throughout ESIA preparation, including: screening, scoping, detailed impact assessment, public disclosure, public hearings, decision-making and follow-up.
  - Public participation is defined as a process of open, ongoing two-way communication that ensures stakeholders receive effective notice and relevant information and can review and comment on major decisions.
  - For projects requiring full ESIA, the EPA organizes or oversees **public hearings** prior to decision issuance, in fulfillment of Section 18 of the EPA Act. ([Facebook](#))
  - The ESIA Guidelines require that the ESIA report:
    - Document stakeholder participation (Section on Public Participation).
    - Attach evidence of consultations (attendance lists, minutes, photographs, questionnaires) as annexes.
2. **AfDB ISS – OS10: Stakeholder Engagement and Information Disclosure**
  - OS10 requires the Borrower to:
    - Identify stakeholders and analyze their interests, influence, and potential project impacts.
    - Prepare and implement a **Stakeholder Engagement Plan** proportional to project risks.

- Disclose ESIA/ESMP and related documents in a timely and accessible manner.
  - Establish and operationalize project-level grievance mechanisms for affected communities, distinct from judicial/jurisdictional mechanisms.
3. Good International Industry Practice (GIIP)

*Table 67: Key Legal and Safeguard Requirements for Stakeholder Engagement and Disclosure*

| Instrument                                | Key provisions on stakeholder engagement & disclosure                                                                                                                                         | Implications for the Project                                                                                                                                                |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EPA Act & 2022 ESIA Procedural Guidelines | Public participation integral to ESIA; public notices, consultations during scoping and assessment; public hearings for major projects; documentation of all engagement in ESIA and annexes.  | Project must implement structured engagement during all ESIA stages; cooperate with EPA public hearings; maintain records; update ESIA and ESMP to reflect community input. |
| EPML & related regulations                | Recognize public participation as a right in environmental decision-making; require that affected communities be informed of project impacts and mitigation measures. (cepf.net)              | Ensure communities along the road corridor are fully informed of risks, benefits and mitigation; integrate traditional authorities in decision-making.                      |
| AfDB ISS – OS1 & OS10                     | Require stakeholder mapping, a Stakeholder Engagement Plan, inclusive participation, culturally appropriate disclosure, and effective grievance mechanisms throughout the project life cycle. | A project-specific SEP and GRM must be in place prior to construction; engagement continues through operation; AfDB disclosure timelines must be met.                       |

### 12.3 STAKEHOLDER IDENTIFICATION AND ANALYSIS

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 River Cess.
- **Local government and traditional authorities:** County Superintendents, District Commissioners, Clan Chiefs, Town Chiefs, elders, and religious leaders.
- **Project-affected communities and PAPs:** Households and businesses along the 60.9 km Buchanan–Cestos Junction corridor within the 250 m Aol and adjacent influence area.
- **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 RAP 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/ESMP and monitoring reports; joint field missions.                                |
| 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; RAP consultations; targeted meetings for women and vulnerable groups; GRM.             |
| 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.                       |

| Stakeholder group            | Main interests/concerns                                                                        | Influence/power  | Potential impact level | Engagement strategy                                                                                 |
|------------------------------|------------------------------------------------------------------------------------------------|------------------|------------------------|-----------------------------------------------------------------------------------------------------|
| 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 ESMP 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                         | Compliance with ISS; effective E&S risk management; robust stakeholder engagement and GM.      | High (financier) | High                   | Periodic supervision missions; review of ESIA/ESMP and SEP; reporting on engagement and grievances. |

#### 12.4 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.
- **Focus group discussions (FGDs):** With women's groups, youth, traders, motorcycle taxi riders and vulnerable groups, using gender-sensitive facilitation.
- **Household and socio-economic surveys:** Conducted as part of the RAP/ARAP 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: Illustrative Summary of ESIA Stage Consultations*

| Location/area | Type of meeting                   | Main stakeholder groups                                     | Key issues/concerns raised                                                                                                   | How issues are addressed in the ESIA/ESMP 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 | Integration of road safety features (signage, markings, crossings); coordination with traffic police; local labour provisions in contracts; traffic management plan for construction. |

| Location/area                                         | Type of meeting                    | Main stakeholder groups                                                       | Key issues/concerns raised                                                                                                                                               | How issues are addressed in the ESIA/ESMP design                                                                                                                                                               |
|-------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                       |                                    |                                                                               | to port traffic and markets.                                                                                                                                             |                                                                                                                                                                                                                |
| 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. | ESMP 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 RAP/ARAP; 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 providers, and road safety NGOs    | Cumulative impacts on environment, biodiversity and water resources; GBV/SEAH prevention; need for independent monitoring; consideration of vulnerable groups.           | Biodiversity and water management measures; involvement of CSOs in awareness campaigns and monitoring; design of survivor-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 ESMP, 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 RAP 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                                                                   |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Pre-construction</b>          | Communicate final design, ESIA/ESMP, RAP; explain land acquisition and compensation; set up GRM.                                | PAPs, local communities, traditional leaders, county/district authorities, CSOs | Public meetings in corridor communities; RAP 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.                               |
| <b>Construction</b>              | Inform communities about construction schedule; manage expectations; address grievances; monitor GBV, labour and safety issues. | 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.    | Contractor (C-ESMP) under the supervision of the Supervision Consultant and PIU. |
| <b>Operation and maintenance</b> | 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 GRM or integration into local structures.                           | At least annually or in line with maintenance cycles.                          | MPW/IIU/PIU and county authorities.                                              |

| Project phase                                          | Key objectives                                                                           | Priority stakeholders                                      | Planned engagement activities                                                          | Frequency/timing                                | Responsibility               |
|--------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------|
| <b>Decommissioning / major rehabilitation (if any)</b> | 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; GRM 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 persons with disabilities or distant communities).

#### **12.7 GRIEVANCE REDRESS MECHANISM (GRM)**

A project-level Grievance Redress Mechanism will be established and maintained throughout project implementation to comply with AfDB OS10, OS1, OS2 and OS5, and to complement the legal remedies available under Liberian law.

**Objectives of the GRM:**

- Provide PAPs, community members, workers and other stakeholders with accessible, transparent and culturally appropriate channels to raise concerns or complaints related to the project.
- Enable timely, fair and consistent resolution of grievances at the lowest appropriate level.
- Strengthen accountability and prevent escalation of conflicts and social tensions.
- Capture and respond appropriately to complaints related to GBV/SEA/SH in a confidential, survivor-centred manner.

**Scope of grievances** may include, but is not limited to:

- Land acquisition, compensation and resettlement issues (linked with RAP/ARAP GRM).
- Construction impacts (noise, dust, access disruption, crop damage, traffic safety).
- Community health and safety issues.
- Labour and working conditions, including workers' accommodation and OHS.
- Allegations of GBV/SEA/SH and other forms of harassment or abuse linked to project activities.
- Misconduct of project staff or security personnel.

**Structure and membership of Grievance Redress Committees (GRCs)**

The Project GRM shall operate through three levels: Level 1 Community GRCs; Level 2 Local/District GRCs; and Level 3 County/Project GRC. The Contractor may receive and investigate construction-related complaints but shall not independently approve or close Project grievances. SEA/SH complaints shall bypass the ordinary GRC levels and follow the confidential survivor-centred referral pathway.

- **Community-level GRCs:**
  - Established in major settlements along the corridor.
  - Composition: town chief or representative; women's representative; youth representative; PAP representative; vulnerable group representative (where appropriate); representative of the contractor and PIV social specialist (ex-officio).
  - At least 30–40% of members will be women, with specific representation of vulnerable groups where feasible.
- **Local/District and County/Project GRCs:**
  - The Local/District GRC shall include the District Commissioner, PIV/CLO, supervision consultant, Contractor CLO and PAP/women/youth representatives. The County/Project GRC shall be chaired by the County Superintendent or designated Project authority and include PIV safeguards specialists, relevant county and line-agency representatives, the supervision consultant and stakeholder representatives.
  - Level 2 shall verify and decide referred cases within fifteen (15) days. Level 3 shall issue the final Project-level decision within a further fifteen (15) days and monitor implementation and verified closure of corrective actions.
- **Workers' grievance mechanism:**
  - A dedicated channel for workers, managed by the Contractor, aligned with OS2, with options for anonymous submissions and non-retaliation.

*Table 71: GRM Process and Indicative Timeframes*

| Step                | Action                                                                                                                                                                    | Responsibility                                        | Indicative timeframe           | Records/outputs                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------|-----------------------------------------------------------|
| 0 – Uptake          | Grievance received verbally or in writing via community focal points, suggestion boxes, phone/SMS, email, meetings, or through GRC members. Anonymous complaints allowed. | Community focal persons/contractor / PIV              | Ongoing                        | Grievance register entry (coded, with brief description). |
| 1 – Acknowledgement | Acknowledge receipt of grievance and inform                                                                                                                               | GRC Secretariat (usually PIV or contractor E&S staff) | Within two (2) days of receipt | Written or verbal acknowledgement recorded.               |

| Step                            | Action                                                                                                                                                                                                                                                                                                  | Responsibility                                                           | Indicative timeframe                                                                                                                      | Records/outputs                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
|                                 | complainant of next steps and expected timelines.                                                                                                                                                                                                                                                       |                                                                          |                                                                                                                                           |                                                                 |
| 2 – Screening & classification  | Assess whether the issue is project-related; classify by type (E&S, land/RAP, labour, GBV/SEAH, etc.); determine appropriate handling level (community vs project-level GRC).                                                                                                                           | GRC                                                                      | Within five (5) days of receipt                                                                                                           | Screening form; decision on handling level.                     |
| 3 – Investigation & response    | Gather information from relevant parties; conduct site visits; consult stakeholders; develop proposed resolution. For GBV/SEAH cases, refer immediately to specialized service providers and maintain confidentiality; do not require survivors to participate in investigations beyond what they wish. | GRC / PIV / Contractor; specialized GBV service providers where relevant | Decision within a cumulative target of thirty-five (35) days from receipt, depending on escalation level and complexity                   | Investigation report; proposed resolution options.              |
| 4 – Communication of decision   | Communicate the proposed resolution to the complainant in a culturally appropriate manner. Obtain agreement or note disagreement.                                                                                                                                                                       | GRC Chair / Secretariat                                                  | Within two (2) days after the decision                                                                                                    | Signed agreement (where appropriate) or record of disagreement. |
| 5 – Implementation & monitoring | Implement agreed corrective actions (e.g., compensation adjustment, repair measures, disciplinary action, changes in practices). Monitor implementation.                                                                                                                                                | PIV / Contractor/authorities, as applicable                              | Corrective action and verified closure within sixty (60) days from receipt, unless an extension is justified, documented and communicated | Action completion form; monitoring notes.                       |
| 6 – Appeal/escalation           | If the complainant is not satisfied, they may appeal to higher-level GRC, PIV management, AfDB's independent recourse mechanisms, or pursue judicial remedies.                                                                                                                                          | Complainant; PIV                                                         | Appeal may be lodged within thirty (30) days after the final Project-level decision; external remedies remain available                   | Appeal record; referral documentation.                          |

For GBV/SEAH-related complaints, a **confidential parallel channel** will be used, with survivor-centred guiding principles (safety, confidentiality, respect, non-discrimination) and referrals to trained service providers, in line with AfDB guidance and GIIP. These cases will be recorded in a de-identified manner and will not be discussed in public GRC meetings.

### **12.8 INFORMATION DISCLOSURE**

Information disclosure is both a legal requirement and a core component of OS10.

**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 and AfDB requirements.

#### **National disclosure arrangements**

In line with EPA ESIA Guidelines and the EPA Act:

- The ESIA (including ESMP), RAP/ARAP 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 River Cess.
  - 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.

#### **AfDB disclosure requirements**

In line with the AfDB ISS and information disclosure policy:

- The ESIA/ESMP and RAP/ARAP (and any Stakeholder Engagement Plan) will be submitted to AfDB 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.

*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 GRM.                      | 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 ESMP                                              | 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. |
| RAP                                                                    | Land acquisition, entitlements, livelihood restoration measures, RAP GRM.                   | 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. |
| ESMP 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.             |
| GRM Procedures                                                         | Steps for submitting and resolving grievances, contacts, and special channels for GBV/SEAH. | All stakeholders, especially PAPs and workers                               | Posters, leaflets, GRM 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 **Stakeholder Engagement Plan (SEP)** or equivalent section within the ESMP, including budgets and responsibilities.
- Annexes containing records of all ESIA-stage consultations (attendance lists, photographs, minutes, issues raised and responses).
- Regular reporting to EPA and AfDB on stakeholder engagement activities, grievances received/resolved, and adaptive management actions.

## 13.0 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 environmental and social safeguards (ESMP)
- 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.
- 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 a 60.9 km length, erosion is the primary threat to structural integrity.

- Bio-engineering: Use of Vetiver grass or indigenous creepers on high embankments to provide deep-root soil stabilization.
- Energy Dissipators: Installation of riprap 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.
- Grievance Redress Mechanism (GRM): 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.

➤ 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 Eco-WES

As a firm focusing on the Environmental & Social (E&S) or Engineering side, you should ensure the Monitoring & Reporting that includes:

- Photographic 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.

## 14.0 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 Environmental and Social Management Plan (ESMP), Resettlement Action Plan (RAP/ARAP) 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 River Cess 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 Area of Influence (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 labour influx and associated risks (communicable diseases, GBV/SEA/SH, child labour, social tension);
- 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 ESMP 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), and the African Development Bank Integrated Safeguards System (ISS), subject to full implementation of the ESMP, RAP/ARAP 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 ESMP and compliance with national law, AfDB ISS and Good International Industry Practice (GIIP).

- i. Cross-cutting recommendations
  1. **Integrate ESMP and RAP 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 RAP/ARAP** – all compensation and resettlement assistance to be completed and verified before any civil works that cause displacement.
  4. **Maintain an accessible, gender-sensitive Grievance Redress Mechanism (GRM)** at the community level, integrated with the RAP and project-wide GRM.

5. **Provide adequate resources for institutional capacity building** for EPA, MPW, PIU, local authorities and MoGCSP, as identified in the ESIA.

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   | ESMP operationalization                      | Prepare Contractor's ESMP (C-ESMP) consistent with this ESIA/ESMP and obtain approval from MPW/IIU and EPA before mobilization; update C-ESMP as needed.                                                                                                       | Contractor, Supervision Consultant, MPW/IIU    | Before site mobilization and ongoing |
| 4   | Land acquisition & resettlement              | Implement RAP/ARAP 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, RAP Implementing Agency           | Before relevant works commence       |
| 5   | Labour & working conditions                  | Implement Labour Management Procedures (LMP) covering fair recruitment, written contracts, prohibition of child/forced labour, OHS management, workers' GRM 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              |

| No | Thematic Area                            | Key Recommendation / Condition                                                                                                                                                                                                                          | Responsible Entity                                   | Timing                                      |
|----|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------|
| 8  | Soils, erosion and water resources       | Implement erosion control measures (silt traps, 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                     |
| 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 & GRM             | Implement the Stakeholder Engagement Plan (SEP), maintain regular communication with communities, ensure functional multi-tier GRM 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, labour conditions and GRM;
  - 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, GRM statistics);
  - Review and approval of method statements, C-ESMP updates, and corrective action plans;
  - Consolidated quarterly ESHS reports to MPW/IIU.
- **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).
- **AfDB:**
  - 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                                        | Example Indicators                                                                                                                                                      | Frequency / Tools                                                                                     | Main Responsibility                                             | Adaptive Management Triggers                                                                      |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Land acquisition &amp; resettlement</b>   | % of PAPs compensated before displacement; number of outstanding grievances; livelihood restoration progress                                                            | Monthly during implementation; RAP completion audit                                                   | MPW/IIU, RAP Implementing Agency                                | Delayed payments, high rate of unresolved grievances, and evidence that PAP incomes are declining |
| <b>OHS and labour conditions</b>             | Lost-time injury frequency rate; use of PPE; hours of OHS training; worker GRM cases                                                                                    | Monthly site inspections, incident logs                                                               | Contractor, Supervision Consultant                              | Serious or repeated accidents; non-use of PPE; systematic labour rights complaints                |
| <b>Community health &amp; safety/traffic</b> | Number and severity of traffic accidents; speed compliance in settlements; community safety complaints                                                                  | Monthly during construction; quarterly during operation; coordination with police & health facilities | Contractor, MPW/IIU, Local Authorities                          | Rising trend of accidents; hotspots near schools/markets; community perception of increased risk  |
| <b>Water and soil quality</b>                | pH, turbidity, TSS, oil & grease, key metals and nutrients at representative upstream/downstream points and at soil sampling locations (including VL lab control sites) | Baseline, then semi-annual during construction and early operation                                    | Contractor (sampling), Accredited Lab (analysis), EPA oversight | Exceedance of national standards or project thresholds; visible pollution or fish kills           |
| <b>Biodiversity &amp; habitat</b>            | Area of vegetation cleared; evidence of habitat degradation near wetlands/streams; wildlife incidents; rehabilitation status of borrow pits                             | Quarterly ecological inspections                                                                      | Contractor, MPW/IIU, FDA                                        | Clearance beyond approved footprint; failure of rehabilitation; significant fauna mortality       |
| <b>GBV/SEAH &amp; social cohesion</b>        | Number/type of GBV/SEAH complaints (anonymous); community perceptions; training coverage of workforce; functionality of referral pathways                               | Quarterly, social monitoring; confidential reporting                                                  | Contractor, MoGCSP, MPW/IIU                                     | Increase in GBV/SEAH cases; breakdown of GRM; community reports of tension or abuse               |
| <b>Stakeholder engagement &amp; GRM</b>      | Number of meetings held; attendance disaggregated by sex/age; number and resolution rate of grievances; disclosure activities                                           | Monthly / quarterly                                                                                   | MPW/IIU, Contractor, Local Authorities                          | High volume of unresolved grievances; exclusion of key groups from meetings; misinformation       |

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 ESMP and C-ESMP will be treated as **living documents**, updated as needed to incorporate lessons learned and new mitigation measures.

### 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 ESMP and RAP 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 GIIP over its full life cycle.

## 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](#))
- African Development Bank (AfDB). *Borrower Guidance Note for Operational Safeguard 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement*. Abidjan: AfDB. ([African Development Bank](#))
- African Development Bank (AfDB). *Borrower Guidance Note for Operational Safeguard 6: Biodiversity, Renewable Resources and Ecosystem Services*. Abidjan: AfDB. ([African Development Bank](#))
- African Development Bank (AfDB). *Borrower Guidance Note for Operational Safeguard 7: Vulnerable Groups*. Abidjan: AfDB, 2024. ([African Development Bank](#))

### 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.
- Topographic 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](#))
- International guidance on ESI/A methodologies, area of influence, cumulative impact assessment and ecosystem services as cited in the main chapters and annexes. ([IUCN](#))

## 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 Area of Influence (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.

#### 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 rapid 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: Topographic 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               |
| 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 |

| Feature           | Description                                                                                        | Relevance for Project                                                            |
|-------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| 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 Aol

| 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 topographic 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       |

| 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

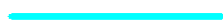
| Water body                     | Approximate Location (chainage / nearby settlement)                | Key Characteristics                                                                                         | Environmental / Social Functions                                                    |
|--------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 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                                    |

## 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 <sub>3</sub> <sup>-</sup> (mg/l) | SO <sub>4</sub> <sup>2-</sup> (mg/l) | Cl <sup>-</sup> (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    |
| Grapue 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)   |

| Sampling location             | Sample Code | KM    | Source type | pH   | Turbidity (NTU) | TDS (mg/l) | TSS (mg/l) | NO <sub>3</sub> <sup>-</sup> (mg/l) | SO <sub>4</sub> <sup>2-</sup> (mg/l) | Cl <sup>-</sup> (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          |

**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. Nomo*  
Chemical Analyst



## 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.

## 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 Aol                                                                                                                          | 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 <sub>10</sub> /PM <sub>2.5</sub> , 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 <sub>10</sub><br>(µg/m³) | PM <sub>2.5</sub> (µg/m³) | CO (mg/m³) | NO <sub>2</sub><br>(µg/m³) | SO <sub>2</sub><br>(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 <sub>10</sub><br>(µg/m³) | PM <sub>2.5</sub><br>(µg/m³) | CO<br>(mg/m³) | NO <sub>2</sub><br>(µg/m³) | SO <sub>2</sub><br>(µg/m³) |
|-------------|------------------------------|-----------------------------|------------------------------|---------------|----------------------------|----------------------------|
| AAQMpt-6    | Gio Town                     | 110                         | 46                           | 1.7           | 22                         | 7                          |
| AAQMpt-7    | Zahnto Town<br>(Quarry Site) | 156                         | 64                           | 3.1           | 36                         | 13                         |
| AAQMpt-8    | Bayon Town                   | 122                         | 50                           | 1.8           | 25                         | 8                          |

| Sample Code | Location        | PM <sub>10</sub><br>(µg/m³) | PM <sub>2.5</sub><br>(µg/m³) | CO<br>(mg/m³) | NO <sub>2</sub><br>(µg/m³) | SO <sub>2</sub><br>(µg/m³) |
|-------------|-----------------|-----------------------------|------------------------------|---------------|----------------------------|----------------------------|
| 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        |
| 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        |
| 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        |
| 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: Yarleah 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 dBA | Time  | Leq dBA |
|-------|---------|-------|---------|
| 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      |

**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                        |

## 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. <b>8,400 vehicles/day</b> 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; <b>around 300 vehicles/day</b> 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.
- 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                                 |

## 2.6 Implications for Project Design and ESMP

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 ESMP 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

### APPENDIX 3: DETAILED ESMP MITIGATION AND MONITORING MATRICES

This Annex presents the detailed Environmental and Social Management Plan (ESMP) 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 ESMP 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 Integrated Safeguards System (ISS, OS1–OS10); and
- 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 Environmental and Social Mitigation Matrix

| Code | Impact / Risk                                                               | Objective                                     | Key Mitigation / Management Measures                                                                                                                                                                                                                    | Location / Scope                                                      | Timing                                     | Responsible Parties*                             | Performance Indicators                                                                                                                          | Safeguard / Legal Reference                                                               |
|------|-----------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| SE-1 | Soil erosion, gully formation 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 traps and diversion drains. ◊ Rapidly 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-construction & 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, AfDB OS1, OS3, OS6, 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                                                                                                        | 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                                                                 | EPML, LWQS Class III, EPA Pollution Control Regulations, OS1, OS3                         |

| Code | Impact / Risk                                                               | Objective                                                                | Key Mitigation / Management Measures                                                                                                                                                                                                                                            | Location / Scope                                                                | Timing                                                    | Responsible Parties*                        | Performance Indicators                                                                                              | Safeguard / Legal Reference                                     |
|------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
|      |                                                                             |                                                                          | 50 m of watercourses. ♦ Designate and line vehicle washing areas. ♦ Immediate clean-up of spills and contaminated soil.                                                                                                                                                         |                                                                                 |                                                           |                                             | monthly. ♦ Water quality monitoring 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 ( $\leq 30$ 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), OS1, OS3 |
| 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 centres, 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), OS1, OS4           |

| Code  | Impact / Risk                                                               | Objective                                                          | Key Mitigation / Management Measures                                                                                                                                                                                                                                                                                    | Location / Scope                                              | Timing                                         | Responsible Parties*                                                     | Performance Indicators                                                                                                                                                                          | Safeguard / Legal Reference                        |
|-------|-----------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| BIO-1 | Loss of roadside vegetation, disturbance of fauna and habitat fragmentation | Avoid unnecessary vegetation loss and maintain ecological function | <ul style="list-style-type: none"> <li>Limit clearing to the designed ROW and work sites.</li> <li>Mark and protect trees to be retained.</li> <li>Prohibit hunting, trapping, and collection of NTFPs by workers.</li> <li>Re-instatement planting with native species along embankments and in work areas.</li> </ul> | 250 m Aol and work sites, borrow areas, and camp surroundings | Site preparation & construction; reinstatement | Contractor; Forestry Development Authority (FDA); Supervision Consultant | <ul style="list-style-type: none"> <li>Area cleared is limited to that required by design.</li> <li>Re-planting completed and survival of planted trees/shrubs &gt;80% after 1 year.</li> </ul> | EPML, Forestry Law, OS6, WBG EHS (Biodiversity)    |
| BIO-2 | Disturbance to aquatic habitats at river and stream crossings               | Protect aquatic ecology and fish habitat                           | <ul style="list-style-type: none"> <li>Minimize in-stream works; install cofferdams where necessary.</li> <li>Maintain flow and provide fish passage.</li> <li>Prohibit dumping of spoil and concrete wash-out into channels.</li> <li>Restore banks and riparian vegetation after works.</li> </ul>                    | All bridge/culvert sites and adjacent river reaches           | Construction at crossings & reinstatement      | Contractor; Supervision Consultant; EPA; FDA                             | <ul style="list-style-type: none"> <li>No deliberate disposal of waste in watercourses.</li> <li>Stable, vegetated banks post-construction.</li> </ul>                                          | EPML, Fisheries Regulations, OS6                   |
| WST-1 | Poor management of solid and hazardous waste                                | Ensure proper segregation, storage and disposal                    | <ul style="list-style-type: none"> <li>Prepare and implement Waste Management Plan.</li> <li>Segregate recyclables, general and hazardous wastes.</li> <li>Provide labelled, covered bins at camps and work fronts.</li> <li>Contract EPA-authorized waste handlers / approved</li> </ul>                               | Camps, work sites, plant yards, laydown areas                 | Throughout construction                        | Contractor; Supervision Consultant; MPW/IIU; EPA                         | <ul style="list-style-type: none"> <li>No uncontrolled dumping.</li> <li>All wastes are recorded and disposed at approved facilities.</li> </ul>                                                | EPML, EPA Solid & Hazardous Waste Regulations, OS3 |

| Code  | Impact / Risk                                                          | Objective                                          | Key Mitigation / Management Measures                                                                                                                                                                                                                                                                                | Location / Scope                                      | Timing                                     | Responsible Parties*                             | Performance Indicators                                                                           | Safeguard / Legal Reference                |
|-------|------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------|
|       |                                                                        |                                                    | disposal sites. ♦ Maintain waste register.                                                                                                                                                                                                                                                                          |                                                       |                                            |                                                  |                                                                                                  |                                            |
| 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, OS2, OS4, WBG EHS (OHS)        |
| 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' GRM 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. | OS2, Liberian Labour Code, ILO conventions |
| CHS-1 | Community health and safety, including traffic safety                  | Protect community health, minimize                 | ♦ Implement the Traffic and Road Safety Management Plan. ♦ Signage, flagmen, and                                                                                                                                                                                                                                    | Communities along the corridor, access roads, detours | Throughout construction                    | Contractor; MPW/IIU; MoH;                        | ♦ Reduction in traffic accidents related to work. ♦ Outreach                                     | OS4, WBG EHS (Community Health and Safety) |

| Code  | Impact / Risk                                    | Objective                                       | Key Mitigation / Management Measures                                                                                                                                                                                                          | Location / Scope                                                           | Timing                                     | Responsible Parties*                               | Performance Indicators                                                                                              | Safeguard / Legal Reference                             |
|-------|--------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|       |                                                  | road safety risks                               | speed control around settlements and schools.<br>◊ Safe pedestrian crossings where appropriate. ◊ Community awareness on road safety and HIV/STIs. ◊ Control standing water at camps to reduce vector breeding.                               |                                                                            |                                            | Traffic Police                                     | sessions held; participant records.                                                                                 |                                                         |
| 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 survivor-centered referral pathway. | 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 GRM, with survivor support.            | OS2, OS4, OS7, OS10; national GBV and Child Rights laws |
| SOC-1 | Land acquisition, economic/physical displacement | Avoid, minimize and compensate for displacement | ◊ Implement approved RAP/ARAP before civil works. ◊ Pay compensation prior to displacement. ◊ Provide livelihood restoration support as in RAP. ◊ 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 (RAP), OS5, Land Rights Act         |

| Code | Impact / Risk                              | Objective                                       | Key Mitigation / Management Measures                                                                                                                                     | Location / Scope                       | Timing                  | Responsible Parties*                                                                     | Performance Indicators                                                                       | Safeguard / Legal Reference                 |
|------|--------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------|
| 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. | OS8, 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                          | OS4, National Road Safety Policy |
| OM-2 | Drainage blockage and local flooding                           | Maintain drainage performance and minimize flooding/erosion | ◊ Routine maintenance of side drains, culverts and outlets. ◊ Community awareness on solid waste disposal.                                                                   | MPW maintenance units; Local authorities            | ◊ Functionality of culverts and drains. ◊ Reports of local flooding.                          | Quarterly and before/after the rainy season | OS1, OS3                         |
| 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              | OS1, OS4                         |

| Code | Impact / Risk                                       | Objective                           | Key Measures                                                                                                                           | Responsible Parties                | Monitoring Indicators                                           | Frequency                      | Reference                  |
|------|-----------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------|--------------------------------|----------------------------|
| 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 | OS3, 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                         | OS1, OS4, OS5              |
| 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                         | OS4, OS7, OS10             |

### 2.3 Environmental and Social Monitoring Matrix

This monitoring plan aligns with the EPA ESIA Guidelines and AfDB ISS 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).

#### Environmental and Social Monitoring Plan

| No. | Parameter / Indicator                                              | Objective                                        | Locations                                                                                          | Method / Equipment                                                                   | Frequency                                                        | Responsibility                                                  | Estimated Cost (USD)* | Notes / Standard                                            |
|-----|--------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------|-------------------------------------------------------------|
| 1   | Ambient particulate matter (PM <sub>10</sub> , PM <sub>2.5</sub> ) | 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. |

| No | Parameter / Indicator                                                                                 | Objective                                                                           | Locations                                                                                                     | Method / Equipment                                                                              | Frequency                                                                | Responsibility                                   | Estimated Cost (USD)* | Notes / Standard                                                                    |
|----|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------|
| 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.                          |
| 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                                                     | Roadside vegetation within Aol; reinstated areas;                                                             | Transect walks; species presence/absence; photo monitoring                                      | Once per dry and wet season during construction,                         | Contractor; Supervision Consultant;              | ~8,000 total          | Focus on confirming the absence of sensitive species                                |

| No. | Parameter / Indicator                                                                                     | Objective                                                                | Locations                                                        | Method / Equipment                                                         | Frequency                                                       | Responsibility                               | Estimated Cost (USD)*                     | Notes / Standard                                         |
|-----|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------|-------------------------------------------|----------------------------------------------------------|
|     |                                                                                                           | biodiversity impacts                                                     | key aquatic crossings                                            |                                                                            | once after final reinstatement                                  | FDA; MPW/IIU                                 |                                           | in the 250 m Aol 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 GRM 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 (GRM cases, GBV/SEA allegations, RAP implementation status, employment of local labour) | Monitor social performance and inclusion                                 | Project corridor and associated communities                      | GRM database; RAP monitoring; HR records; community surveys                | Quarterly during construction; annual RAP completion audit      | MPW/IIU; Contractor; Independent RAP monitor | Included in RAP and ESMP budgets          | Disaggregated by gender, age and vulnerability category. |

\*Monitoring costs shown in Appendix 3 are planning estimates. Before mobilization, each monitoring activity shall be assigned either to the PIU-managed ESMP allocation or to a priced Contractor BOQ/C-ESMP 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 ESMP implementation reports to MPW/IIU, EPA and AfDB.
- **MPW/IIU:** consolidated semi-annual safeguards performance reports to EPA and AfDB, including results of UL laboratory re-sampling, ESMP compliance, and GRM status.
- **Independent audits:** periodic external audits as required by EPA permit conditions and AfDB ISS.

## 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 RAP/ARAP for the Paving of the Buchanan–Cestos Junction road project. The SEP is designed to:

- Comply with AfDB OSIO – Stakeholder Engagement & Information Disclosure and other relevant OSs;
- Meet the public participation requirements of the EPA ESIA Procedural Guidelines; and
- Ensure inclusive, culturally appropriate, and continuous engagement with Project Affected Persons (PAPs) 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, ESMP, RAP, 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 |

| Stakeholder Group                            | Examples                                                                                                                                                      | Interest / Expectations                                                                                | Influence  | Key Issues / Concerns                                                                                                         | Preferred Engagement Methods                                                                         |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| County and district authorities              | Superintendents, District Commissioners, County Environmental Officers, City Mayors                                                                           | Local development, road accidents, orderly resettlement, and employment opportunities for residents    | High       | Land acquisition and compensation; local employment; security; conflict resolution; GBV risks                                 | Courtesy visits, joint planning meetings, public forums                                              |
| 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 RAP; 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 GRM; 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 & RAP disclosure) | National agencies; MPW/IIU; EPA; county authorities | Obtain approvals and permits; agree on roles; | ESIA, ESMP, RAP/ARAP, design drawings, permit conditions | Technical workshops, formal submissions, | At key milestones and prior to permit issuance | MPW/IIU; ESIA Consultant |

| Phase                    | Stakeholder Group                    | Objectives of Engagement                                            | Information to be Shared                                                             | Methods / Tools                                                                          | Frequency / Timing                                     | Responsible Parties                               |
|--------------------------|--------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------|
|                          |                                      | present ESIA & RAP results                                          |                                                                                      | and bilateral meetings                                                                   |                                                        |                                                   |
| Pre-construction         | Communities, PAPs, vulnerable groups | Present final design, ESIA & RAP; confirm entitlements and schedule | Final alignment and ROW width; impact zones; RAP eligibility and rates; GRM 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; RAP team; Local authorities              |
| 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 GRM                     | OHS rules; workers' rights; worker GRM, 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 GRM                                              | 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, KIIIs, 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).

### 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 RAP, 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 RAP 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; ESMP includes measures on safety, dust/noise, equal employment, and social cohesion; further meetings planned before works. |

| No. | Date         | Location                                          | Type of Event            | Approx. No. of Participants (M/F) | Stakeholder Categories                                    | Main Issues Raised                                                                      | Project Responses / Follow-up                                                                          |
|-----|--------------|---------------------------------------------------|--------------------------|-----------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 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 RAP survey strategy, communication channels, and to select GRC members. |

## 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 AfDB Operational Safeguard 6 (Habitat and Biodiversity Conservation) 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.
- 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 rapid 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.                                                         |                                                                                                                      |

| Taxonomic Group | Survey Methods                                                                                                                                    | Notes                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 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.              |

### 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

- Rapid 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 trapping.
- Surveys were confined primarily to the direct Aol 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 Aol 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 Aol:

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 Aol 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  | <i>Thryonomys swinderianus</i> | Cane rat                   | LC           |
| 2  | <i>Sciurinae (spp.)</i>        | Squirrel                   | LC           |
| 3  | <i>Marmota monax</i>           | Ground hog                 | LC           |
| 4  | <i>Cephalophus natalensis</i>  | Common duiker              | LC           |
| 5  | <i>Grammomys poensis</i>       | Shining thicket rat        | LC           |
| 6  | <i>Cricetomys gambianus</i>    | Giant pouched rat/bush rat | LC           |
| 7  | <i>Capra aegagrus hircus</i>   | Goat (domestic)            | LC           |
| 8  | <i>Ovis aries</i>              | 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 Aol, 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  | <i>Turtur afer</i>               | Blue-spotted Wood Dove   | LC          |
| 2  | <i>Streptopelia semitorquata</i> | Red-eyed Dove            | LC          |
| 3  | <i>Centropus senegalensis</i>    | Senegal Coucal           | LC          |
| 4  | <i>Merops albicollis</i>         | White-throated Bee-eater | LC          |
| 5  | <i>Pogoniulus scolopaceus</i>    | Speckled Tinkerbird      | LC          |
| 6  | <i>Andropadus virens</i>         | Little Greenbul          | LC          |
| 7  | <i>Andropadus gracilirostris</i> | Slender-billed Greenbul  | LC          |
| 8  | <i>Pycnonotus barbatus</i>       | Common Bulbul            | LC          |

| No | Scientific Name                             | Common Name            | IUCN Status |
|----|---------------------------------------------|------------------------|-------------|
| 9  | <i>Cisticola lateralis</i>                  | Whistling Cisticola    | LC          |
| 10 | <i>Cisticola brachypterus</i>               | Short-winged Cisticola | LC          |
| 11 | <i>Prinia subflava</i>                      | Tawny-flanked Prinia   | LC          |
| 12 | <i>Loceus cucullatus</i>                    | Village Weaver         | LC          |
| 13 | <i>Lanius collaris</i>                      | Common Fiscal          | LC          |
| 14 | <i>Chalcomitra adelberti</i>                | Buff-throated Sunbird  | LC          |
| 15 | <i>Cyanomitra olivacea</i>                  | Olive Sunbird          | LC          |
| 16 | <i>Spilopelia senegalensis</i> <sup>1</sup> | Laughing Dove          | LC          |

<sup>1</sup>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 Aol.

### 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

| No | Scientific Name                 | Common Name          | Group    | IUCN Status |
|----|---------------------------------|----------------------|----------|-------------|
| 1  | <i>Amietophrynus regularis</i>  | Common toad/frog     | Amphibia | LC          |
| 2  | <i>Cynisca liberiensis</i>      | Liberian worm lizard | Reptile  | LC          |
| 3  | <i>Phrynobatrachus plicatus</i> | Spring frog          | Amphibia | LC          |
| 4  | <i>Archachatina marginata</i>   | 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 Aol.

### 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  | <i>Brycinus imberi</i>           | Spot-tail     | LC          |
| 2  | <i>Chrysichthys auratus</i>      | Catfish       | LC          |
| 3  | <i>Heterobranchus longifilis</i> | Black catfish | LC          |
| 4  | <i>Mormyrops anguilloides</i>    | Cornish jack  | LC          |

| No | Scientific Name       | Common Name       | IUCN Status |
|----|-----------------------|-------------------|-------------|
| 5  | <i>Tilapia zillii</i> | 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  | <i>Alchornea cordifolia</i>                          | Christmas bush    | Secondary forest / fallow               | LC          |
| 2  | <i>Bambusa vulgaris</i>                              | “Reefs” (bamboo)  | Homesteads / moist areas                | LC          |
| 3  | <i>Chromolaena odorata</i>                           | “Kill-Doe”        | Disturbed road verges, farms (invasive) | LC          |
| 4  | <i>Cenchrus polystachios</i>                         | Mission grass     | Grassy verges, fallow                   | LC          |
| 5  | <i>Cocos nucifera</i>                                | Coconut           | Homesteads, gardens                     | LC          |
| 6  | <i>Elies guineensis</i> ( <i>Elaeis guineensis</i> ) | Palm              | Plantations / homesteads                | LC          |
| 7  | <i>Managifera indica</i> ( <i>Mangifera indica</i> ) | Plum/mango tree   | Homesteads, farms                       | LC          |
| 8  | <i>Rhizophora harrisonii</i>                         | White mangrove    | Riverine / estuarine margins            | LC          |
| 9  | <i>Acrostichum aureum</i>                            | Swamp fern        | Wetlands / riverbanks                   | LC          |
| 10 | <i>Scleria</i> spp.                                  | Soft grass        | Wet depressions, wetlands               | LC          |
| 11 | <i>Carica papaya</i>                                 | Pawpaw            | Homesteads, farms                       | LC          |
| 12 | <i>Bidens pilosa</i>                                 | “Farmer friend”   | Croplands, disturbed soils              | LC          |
| 13 | <i>Cardiospermum grandiflorum</i>                    | Balloon vine      | Climber; edges / hedges                 | LC          |
| 14 | <i>Eichhornia crassipes</i>                          | Water hyacinth    | Slow-moving surface waters              | LC          |
| 15 | <i>Rottboellia cochinchinensis</i>                   | Itchy grass       | Farms, road verges                      | LC          |
| 16 | <i>Phymatosorus scolopendria</i>                     | Breadfruit fern   | Shaded moist sites                      | LC          |
| 17 | <i>Panicum repens</i>                                | Dog-tooth grass   | Wet margins, road verges                | LC          |
| 18 | <i>Leucaena leucocephala</i>                         | Lead tree         | Fallow / homesteads (often planted)     | LC          |
| 19 | <i>Imperata cylindrical</i>                          | Spear grass       | Degraded land, fallow                   | LC          |
| 20 | <i>Musa paradisiac</i>                               | Plantain          | Farms, homesteads                       | LC          |
| 21 | <i>Manihot esculenta</i>                             | Cassava           | Farms                                   | LC          |
| 22 | <i>Hevea brasiliensis</i>                            | 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.

## 5.8 Summary of Species Richness and Conservation Status

### 5-7: Summary of Species Recorded and IUCN Conservation Status in Direct Aol

| 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 Aol**, 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 OS6 Compliance

### 1. Habitat classification:

- The direct Aol is best classified as **modified habitat** under AfDB OS6, 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 Aol.
- 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.

### 3. Ecosystem services:

- Flora and fauna in the Aol contribute to provisioning (fuelwood, NTFPs, bushmeat, fish), regulating (soil stabilisation, 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 ESMP 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, trapping 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 AfDB OS6 and supports the biodiversity-related commitments in the ESMP and associated thematic management plans.

## APPENDIX 6: PICTORIAL RECORD OF STAKEHOLDER CONSULTATIONS



Public Consultation Meeting in Big Joe Town, Grand Bassa County Authority

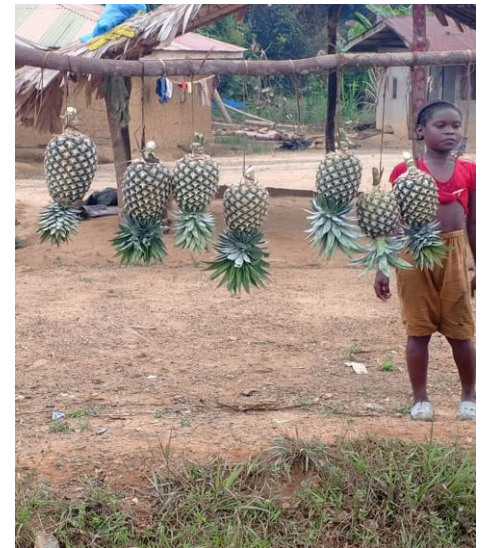


PIU, ESAFE/MPW, and Consultant  
Team



Timbo River Bridge

Timbo River



Some commercial activities along  
the project road



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.

## 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 RAP & 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 RAP & 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 RAP 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 RAP 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.
- 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 |         |

| No. | Name of Participant | Participant's Telephone Number | Comment/Question from Participant                                                                                                                                                                                                                                                                                                                                                                      | Response/Answer from Consultant & MPW-ESAFE Team                                                                                                                                                                                                                                                                                                                                                                    | Remarks |
|-----|---------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 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.                                                                                                                                                                                                                                                                                                                                    |         |
| 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?<br>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. |         |

| No. | Name of Participant | Participant's Telephone Number | Comment/Question from Participant                                                                                                                                             | Response/Answer from Consultant & MPW-ESAFE Team                                                                                                                                                                                                                                                                                                                                                 | Remarks |
|-----|---------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 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 mark the place, who is at fault, me or you                                          | The Ministry of Public Works doesn't give people land in the ROW.                                                                                                                                                                                                                                                                                                                                |         |
| 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                                                                                                                                                                                                                                                                                                                                                            |         |

| No. | Name of Participant | Participant's Telephone Number | Comment/Question from Participant                                                                                                                    | Response/Answer from Consultant & MPW-ESAFE Team                                                                                                                                                                                                                | Remarks |
|-----|---------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 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.                                                                                                        |         |
| 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 GRM 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/RAP 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 River Cess 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 River Cess 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.

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 RAP & 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

4. Opening Prayer: The opening prayer was done by a volunteer. Welcome Remarks and Introduction of Local Authorities and RAP & 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 RAP 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 RAP 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, |         |

| No. | Name of Participant | Participant's Telephone Number | Comment/Question from Participant                                                                                                                     | Response/Answer from Consultant & MPW-ESAFE Team                                                                                                                                                                                                          | Remarks |
|-----|---------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|     |                     |                                |                                                                                                                                                       | and if not, then we will compensate or relocate to a suitable area.                                                                                                                                                                                       |         |
| 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 |         |

| No. | Name of Participant | Participant's Telephone Number | Comment/Question from Participant                                                                                           | Response/Answer from Consultant & MPW-ESAFE Team                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Remarks |
|-----|---------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|     |                     |                                |                                                                                                                             | 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 the cemetery along the road that falls in the ROW? | We don't pay for land that falls in the ROW. In the past, the government had 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                                                                                                                                                                                                                                                                                |         |

| No. | Name of Participant | Participant's Telephone Number | Comment/Question from Participant | Response/Answer from Consultant & MPW-ESAFE Team | Remarks |
|-----|---------------------|--------------------------------|-----------------------------------|--------------------------------------------------|---------|
|     |                     |                                |                                   | 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 GRM 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/RAP Officer of the Ministry of Public Works.

#### Grievance Redress Committee (GRC)

| No  | Name             | Position                                | Telephone Number |
|-----|------------------|-----------------------------------------|------------------|
| 8.  | Manasseh S. Gbar | Chair                                   | 0776465682       |
| 9.  | Clapha 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       |
| 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 River Cess counties

Meeting Venue: Yarpah Town's Town Hall, Yarpah Town, River Cess 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 River Cess 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.

By organizing such a consultation meeting, the MRU/RDTEP 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 RAP &  
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 RAP & 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 RAP 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
  - xxxv) Illegibility or what qualifies you to benefit from the RAP 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 in the middle of the road?                                                                                                                      | Yes, light poles that fall within the ROW will be relocated if there are no engineering alternatives. Realignment of the road to avoid the affected light                                                                                                                                                                                   |         |

| No. | Name of Participant | Participant's Telephone Number | Comment/Question from Participant                                                                                                                        | Response/Answer from Consultant & MPW-ESAFE Team                                                                                                                                                                                                                                                                                                                                                                                                                                              | Remarks |
|-----|---------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|     |                     |                                |                                                                                                                                                          | 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                                                      | Do not give anything to whosoever, be it the town chief, commissioner, or any government or local authority officials; the                                                                                                                                                                                                                                                                                                                                                                    |         |

| No. | Name of Participant | Participant's Telephone Number | Comment/Question from Participant                                                                                                                                                     | Response/Answer from Consultant & MPW-ESAFE Team                                                                                                                                                                                                                                                                               | Remarks |
|-----|---------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
|     |                     |                                | for giving land, what should be done?                                                                                                                                                 | government paying/compensating you for you to build yourself a new home or make another farm, it's not for you to 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 GRM 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/RAP Officer of the Ministry of Public Works.

#### 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 |

# APPENDIX 7.4: STAKEHOLDER ENGAGEMENT ATTENDANCE RECORD

| Ministry of Public Works Meeting<br>with Grand Bassa County Authority Jun/19/2025 |                              |                       |  |
|-----------------------------------------------------------------------------------|------------------------------|-----------------------|--|
| Venue: Administrative Building                                                    | Attendance                   | Stakeholder Meeting   |  |
| Name                                                                              | Position                     | Tele #                |  |
| 1) James W. Duen                                                                  | County Acting Superintendent | 077447045             |  |
| 2) Moses G. Henry                                                                 | " Development Officer        | 077768521             |  |
| 3) Paul Y. Piah                                                                   | " Finance Officer            | 0776602068            |  |
| 4) Onesimus S. Garbay Sr                                                          | " Information Officer        | 0775967492            |  |
| 5) Thomas Davies                                                                  | " Project Planner            | 0770232653            |  |
| 6) Michael Vasram                                                                 | Statutory Superintendent     |                       |  |
| 7) Samuka Konneh                                                                  | Project Eng./MPW             | 0775197644            |  |
| 8) Siaka Jusu. Dener                                                              | Accfard INRF                 | 0886711604            |  |
| 9) Moses Yeelcas                                                                  | Auditor - MPW                | 0776016695            |  |
| 10) M. Soma                                                                       | Asst MPW                     | 0779160173            |  |
| 11) Jackson T. Sateah                                                             | RAP Officer                  | 0777381591            |  |
| 12) Kentoma C. Kilby                                                              | Property Valuator            | 0886222426/0777680412 |  |
| 13) Armando G. Paye                                                               | Director, ESAFE Division     | 0770214700            |  |
| 14) Richard S.B. Kpehe                                                            | EO-MPW                       | 0886816932            |  |
| 15) Ernest B. Hiner                                                               | BMASH Tech.                  | 0777691424            |  |
|                                                                                   |                              | 0777224874            |  |

## APPENDIX 7.5: PROJECT PROPONENT APPLICATION AND EPA APPROVAL FOR THE ESIA

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                  |                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <br>Office of the Minister                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p style="text-align: center;"><b>REPUBLIC OF LIBERIA</b><br/><b>MINISTRY OF PUBLIC WORKS</b><br/>P.O. Box 9011<br/>South Lynch Street<br/>Monrovia, Liberia</p> |  |
| Ref.: RLG-M/MPW-RL/763/24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                  |                                                                                     |
| November 18, 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                  |                                                                                     |
| Hon. Dweh Siehwoh Bailey, Sr.<br>Acting Executive Director<br>Environmental Protection Agency<br>5 <sup>th</sup> Street, Sinkor, Monrovia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                  |                                                                                     |
| <b>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</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                  |                                                                                     |
| Dear Hon., Yorkeba:wa:lo:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                  |                                                                                     |
| <p>The Government of the Republic of Liberia has received funding from the African Development Bank Group (ADB) for the paving of Buchanan City to Greenville City Road Corridor (237 km). As part of the counterpart 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.</p> <p>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.</p> <p>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.</p> |                                                                                                                                                                  |                                                                                     |
| <p>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 (CPML, 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.</p> <p>Please do not hesitate to contact the Ministry if there are any queries relating to the above matters.</p> <p>We appreciate your usual kind assistance in these processes.</p> <p>Sincerely yours,</p> <p><br/>Roland Layfette Giddings<br/>Minister</p> <p>CC: Hon. Prince D. Tambah, Sr. – Deputy Minister for Technical Services/ MPW<br/>Mr. Rawlings Baco Kesselly – Programme Coordinator, ADB Road Programme</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                  |                                                                                     |