MINISTRY OF FINANCE, ECONOMIC PLANNING AND INFORMATION TECHNOLOGY

CONSULTANCY SERVICES FOR DESIGN AND CONSTRUCTION SUPERVISION OF BRIDGES IN LONDON (SITE-1), NOEL (SITE-2) AND OVERLAND (SITE-3)

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR CONSTRUCTION OF NEW BRIDGE AT LONDON (SITE-1)

ECO REPORT NO: 21/2023

Revised April 09, 2025

PRIME CONSULTANT
TRINTOPLAN CONSULTANTS LIMITED

ENVIRONMENTAL SUB-CONSULTANTS
ECOENGINEERING CONSULTANTS LIMITED
AND
KAIRI CONSULTANTS LIMITED

62 EASTERN MAIN ROAD
ST. AUGUSTINE
TRINIDAD, WEST INDIES

TELEPHONE: (868) 217-4420 / 217-6544

EMAIL: ecoeng@ecoenggroup.com

THIS DOCUMENT HAS BEEN
FORMATTED FOR DOUBLE SIDED
PRINTING AND THE WORDS:

“THIS PAGE IS INTENTIONALLY LEFT BLANK”

FACILITATES SUCH PRINTING WHERE
FOUND WITHIN THE REPORT

LIST OF ACRONYMS

ACRONYM	MEANING
AOI	AREA OF INTEREST / AREA OF INFLUENCE
BOQ	BILL OF QUANTITIES
BRAGSA	ROADS, BUILDINGS AND GENERAL SERVICES AUTHORITY
CEP	COMMUNITY ENGAGEMENT PLAN
CHSP	COMMUNITY HEALTH AND SAFETY PLAN
CLO	COMMUNITY LIAISON OFFICER
EHS	ENVIRONMENTAL, HEALTH AND SAFETY
EPD	ECONOMIC PLANNING DIVISION
ERP	EMERGENCY RESPONSE PLAN
ESHS	ENVIRONMENTAL, SOCIAL, HEALTH AND SAFETY
ESIA	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ESMF	ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK
ESMP	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN
GBV	GENDER-BASED VIOLENCE
GCC	GENERAL CONDITIONS OF CONTRACT
GRM	GRIEVANCE REDRESS MECHANISM
GOSVG	GOVERNMENT OF ST. VINCENT AND THE GRENADINES
HSE	HEALTH, SAFETY AND ENVIRONMENT
IDA	INTERNATIONAL DEVELOPMENT ASSOCIATION – WORLD BANK
LMP	LABOUR MANAGEMENT PLAN
MOTW	MINISTRY OF TRANSPORT, WORKS, LANDS AND SURVEYS AND PHYSICAL PLANNING
MOFEP	MINISTRY OF FINANCE, ECONOMIC PLANNING AND INFORMATION TECHNOLOGY
MSIP	MANAGEMENT STRATEGIES AND IMPLEMENTATION PLAN
NEMO	NATIONAL EMERGENCY MANAGEMENT OFFICE
NGOS	NON-GOVERNMENTAL ORGANIZATIONS
OECS	ORGANIZATION OF EASTERN CARIBBEAN STATES
OHS	OCCUPATIONAL HEALTH AND SAFETY
OHSMP	OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT PLAN
PIU	PROJECT IMPLEMENTATION UNIT
PSIPMU	PUBLIC SECTOR INVESTMENT PROGRAM MANAGEMENT UNIT
RAP	RESETTLEMENT ACTION PLANS
RC	REINFORCED CONCRETE
ROW	RIGHT-OF-WAY
SPD	SUPPLEMENTARY PLANNING DOCUMENT
TCL	TRINTOPLAN CONSULTANTS LIMITED
TMP	TRAFFIC MANAGEMENT PLAN
SEP	STAKEHOLDER ENGAGEMENT PLAN
SVG	ST. VINCENT AND THE GRENADINES
VAC	VIOLENCE AGAINST CHILDREN
VEEP	VOLCANIC ERUPTION EMERGENCY PROJECT
USD	UNITED STATES DOLLAR
WGM	WORKERS GRIEVANCE MECHANISM
WMP	WASTE MANAGEMENT PLAN

THIS PAGE IS INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Authorization and Layout 1
1.2 Project Overview 2
1.3 Description of the Project 5
1.4 Approach to Preparing ESMP 5
1.5 Format of Procedures 8
2 POLICIES, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK 9
2.1 National Policies 9
2.2 National Legislation 9
2.3 Regional and International Guidelines 10
2.4 Regulatory Agencies 10
3 MANAGEMENT STRUCTURE 11
3.1 Construction Phase 11
3.1.1 Owner 11
3.1.2 Supervising Engineer 17
3.1.3 Environmental Safeguard Specialist 18
3.1.4 Social Safeguard Specialist 19
3.1.5 Contractor 20
3.2 Maintenance Phase 22
3.3 Record Keeping 25
3.3.1 Construction Phase 25
3.3.2 Maintenance Phase 25
3.4 Reporting 26
3.4.1 Construction Phase 26
3.4.2 Maintenance Phase 26
3.5 Corrective / Preventative Actions 26
3.5.1 Construction Phase 26
3.5.2 Maintenance Phase 27
3.6 Audit and Review of the ESMP 28
4 STAKEHOLDER ENGAGEMENT 29
4.1 Design Phase 29

4.2 Preconstruction Phase 30
4.3 Construction Phase 30
5 MITIGATION ACTION PLAN 31
5.1 Design / Pre-Construction Phase 34
5.1.1 Land Acquisition 35
5.1.2 Baseline Monitoring 36
5.1.3 Preparation of Plans 36
5.1.3.1 Occupational Health and Safety Management Plan (OHSMP) 36
5.1.3.2 Community Health and Safety Plan (CHSP); 37
5.1.3.3 Waste Management Plan (WMP) 37
5.1.3.4 Traffic Management Plan (TMP) 38
5.1.3.5 Emergency Response Plan (ERP) 38
5.1.4 Condition Assessment of Road Infrastructure, Buildings and Utilities 39
5.1.5 Consultation with Utility Companies 39
5.2 Construction Actions 40
5.2.1 Physical Environment 40
5.2.1.1 On-Site Erosion 41
5.2.1.2 Slope Instability 42
5.2.1.3 Impaired Water Quality (Siltation) 43
5.2.1.4 Impaired Water Quality (Hydrocarbon Spills and Leaks) 45
5.2.1.5 Impaired Water Quality (Concrete Washings) 47
5.2.1.6 Impaired Water Quality (Toilet Waste) 48
5.2.1.7 Impaired Air Quality (Dust) 49
5.2.1.8 Impaired Air Quality (Exhaust Emissions) 51
5.2.1.9 Noise and Vibration 52
5.2.1.10 Flooding 54
5.2.1.11 Soil Contamination 55
5.2.1.12 Groundwater Contamination 57
5.2.1.13 Improper Disposal of Solid Waste 60
5.2.1.14 Artificial Light 62
5.2.2 Biological Environment 63
5.2.2.1 Loss of Vegetated Areas 63
5.2.2.2 Disturbance to Wildlife 64
5.2.2.3 Impacts to Nearshore Marine Ecosystems 66

5.2.3 Human Environment 71
5.2.3.1 Land Acquisition and Displacement of Landowners and Households . 71
5.2.3.2 Inadequate Community Engagement and Relations 73
5.2.3.3 Subproject Concerns and Grievances 74
5.2.3.4 Low Local Employment Levels 75
5.2.3.5 Under Representation of Women in the Subproject Construction Workforce 77
5.2.3.6 Occupational Health and Safety Impacts Specific to Female Workers 79
5.2.3.7 Community Gender-Based Violence 81
5.2.3.8 Worker Gender-Based Violence 82
5.2.3.9 Discovery of Unknown Cultural Heritage Assets 84
5.3 Maintenance Actions 86
5.3.1 Physical Environment 86
5.3.1.1 Impaired Water Quality (Siltation) 87
5.3.1.2 Impaired Water Quality (Hydrocarbon Spills and Leaks) 88
5.3.1.3 Impaired Air Quality (Dust) 89
5.3.1.4 Impaired Air Quality (Exhaust Emissions) 90
5.3.1.5 Noise 91
5.3.1.6 Improper Disposal of Silt/Debris 92
5.3.2 Biological Environment 93
5.3.3 Human Environment 94
5.3.3.1 Increased Traffic Volume 94
5.3.3.2 Community Health and Safety 95
6 MONITORING PLAN 96
6.1 Pre-Construction Phase Monitoring 96
6.2 Construction Phase Monitoring 97
6.3 Post-Construction Phase Monitoring 97

LIST OF FIGURES

Figure 1-1: Location Map 3
Figure 1-2: Conceptual Design Layout: London 7
Figure 3-1: Management Structure: Construction Phase 13
Figure 3-2: Management: Expanded Structure 15
Figure 3-3: Management Structure: Maintenance 23

LIST OF APPENDICES

Appendix A: Stakeholder Engagement Plan inclusive of Grievance Redress Mechanism

Appendix B: Cultural Heritage Chance Finds Procedure

Appendix C: Code of Conduct for Workers

Appendix D: Plan Preventing and Addressing Gender Based Violence

Ecoengineering Consultants Limited
62 Eastern Main Road
St. Augustine, Trinidad, West Indies

Phone: (868) 217 4420/217-6544 e-mail: ecoeng@ecoenggroup.com

Eco Report No. 21/2023 Revised April 09, 2025

MINISTRY OF FINANCE, ECONOMIC PLANNING AND INFORMATION TECHNOLOGY

CONSULTANCY SERVICES FOR DESIGN AND CONSTRUCTION SUPERVISION OF BRIDGES IN LONDON (SITE-1), NOEL (SITE-2) AND OVERLAND (SITE-3)

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN CONSTUCTION OF NEW BRIDGE AT LONDON (SITE-1)

1 INTRODUCTION

1.1 Authorization and Layout

Trintoplan Consultants Limited (TCL) was contracted by the Ministry of Finance, Economic Planning and Information Technology of Saint Vincent and the Grenadines (SVG) to undertake consultancy services for the design and construction supervision of three bridges at London (Site-1), Noel (Site-2) and Overland (Site-3), located on the North Windward side of Saint Vincent (see Figure 1-1). Trintoplan sub-contracted Ecoengineering Consultants Limited to conduct and document an Environmental and Social Impact Assessment (ESIA) and prepare an Environmental and Social Management Plan (ESMP) for the construction of each of these bridges. This ESMP is specific to the construction of a new bridge across the Agrika River at London (Sandy Bay) (see Figure 1-1: Location Map).

This ESMP consists of 6 Chapters and 5 Appendices. The remainder of this introductory chapter presents the background of the project, describes the approach to preparing this ESMP and summarizes the format of the procedures used in this ESMP. Chapter 2 presents the legislative and institutional framework which will guide the construction of the new bridge. Chapter 3 describes the management arrangements for implementing the environmental aspects of this project, while Chapter 4 makes recommendations for stakeholder engagement. Chapter 5 presents, in tabular format, the procedures necessary to mitigate potential impacts and validate the implementation of those measures. Finally, Chapter 6 provides a summary of the monitoring to be conducted.

1.2 Project Overview

The Government of Saint Vincent and the Grenadines (GoSVG) has received financing from the International Development Association - World Bank (IDA) toward the cost of the Volcanic Eruption Emergency Project (VEEP) and intends to apply part of the proceeds of this loan to payments for goods, works, non-consulting and consulting services to be procured under this project. The Ministry of Transport, Works, Lands and Physical Planning (MoTW) in collaboration with the Roads, Buildings and General Services Authority (BRAGSA) has identified a number of priority investments to reduce the country's physical and economic vulnerability to adverse natural events.

As such, one of the priority investments is the construction of three (3) permanent bridges in London (Sandy Bay), Noel (Sandy Bay) and Overland which is located on the North Windward side of the island. These two-lane bridge systems with foot walks are to be used to maintain continuous access from one village to another, cross uneven ground, and ford obstacles so that residents can conduct their daily activities without disruptions.

The budget for the environmental and social mitigation to be delivered within the design and during implementation will be made available. The cost for mitigation during construction should be considered as per the Supplementary Planning Document (SPD) guidance, and namely an incidental part of the main Bil of Quantities (BoQ) items.

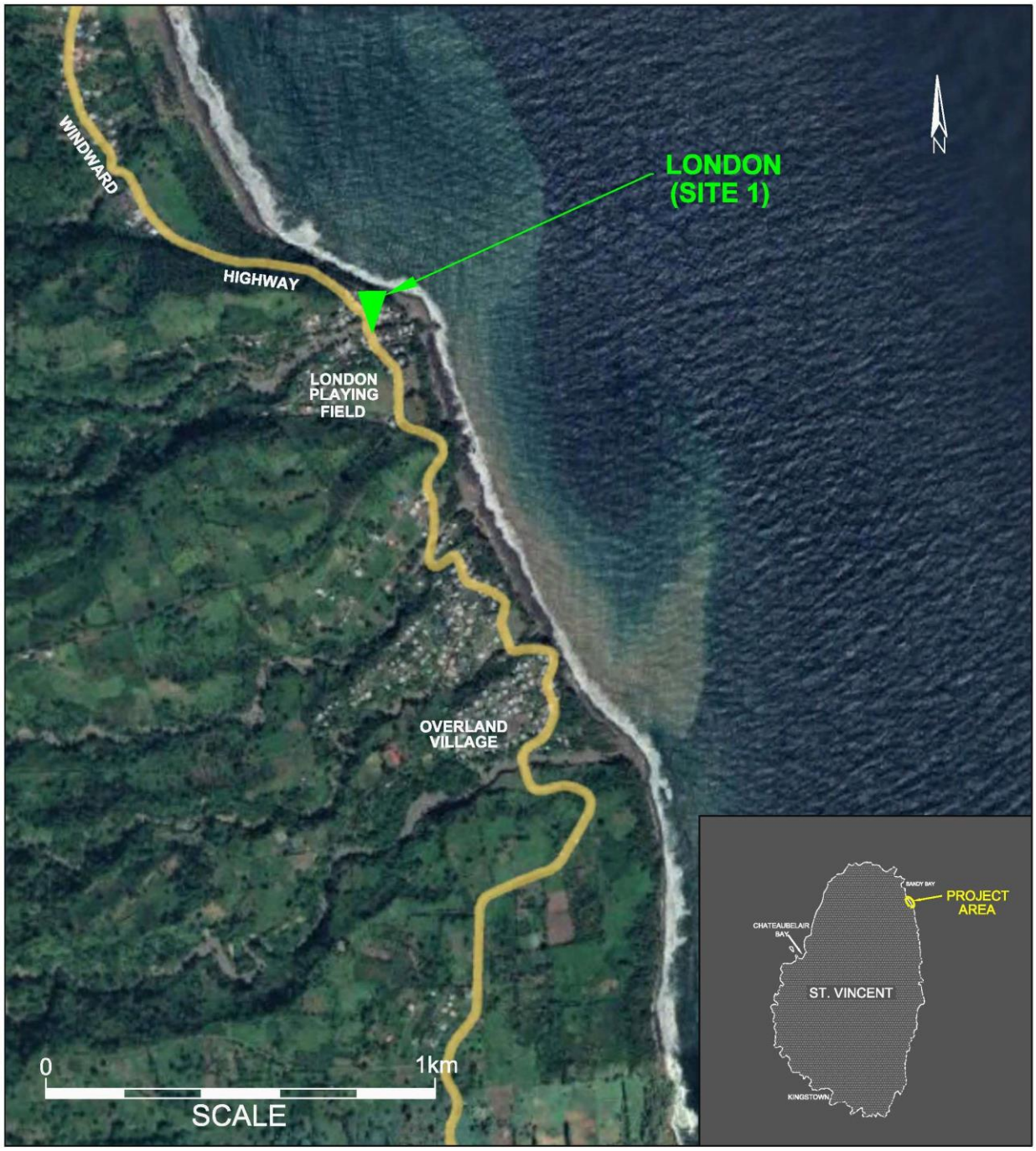

FIGURE 1-1: LOCATION MAP

THIS PAGE IS INTENTIONALLY LEFT BLANK

1.3 Description of the Project

The existing crossing at the London Bridge is an 8 m span x 5 m wide box culvert with a soffit approximately 3 m above the existing riverbed. This river has had a history of overtopping and blockage during storm events. Therefore, the waterway opening area is currently inadequate to accommodate the stormwater flows and the lahar flows. A new bridge of an adequate size is therefore needed to accommodate the runoff anticipated from the design storm events. A Reinforced Concrete Deck Slab spanning between cast in place concrete abutments and supported on reinforced concrete beams is proposed for the London site. The bridge, 15 m wide, clear span with a minimum clear depth of 3 m will be constructed downstream of the existing culvert crossing. In addition to construction of the new bridge, the following channel improvements/ scour protection works are recommended:

- Concrete lining under bridge as well as 100 m upstream and 50 m downstream for a width of 15 m and side walls of 2.5 m high.
- River training works downstream of the bridge along the southern bank only to protect the existing structures.
- River training work upstream.
- Wingwalls to be included to match upstream and downstream channel improvement works.

1.4 Approach to Preparing ESMP

The preparation of this ESMP involved the following steps:

- Summarize the Environmental and Social Setting at the London site (Sandy Bay).
- Summarize the Tasks to be undertaken for the construction of the new bridge at London.
- Identify the Potential Environmental and Social Impacts of the various Construction Tasks.
- Recommend appropriate Mitigation Measures to reduce (or, if possible, eliminate) Adverse Environmental and Social Impacts.
- Describe Procedures for implementing the Recommended Mitigation Measures, including assignment of responsibility; description of timing, special training requirements, special tools and material to be used; verification that the mitigation measures have been implemented; and reporting and follow-up.
- Recommend a Monitoring Plan for the Works at the London Bridge.

The results of the first four tasks listed above are contained in the ESIA, while the results of the final two tasks are provided in Chapter 5 and Chapter 6 of this ESMP, respectively.

THIS PAGE IS INTENTIONALLY LEFT BLANK

INSERT

FIGURE 1-2: CONCEPTUAL DESIGN LAYOUT: LONDON

1.5 Format of Procedures

Each Procedure in Chapter 5 relates to a particular Potential Impact identified in the ESIA (Eco Report No. 14/2023), and contains the following information:

- The potential impact to be addressed,
- Mitigation measures to minimize or eliminate the impact,
- Person responsible for implementing the mitigation measures,
- Schedule/timing for implementing the mitigation measures,
- Specialized equipment or material necessary to implement the mitigation measures, and
- Competence and training necessary to implement the mitigation measures.
- Costs for implementing mitigation measures are indicated where applicable.

In addition, the procedures specify verification, as follows:

- Type and location of verification,
- Frequency of verification,
- Person responsible for verification,
- Specialized equipment or material necessary for verification,
- Monitoring costs are indicated where applicable,
- Competence and training necessary for verification, and
- Reporting of any environmental monitoring which may be required, and/or concerns or issues which may arise.

2 POLICIES, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

This chapter presents the legislative and institutional framework which will guide the construction of the new bridge across the Agrika River at London under the following headings:

- National Policies;
- National Legislation;
- Regional and International Guidelines; and
- Regulatory Agencies.

2.1 National Policies

The construction of the new bridge at London aligns with the following national policies:

- National Physical Development Plan, 2021-2041;
- National Economic and Social Development Plan, 2013-2025;
- National Adaptation Plan, 2018-2030;
- National Climate Change Policy;
- Resettlement Policy Framework St. Vincent and the Grenadines Disaster Vulnerability Reduction Project; and
- National Action Plan Against Gender-Based Violence, 2015-2018.

2.2 National Legislation

National Legislation which will guide the construction of the new bridge at the London site include the following:

- Town and Country Planning Act,1992;
- Environmental Health Services Act, 1991;
- Waste Management Act, 2000;
- Litter Act, 1991;
- Wildlife Protection Act, 2002;
- National Parks, Rivers and Beaches Act; 2002;
- Forest Resource Conservation Act, 1992;
- Fisheries Act, 1986;
- Central Water and Sewerage Authority Act; 2007;
- Noise Control Act 2019;
- Constitution of St. Vincent and the Grenadines;
- Domestic Violence Act, 2015;
- National Trust Act, 1969;
- Preservation of Historical Buildings and Antiquities, Cap 247; and
- Land Acquisition Act of 1947.

2.3 Regional and International Guidelines

The construction of the new bridge at London will be guided by the following regional and international guidelines:

- The World Bank Environmental and Social Framework;
- VEEP Environmental and Social Framework;
- VEEP Labour Management Plan;
- VEEP Stakeholder Engagement Plan;
- VEEP Grievance Redress Mechanism;
- St. George's Declaration of Principles for Environmental Sustainability in the Organization of Eastern Caribbean States (OECS);
- World Bank Group Environmental, Health and Safety Guidelines; and
- Sustainable Development Goals.

2.4 Regulatory Agencies

The construction of the new bridge at London will adhere to the environmental and social requirements of the following agencies:

- Ministry of Urban Development, Energy, Airports, Seaports, Grenadines Affairs and Local Government.
- Ministry of Transport, Works, Urban Development and Local Government.
- Ministry of Health and the Environment, (Public Health Department).
- Ministry of Finance, Economic Planning, and Information Technology, (the Volcanic Eruption Emergency Project, (VEEP)).
- Ministry of Agriculture, Forestry and Fisheries, (Fisheries Department).
- Ministry of Transport, Works, Land and Surveys and Physical Planning, (Physical Planning Board).
- Ministry of Tourism, Civil Aviation, Sustainable Development and Culture, (Sustainable Development Unit).
- Central Water and Sewerage Authority.
- National Emergency Management Office (NEMO).
- Occupational Health and Safety Agency.

3 MANAGEMENT STRUCTURE

This Chapter describes the likely management arrangements for implementing this ESMP for the construction and maintenance of the new bridge at London.

3.1 Construction Phase

Figures 3-1 and 3-2 show the proposed organization structure for the management of the construction phase of this assignment. In this section, the terms “Owner”, “Engineer” and “Contractor” are used in the same context as in international Conditions of Contract (FIDIC, ICE, etc).

3.1.1 Owner

The GoSVG is the Owner of the project.

The Economic Planning Division (EPD) of the Ministry of Finance, Economic Planning and Information Technology (MoFEP) is responsible for the preparation of the detailed designs and bills of quantities, preparation of bidding documents and construction supervision of infrastructure works during the construction and defects liability periods for the construction of the bridges and roads.

The Project Implementation Unit (PIU) of the Public Sector Investment Program Management Unit (PSIPMU) includes the following persons who are relevant to this ESMP: a Project Engineer, the Supervising Engineer, a Communications Officer and Procurement.

THIS PAGE IS INTENTIONALLY LEFT BLANK

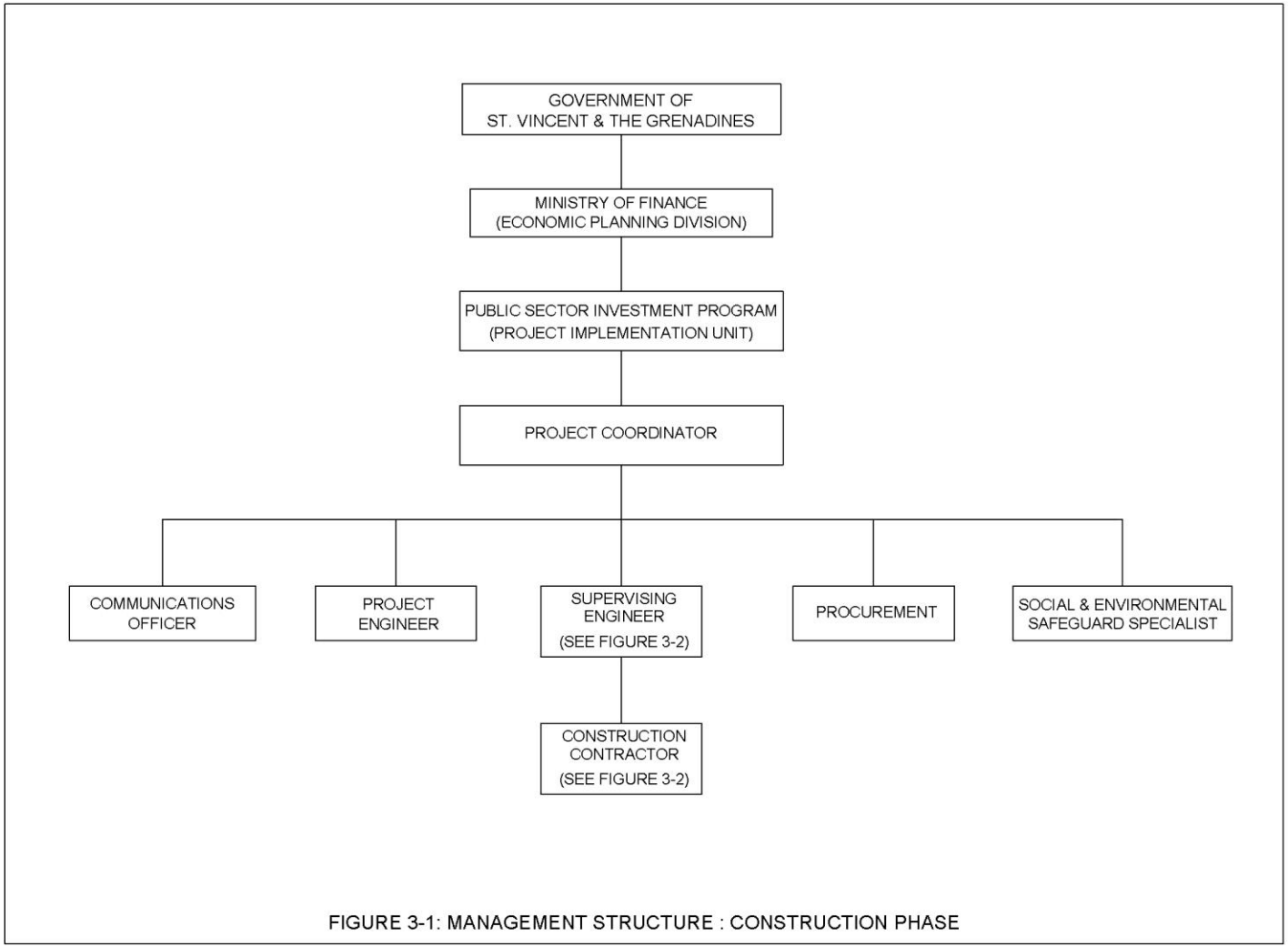

FIGURE 3-1: MANAGEMENT STRUCTURE: CONSTRUCTION PHASE

THIS PAGE IS INTENTIONALLY LEFT BLANK

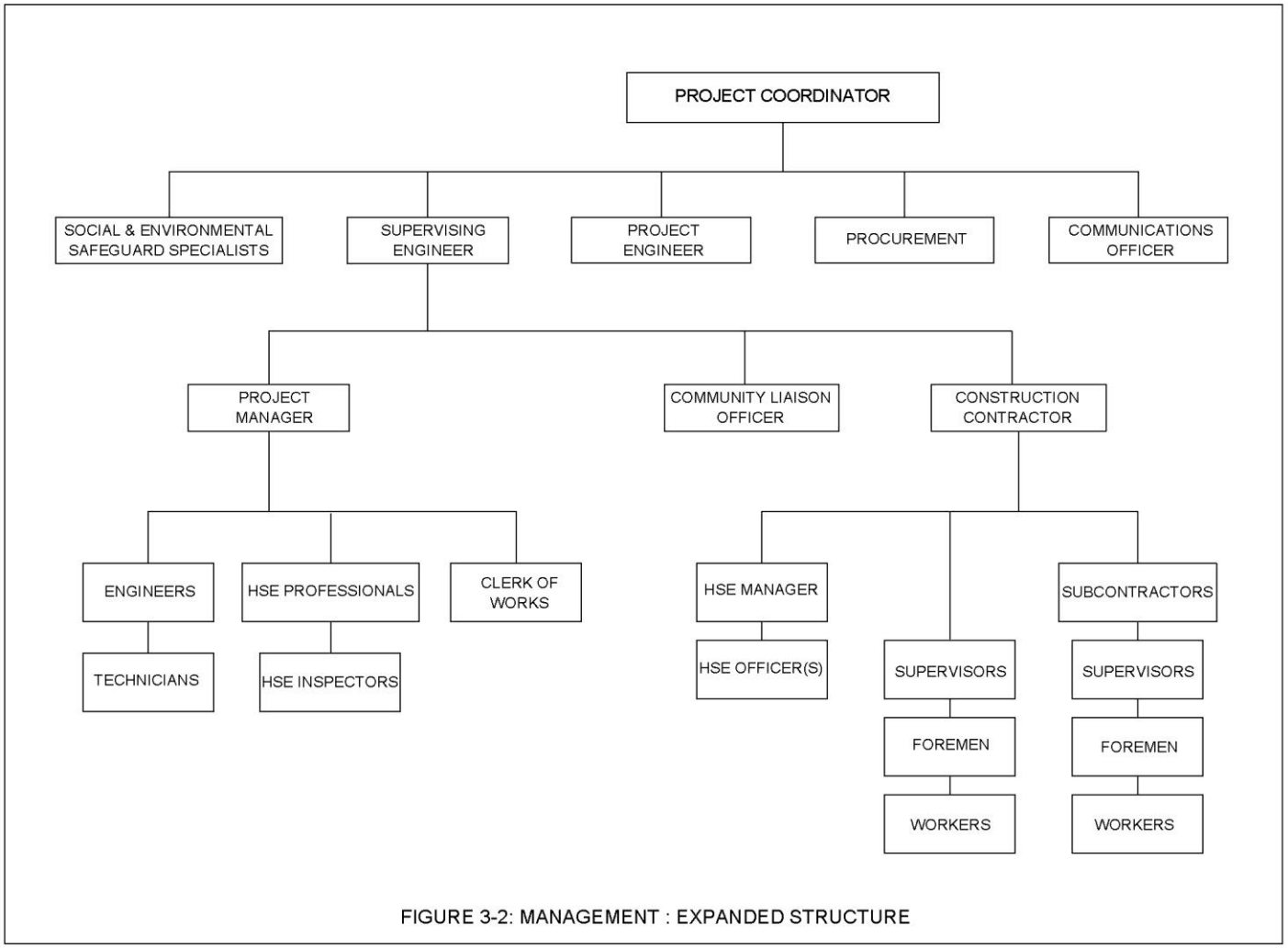

FIGURE 3-2: MANAGEMENT: EXPANDED STRUCTURE

THIS PAGE IS INTENTIONALLY LEFT BLANK

3.1.2 Supervising Engineer

The Supervising Engineer will represent the GoSVG in the day-to-day oversight of the construction works and will report to the PIU Project Management Team. Their team will be headed by a Project Manager, who will supervise a Clerk of Works, Engineers, Technicians, Health & Safety and Environmental (HSE) Professional(s) and the Contractor. A Community Liaison Officer also forms part of the Supervising Engineer's Team.

The Clerk of Works will be assigned full time on site and will verify that the works are being undertaken in accordance with the design drawing and specifications. The Clerk of Works will be provided with checklists and trained to monitor the specific environmental performance of the contractor on a day-to-day basis, supported by the Engineers. The Technicians will verify that the work is being undertaken in accordance with the contract specifications.

The HSE Professionals will review the Contractor's Health and Safety Manual and Management Strategies and Implementation Plans (MSIPs) prepared in accordance with the requirements of the Contract (especially the General Conditions of Contract and the Environmental and Safety Requirements). They will also attend site as needed to confirm that the works are being implemented in accordance with the Contract requirements. They will also confirm that the mitigation measures indicated in the ESMP are being implemented and advise the Project Manager and the Contractor of any non-compliances to be addressed. The HSE Professionals may be requested by the Project Manager to visit the site if any incident occurs which requires specialist input to resolve it.

The Supervising Engineer will:

- Verify that quantities and quality of construction materials received by the contractor meet required specifications.

- Ensure that the contractor is carrying out the work in accordance with the contract documents and communicate with the Contractor and the Owner regarding deficiencies in the work and other matters of direct interest or concern. Where necessary, check the contractor's survey lines, levels, grade, and the results of laboratory testing.

- Supervise, monitor and report on the Contractor's compliance with the ESMP.

- Arrange for all necessary testing required from the material testing laboratory for the samples collected from the completed works and carry out technical inspection of materials to ensure that they are consistent with the approved technical specifications.

- Investigate and report on all unusual circumstances that may arise during construction.

- Undertake audits and inspections of the construction site, accident logs and complaints records to verify OHS compliance by Contractors.

- Carry out final inspection at the conclusion of the construction contract as part of the acceptance program of the client.

3.1.3 Environmental Safeguard Specialist

The duties/responsibilities of the Environmental Safeguard Specialist are as follows:

- Ensure the application of the Environmental and Social Management Framework (ESMF) and the Environmental and Social Management Plans (ESMPs).

- Conduct screening as described in the ESMF and prepare and/or update the ESMF and ESMPs of the project as needed.

- Provide support for the development of Environment, Social, Health and Safety (ESHS) measures for bidding and procurement documents.

- Provide support for the review of the Contractor's Environmental and Social Management Plans.

- Monitoring compliance by consultants/contractors with the contract ESHS specifications.

- Provide support for the preparation of quarterly monitoring reports on the environmental, social, health and safety (ESHS) performance of the Project.

- Provide technical assistance as needed to ensure that the requirements of the ESMF and ESMP are met.

- Provide orientation to contractors and workers on application of ESMPs, Code of Conduct, Occupational Health and Safety Guidelines, and Labor Management Procedures, and supervise compliance.

- Work closely with key agencies including line ministries and beneficiary agencies, with aspects of infrastructure, transport, water resources, health, solid waste management, and others.

- Prepare and/or support subprojects/contractors with reports on incidents or accidents and propose measures to prevent their recurrence.

- Prepare environmental guidelines and tools in consultation with stakeholders.

- Assist in commissioning and managing additional and/ or special studies/ assessments, if necessary.

- Assist the project team in preparing the technical aspects of reports relevant to civil works.

- Conduct consultations with the relevant project beneficiaries and any Project-affected parties on a regular basis to ensure that Environmental and Social issues are addressed in a timely manner and that project beneficiaries are kept abreast of developments; document all community consultations and meetings held with project beneficiaries, local communities, stakeholders, and any project-affected parties in the form of minutes of the meetings.

- Work closely with the Social Safeguard Specialist and support preparation and/or updating of management plans such as the Labour Management Plan (LMP), Workers Grievance Mechanism (WGM), Stakeholder Engagement Plan (SEP) and the Grievance Redress Mechanism (GRM).

3.1.4 Social Safeguard Specialist

The duties/responsibilities of the Social Safeguard Specialist are as follows:

- Implement the LMP, SEP, GRM and WGM.

- Keep abreast of the implementation of the RAP.

- Prepare and/or update the social and environmental instruments such as the LMP, WGM SEP and GRM.

- As part of the LMP, develop and implement a code of conduct for the project detailing measures, to address sexual exploitation and abuse, sexual harassment, and violence against children.

- Provide orientation to contractors and workers on application of ESMPs, Code of Conduct, and Labor Management Procedures, and supervise compliance.

- Advise and instruct Project staff, consultants and other stakeholders on various social issues associated with project implementation to ensure that these issues are addressed.

- Review the Contractor's Environmental and Social Management Plans.

- Monitoring compliance by consultants/contractors with the contract ESHS specifications.

- Prepare quarterly regular monitoring reports on the ESHS performance of the Project.

- Contribute to the design and delivery of social advice to support relevant stakeholders.

- Conduct consultations with the relevant project beneficiaries and any Project-affected parties on a regular basis to ensure that Environmental and Social issues are addressed in a timely manner and that project beneficiaries are kept abreast of developments; document all community consultations and meetings held with project beneficiaries, local communities, stakeholders, and any project-affected parties in the form of minutes of the meetings.

- Assist with development and implementation of the GRM and WGM.

- Ensure that the GRM and the WGM are adapted to address complaints on Sexual Exploitation, Abuse and Harassment.

- Record, investigate and report on grievances and give follow up for the timely resolution of these.

- Prepare quarterly monitoring reports on the ESHS performance of the Project.

- Support with the organization and implementation of training to Project workers on Environmental and Social Standards, Citizen engagement, stakeholder engagement, GRM, Closing the Gender Gap, and how these relate to Monitoring and Evaluation.

3.1.5 Contractor

The Owner will hire a Contractor who will construct the bridge in accordance with the design drawings and specifications. The Contractor will report to the Supervising Engineer (see Section 3.1.2, above).

The Contractor's team will be headed by a Construction Manager, who will manage the work of his staff. The Contractor's Health, Safety and Environment (HSE) Manager will report to the Construction Manager. Each team on the Contractor's staff (earthworks, concrete works, etc.) will be headed by a Construction Supervisor, who will manage the work of foremen, skilled construction workers and labourers. The Contractor's HSE

Manager and HSE Officers will assist the Construction Manager in managing the environmental and occupational health and safety aspects of the contract.

The Contractor will be responsible for the following:

- Preparation of the Management Strategies and Implementation plans (MSIPs) in accordance with Contract requirements; and OHS Plan based on risk assessment, construction methods, site-specific hazards.

- Implementation of mitigation and monitoring measures and controls described in the ESMP and OHS Plan.

- Overseeing the occupational health and safety of his staff and sub-contractors; managing OHS performance; and ensuring compliance with all relevant OHS legislation.

- Preparing emergency response procedures for injuries and medical evacuation.

- Submitting sub-contractor's OHS procedures and plans to the Supervising Engineer for review and approval, prior to the commencement of construction activity.

- Supervising subcontractors' implementation of their labour management procedures and occupational health and safety plans.

- Maintaining records of recruitment and employment processes of contracted workers.

- Establishing clear job descriptions and employment conditions for contracted workers.

- Developing and implementing workers' grievance mechanism and addressing any grievances received from the contracted and sub-contracted workers.

- Establishing a system for regular review and reporting on labour, and occupational safety and health performance.

- Providing orientation/induction for workers and all relevant training for performing their jobs safely.

- Ensuring that all contractor and sub-contractor workers understand and sign the Code of Conduct, prior to the commencement of works.

- Providing all necessary personal protective equipment, first aid facilities and worker amenities.

- Reporting incidents and accidents to the Supervising Engineer.

- Investigating all serious accidents and implementing necessary corrective and preventive action, including revision of the OH&S Plan.

- Preparing and implementing a grievance mechanism and informing the workforce on its use.

- Preparation of separate monthly reports addressing environmental and social impacts and OHS issues.

3.2 Maintenance Phase

After the new bridge is constructed, the main environmental and social concerns will relate to maintenance. This work will largely be done by workers of the MoTW and the BRAGSA. In the event that major or non-routine repairs are required a contractor will be hired. In that case, the contractor will be supervised directly by MoTW and BRAGSA (see Figure 3-3 below).

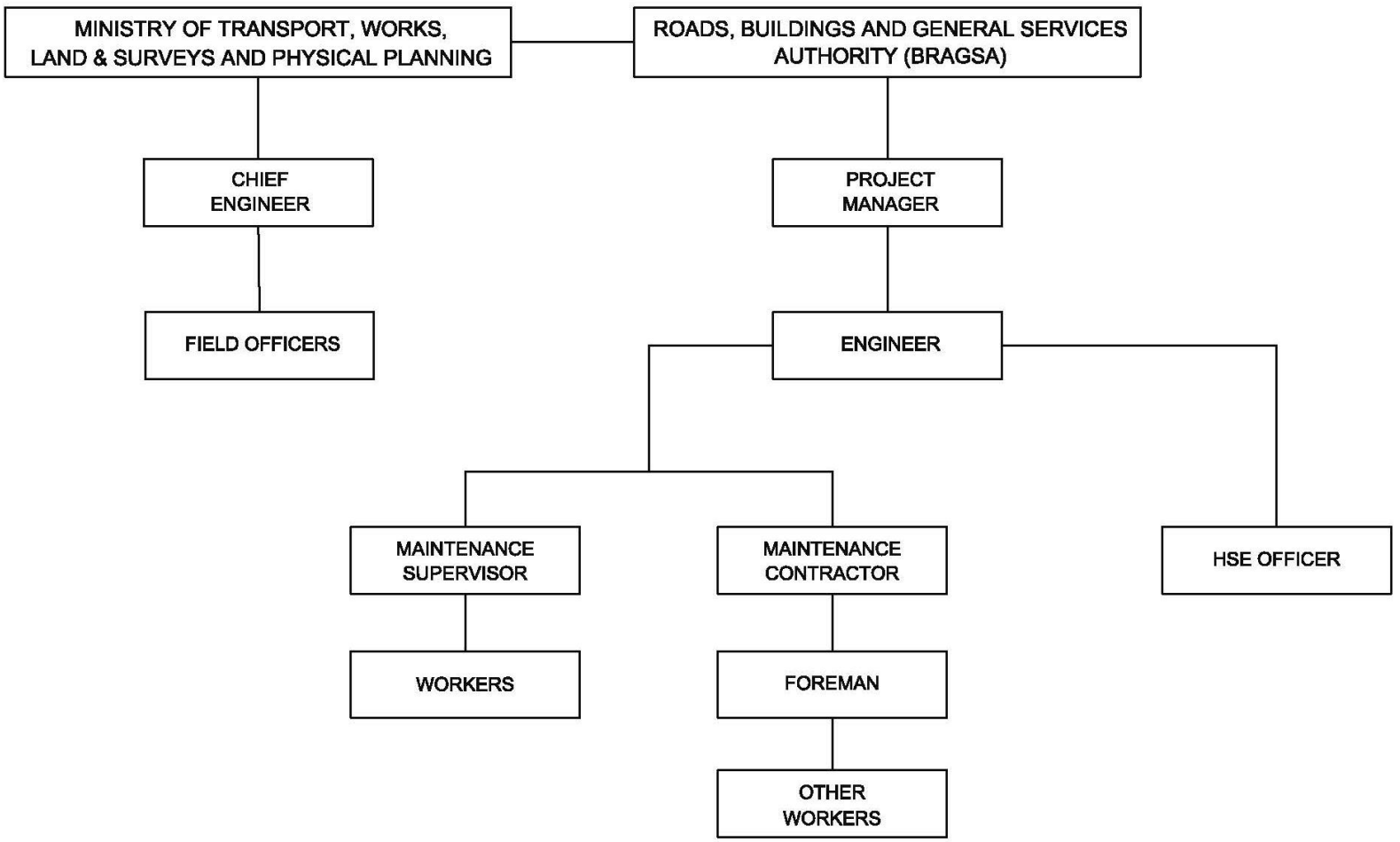

FIGURE 3-3: MANAGEMENT STRUCTURE: MAINTENANCE

THIS PAGE IS INTENTIONALLY LEFT BLANK

3.3 Record Keeping

3.3.1 Construction Phase

During the construction works, a variety of records will have to be maintained onsite by the Contractor's HSE Officer. These include:

- A register for public complaints arising from impacts such as noise, air quality, traffic, damage to infrastructure, loss of access, and health and safety concerns.
- A register for documenting how frequent garbage bins are emptied, including the haulage and disposal records.
- A register for accidents and incidents arising as a result of construction works.
- A register of spills and leaks of hydrocarbons.
- A register documenting the maintenance of vehicles and equipment.
- Inspection Checklists for instances where features being constructed are verified for compliance with the design and monitoring is undertaken.
- A register for other types of waste disposal and or remediation (hazardous wastes, remediation, etc.).
- A register of workers, role and duration of contract.

Non-compliance observations or complaints, accidents, incidents will require reporting (see Section 3.4) so that such issues can be addressed.

3.3.2 Maintenance Phase

During the maintenance phase, records will similarly need to be kept by MoTW and BRAGSA for the following items:

- A register for public complaints.
- A register for documenting how frequently bridge maintenance works are conducted (including clearing of the riverbed, cleaning of drains and culverts, etc.).
- A register for accidents and incidents occurring within the study area.

3.4 Reporting

3.4.1 Construction Phase

For the procedures provided in Chapter 5, the reporting will be as follows, unless otherwise stated:

- The Contractor's HSE Officer(s) will relay any observation of non-compliance to the HSE Manager immediately through verbal communication followed by a written report. This report will be forwarded to the Construction Manager, for onward submission to the Supervising Engineer.

- The Clerk of Works, Engineers and the HSE Professional will prepare a weekly inspection report to be forwarded to the Supervising Engineer's Project Manager, which will include a description of the Contractor's environmental performance. Reports indicating non-compliance will be forwarded to the Construction Manager for his attention.

3.4.2 Maintenance Phase

During the maintenance phase, unless provided as otherwise, Field Officers of the MoTW will relay any observation of environmental and social non-compliance to the Chief Engineer for corrective action. The Chief Engineer will discuss the nature of the problem with BRAGSA and the corrective action to be taken and will report these discussions to the Permanent Secretary of the Ministry.

3.5 Corrective / Preventative Actions

The following sub-sections describe the approach to be taken if any non-compliances with environmental standards are noted during the construction phase or the maintenance phase.

3.5.1 Construction Phase

During the construction phase, the Supervising Engineer will have HSE oversight for any non-compliance or non-conformance reported by the Engineers or Clerk of Works. At the construction site, the Contractor's HSE Officers will bring to the attention of their HSE Manager any instances of non-compliance or non-conformance. On receiving this information:

- The HSE Manager will consult with the Construction Manager, and they will agree on any necessary corrective and/or preventative actions. The Construction Manager will assign resources to undertake the required action.

- In the case of a release resulting in acute environmental damage or threat to human health, the Construction Manager will immediately proceed with the necessary corrective and/or preventative actions. This may or may not require that all construction works be stopped and will be decided based on the situation by the Construction Manager. He/she will simultaneously inform the Supervising Engineer's Project Manager of the nature of the release and that emergency corrective and/or protective works have been initiated. The Social and Environmental Safeguard Specialists will also be notified.

- For non-emergency incidents, the Construction Manager will submit to the Supervising Engineer's Project Manager, the results of the monitoring that was undertaken, a clear statement on the item of exceedance, and a description of any corrective and/or preventative measures to be undertaken. Monitoring results will also be submitted to the Environmental Safeguard Specialist.

- The Supervising Engineer's Project Manager will have the HSE Professionals on his team review the proposed corrective and/or preventative measures, and suggest improvements where necessary. The Supervising Engineer's Project Manager will advise the Construction Manager of these changes, and the Construction Manager will incorporate them into the plan and then instruct that the works proceed. The Supervising Team's Environmental Professional will visit the site to inspect and monitor the implementation of the corrective and/or preventative measures. The Social and Environmental Safeguard Specialists will also be informed of implemented corrective and/or preventative measures.

- The Supervising Engineer's Project Manager will report non- compliances to PIU. Records of these non-compliances and monitoring reports will be maintained and made available to the Ministry of Health and Environment of the GoSVG upon request.

3.5.2 Maintenance Phase

During the maintenance phase, the BRAGSA crew undertaking the upkeep or repair work will bring to MoTW's attention any environmental incidents or observations which require corrective / protection action. MoTW will seek advice from HSE Professionals within the Ministry and the Ministry of Health and Environment to agree on any necessary corrective and preventative actions. Reports of any non-compliances and the actions implemented will be prepared by MoTW and BRAGSA and forwarded to the Permanent Secretary of the MoTW.

3.6 Audit and Review of the ESMP

Following this ESMP, Management Strategies and Implementation Plans (MSIPs) will be reviewed and updated by the Contractor as needed during the construction and maintenance phases.

4 STAKEHOLDER ENGAGEMENT

ESS 10 of the World Bank's Environmental and Social Framework recognizes "the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice". Communication between project developers and key stakeholders throughout the project cycle will allow for adequate feedback and response between the parties. This is an important part of implementing environmental and social mitigation measures on any project, to inform potentially impacted parties of the protective measures implemented and to seek their buy-in to the program.

The following plans have been developed on this project:

- Stakeholder Engagement Plan inclusive of Grievance Redress Mechanism (see Appendix A),
- Cultural Heritage Chance Finds Procedure (see Appendix B),
- Code of Conduct for Workers (see Appendix C),
- Plan Preventing and Addressing Gender Based Violence (see Appendix D).

A Subproject Land Acquisition and Resettlement Plan will be prepared by the Government of St. Vincent in accordance with the Resettlement Policy Framework St. Vincent and the Grenadines Disaster Vulnerability Reduction Project.

4.1 Design Phase

As soon as this ESMP and supplementary plans have been accepted by the Economic Planning Division (EPD), it will be circulated to other Government Agencies, any Community Groups in the Study Area and any Non-Governmental Organization (NGOs) by the PIU, for their information. These groups will be invited to submit comments pertaining to the completeness of the list of potential impacts and the appropriateness of the recommended mitigation measures. These comments will then be reviewed and incorporated into a revised version of the ESMP or plan, as appropriate.

4.2 Preconstruction Phase

Upon the award of the bridge construction contract, the following consultation steps are required:

i. MoTW to advise the general public of the award of the bridge construction contract(s), the names of the successful contractors and tentative project start dates.

ii. Contractor(s) in association with MoTW and the Project Implementation Unit (PIU) to host a meeting or series of meetings with Area Residents, Community Groups, Government Agencies and NGOs to:

- advise them of the construction activities to be undertaken,
- inform them of the timing of the works, and
- sensitize them to the contents of the Grievance Redress Mechanism (see Appendix A) and the Emergency Response Plan (see Section 5.1.3.5).

The Social and Environmental Safeguard Specialists will also attend these meetings.

iii. Contractor(s) to communicate with persons living in the project area to indicate work opportunities that may be available, including necessary training and experience.

iv. Contractor(s) to communicate with NGOs which focus on women and handicapped persons to indicate work opportunities that may be available, including necessary training and experience.

4.3 Construction Phase

During the construction phase, the following consultation steps will be required:

i. MoTW and Contractor(s) to advise the general public, area residents, local farmers and road users of temporary road diversions, temporary closure of roads and temporary disruption in services and utilities; in a timely fashion prior to each event.

ii. MoTW and Contractor(s) to provide regular updates throughout the construction period to the general public, area residents, local farmers and road users on the progress of the work and any deviations from the work plan.

iii. PIU Environmental and Social Safeguard Specialist to receive and address complaints in accordance with the provisions of the Grievance Redress Mechanism (see Appendix A).

5 MITIGATION ACTION PLAN

This Chapter discusses required actions to mitigate the adverse impacts of this project during the following phases:

- Design / Pre-Construction,
- Construction, and
- Post-Construction / Maintenance of Bridge.

Tables 5-1 and 5-2 summarise the classification of the potential impacts for the Natural and Social Environments, respectively. Details of the potential impacts and the classification systems are discussed in the Environmental and Social Impact Assessment Report London (Site 1) (Eco Report No. 14/2023) which was prepared as a separate document.

TABLE 5-5-1:SUMMARY OF POST MITIGATION CLASSIFICATION (NATURAL ENVIRONMENT)

POTENTIAL IMPACT	EXTENT	INTENSITY	DURATION	CLASSIFICATION
CONSTRUCTION PHASE				
Physical Environment				
Erosion	On-site	Medium	Short Term	Low
Slope Instability	On-site	Medium	Short Term	Low
Impaired Water Quality (Siltation)	On-site	Medium	Short Term	Low
Impaired Water Quality (Hydrocarbon Spills and Leaks)	On-site	Minor	Short Term	Low
Impaired Water Quality (Concrete Washings)	On-site	Minor	Short Term	Low
Impaired Water Quality (Improper Disposal of Toilet Waste)	This Impact will be Eliminated			
Impaired Air Quality (Dust)	Regional	Medium	Short Term	Moderate
Impaired Air Quality (Exhaust Emissions)	Regional	Very Small	Short Term	Low
Noise and Vibration	Localized	Very Small	Short Term	Low
Flooding	On-site	Very Small	Short Term	Low
Soil Contamination	On-site	Very Small	Short Term	Low
Groundwater Contamination	Regional	Very Small	Long Term	Moderate

POTENTIAL IMPACT	EXTENT	INTENSITY	DURATION	CLASSIFICATION
Improper Disposal of Solid Waste	This Impact will be Eliminated			
Artificial Lighting	On-site	Very Small	Short Term	Low
Biological Environment				
Loss of Vegetated Areas	On-site	Very Small	Medium Term	Low
Disturbance to Wildlife	Localized	Very Small	Medium Term	Low
Impacts to Nearshore Marine Ecosystems	Localized	Medium	Short Term	Moderate
Post- Construction / Maintenance Phase				
Physical Environment				
Impaired Water Quality (Siltation)	Localized	Very Small	Medium Term	Low
Impaired Water Quality (Hydrocarbon Spills and Leaks)	Localized	Very Small	Medium Term	Low
Impaired Air Quality (Dust)	Localized	Very Small	Medium Term	Low
Impaired Air Quality (Exhaust Emissions)	On-site	Very Small	Medium Term	Low
Noise	Localized	Very Small	Medium Term	Low
Improper Disposal of Silt/Debris	This Impact will be Eliminated			
Biological Environment				
Disturbance to Wildlife	On-site	Very Small	Medium Term	Low
Impacts to Nearshore Marine Ecosystems	This Impact will be Eliminated			

TABLE 5-2: SUMMARY OF POST MITIGATION CLASSIFICATION (SOCIAL ENVIRONMENT)

POTENTIAL IMPACT	NATURE/INTENSITY/SENSITIVITY	CLASSIFICATION
Construction Phase		
Land Procurement	Short-term direct and indirect changes caused by subproject implementation, but with no long-term change or consequences to people's way of life and well-being. Affected receptors either easily adapt to changes or proceed with their 'normal life'.	Minor
Community Engagement and Relations		Minor
Local employment and livelihoods,		Minor
Community health and safety,		Minor
Damage to Windward Highway		Minor
Traffic Delays		Minor
Under-representation of Women in Subproject Workforce		Minor
Occupational Health and Safety Hazards for Women		Minor
Gender Violence and Sexual Harassment	Direct or indirect impacts practically do not change the social baseline conditions, local in extent and short term (temporary) in duration; impacts do not adversely affect the local community/project area.	Negligible
Cultural heritage resources		Negligible
Post- Construction / Maintenance Phase		
Traffic Volume	Direct or indirect impacts practically do not change the social baseline conditions, local in extent and short term (temporary) in duration; impacts do not adversely affect the local community/project area.	Negligible
Community Health and Safety		Negligible

5.1 Design / Pre-Construction Phase

The following actions are required prior to the start of construction works:

- Land Acquisition;
- Baseline Monitoring;
- Preparation of Plans;
- Condition Assessment of Roads and Bridges; and
- Consultation with Utility Providers.

Each action is summarized below in tabular format, indicating the party responsible for undertaking the action, the timing of the action and the party responsible for verifying that the action was taken.

5.1.1 Land Acquisition

As noted in the Feasibility Study, the proposed alignment at London would result in the need for the relocation of the houses presently in the immediate vicinity of the roadway. In addition, temporary laydown areas will also have to be acquired close to the respective sites. For example, potential areas in the southern limit of the Lahar Demarcation zone sites at London may be suitable provided the houses have been demolished.

Actions	• Social Safeguard Specialist to conduct a formal survey of affected persons, properties, and businesses in the London Bridge Right of Way (RoW) to fully understand land ownership and management and the complexities that would arise from land acquisition and compensation claims. • Provide compensation for the loss of assets (property – land and structures) at full replacement cost to landowners (persons with legal rights to land or recognisable claims under Saint Vincent and the Grenadines law). • Provide compensation to business owners for the cost of re-establishing business activities at a different location, transferring and reinstalling business equipment, and for income lost during the transition period.
Action By	▸ Physical Planning Department and Housing Department to conduct a census of affected homeowners and households. ▸ Social Safeguard Specialist to consult with project affected persons. ▸ The Land and Survey Department to valuate properties and provide technical advice to Physical Planning Department and PIU in negotiating with affected property owners, land users, and households. ▸ PIU to pay compensation to affected parties.
Timing	Actions to be undertaken during the preconstruction phase of the Subproject.
Cost	Cost of the compensation package will be determined during the preconstruction stage.
Verification	▸ The Department of Physical Planning to maintain an inventory of affected landowners, lessees and households, including value of land and other assets and compensation amounts. ▸ Department of Physical Planning and legal department to maintain database of legal documentation

5.1.2 Baseline Monitoring

Air Quality, Noise and Surface Water Quality monitoring should be undertaken prior to the start of construction (see Chapter 6) to establish baseline conditions against which monitoring results during later phases can be compared. The responsibilities for baseline monitoring are summarized in Table 6.1.

Actions	Conduct ambient monitoring for the following parameters: • Air Quality; • Noise; • Surface Water Quality; and • Nearshore Marine Water Quality.
Action by	HSE Manager
Timing	Before the start of Site Preparation and Construction
Cost	Air quality monitoring at 2 locations (upwind and downwind): USD 4200 Noise Monitoring at 1 location (nearest sensitive receptor): USD 4000 Surface Water Quality Monitoring at 2 locations (within river upstream and downstream of project site): USD 4200 Nearshore Water Quality Monitoring at 2 locations: USD 4200
Verification by	Supervising Engineer's Project Manager

5.1.3 Preparation of Plans

The following Plans should be prepared prior to the start of construction:

- Occupational Health and Safety Management Plan (OHSMP);
- Community Health and Safety Plan (CHSP);
- Waste Management Plan (WMP);
- Traffic Management Plan (TMP); and
- Emergency Response Plan (inclusive of a Spill Control Plan) (ERP).

Responsibilities for preparing each of these plans are listed below.

5.1.3.1 Occupational Health and Safety Management Plan (OHSMP)

Actions	Prepare an OHSMP in accordance with the requirements of the Ministry of Labour, the VEEP Labour Management Procedures and the VEEP ESMF. The Plan should indicate potential health and safety risks, the means through which these risks should be minimized, and the necessary personnel and resources required to implement these measures.
Action by	Construction Manager to delegate.
Timing	To be submitted as part of their Bid Documents.
Cost	To be submitted as part of their Bid Documents.
Verification by	Environmental and Social Safeguard Specialists

5.1.3.2 Community Health and Safety Plan (CHSP);

Actions	Prepare a CHSP in accordance with the VEEP ESMF and the requirements of the Ministry of Health, Wellness and the Environment. The Plan should include risks to surrounding communities in relation to road safety, sexual exploitation and abuse (SEA)/sexual harassment (SH), outbreak and spread of diseases and women in the workplace and the measure through which these risks will be minimized, and the necessary personnel and resources required to implement these measures.
Action by	Construction Manager to delegate.
Timing	To be submitted as part of their Bid Documents.
Cost	To be submitted as part of their Bid Documents.
Verification by	Environmental and Social Safeguard Specialists

5.1.3.3 Waste Management Plan (WMP)

Actions	Prepare a WMP to include, but not be limited to the following: Identification of solid and hazardous waste streams. • Provision of secured receptacles for the disposal of wastes. Separate containers should be used for food wastes, domestic wastes and construction debris. • Schedule for which the containers will be emptied, by whom (a suitable waste disposal company) and their disposal locations (an approved landfill). • Provision of portable toilets on site, as well as a schedule for which the toilets will be emptied, by whom (a suitable waste disposal company) and their disposal locations (an approved facility). This WMP should also include storage, handling, transport and disposal of any hazardous waste (such as hot mix asphalt, fuel (diesel), lubricating oils and hydraulic fluids, etc).
Action by	Construction Manager to delegate.
Timing	To be submitted as part of their Bid Documents.
Cost	To be submitted as part of their Bid Documents.
Verification by	Supervising Engineer's Project Manager.

5.1.3.4 Traffic Management Plan (TMP)

Actions	Prepare a TMP in consultation the Royal St. Vincent and the Grenadines Police Force and the MoTW. The TMP will require information on the existing traffic along main haulage routes to the project site; as well as an understanding of additional traffic that would be generated by the project during the construction (types and sizes of vehicles, numbers of vehicles and trips, loading and off-loading requirements, etc.). The Plan should include: • Provision for consultation with the Police Service and MoTW to conduct an assessment of the roadways and bridges to be traversed and how they may be upgraded to allow for the safe passage of heavy vehicles. • Provision for the repair of damaged roads and/or bridges as a result of construction works. • Routes and schedule for the transport of material and equipment to and from the site. • Notification to road users and area residents of the proposed works. • Provision for the supply and adequate placement of traffic signs.
Action by	Construction Manager to delegate.
Timing	One month prior to the start of construction.
Cost	Approximately USD 3,000.00.
Verification by	Supervising Engineer's Project Manager.

5.1.3.5 Emergency Response Plan (ERP)

Actions	Prepare an ERP in consultation with key emergency response agencies, to guide response to incidents and accidents which may occur during the construction phase of this project. This plan should consist of the following main sections: ▸ General Guidance, ▸ Emergency Response Team, ▸ Emergency Preparedness, ▸ Communication, ▸ Emergency Procedures, and ▸ Spill Control Plan.
Action by	Construction Manager to delegate.
Timing	To be submitted as part of their Bid Documents.
Cost	To be submitted as part of their Bid Documents.
Verification by	Supervising Engineer's Project Manager.

5.1.4 Condition Assessment of Road Infrastructure, Buildings and Utilities

The Conceptual Report has identified narrow bridge crossings, fordings/bailey bridges at Noel and Overland, restricted access through the Byera Tunnel and a single lane culvert at the God Save the Queen River as road conditions which would need to be considered in the construction of the new bridge at London. In addition, there are buildings and utilities in close proximity to the construction site. As such, a condition survey should be undertaken prior to the commencement of construction work, to ensure that load limits, etc, are not exceeded. Responsibilities are summarized as follows:

Actions	• Conduct a condition assessment of all roads, culverts and bridges which are located along the access routes to the project site to document the current state of these structures and, determine if they are capable of bearing the expected load capacity. This should be done in collaboration with the MoTW. • Inspect buildings and utilities (if any) in close proximity to the project site to assess any future claims made for damage as a result of construction activities.
Action by	Construction Manager to delegate.
Timing	One month prior to the start of construction.
Cost	No additional cost, such assessment is a normal part of the management of the construction works.
Verification by	Supervising Engineer's Project Manager.

5.1.5 Consultation with Utility Companies

This task must be undertaken to guard against damage to infrastructure during construction. Responsibilities are as follows:

Actions	Consult with utility providers in order to verify the location of existing infrastructure (overhead and buried cables, etc.) in proximity to the proposed site prior to earthworks and construction in order to avoid direct damage of infrastructure.
Action by	Construction Manager.
Timing	One month prior to the start of construction.
Cost	No additional cost, a such consultation is a normal part of the management of the construction works.
Verification by	Supervising Engineer's Project Manager.

5.2 Construction Actions

These actions are the primary focus of this ESMP, and procedures for implementing the necessary mitigation measures are provided in three parts:

- Physical Environment;
- Biological Environment; and
- Human Environment

5.2.1 Physical Environment

This Section provides procedures to address impacts to the physical environment under the following headings:

- Erosion
- Slope Instability
- Impaired Water Quality (Siltation)
- Impaired Water Quality (Hydrocarbon Spills and Leaks)
- Impaired Water Quality (Concrete Washings)
- Impaired Water Quality (Improper Disposal of Toilet Waste)
- Impaired Air Quality (Dust)
- Impaired Air Quality (Exhaust Emissions)
- Noise and Vibration
- Flooding
- Soil Contamination
- Groundwater Contamination
- Improper Disposal of Cleared Vegetation
- Improper Disposal of Demolition Rubble
- Improper Disposal of Other Construction Solid Waste
- Artificial Lighting.

5.2.1.1 On-Site Erosion

5.2.1.1 POTENTIAL IMPACT	ON-SITE EROSION
MITIGATION MEASURES	▸ To the extent practical, conduct major earthworks during the dry season; ▸ Maintain natural vegetation to the extent practical. Only clear areas that are needed for construction or stockpiling; ▸ Re-surface roadway and re-vegetate cleared areas as early as practical; and ▸ Keep temporarily stored stockpiles of construction aggregate to a safe distance away from watercourse and ensure that they are confined (using straw bales, wooden cribs etc.). ▸ Install scour protection such as riprap aprons upstream and downstream of bridges and at other critical locations along the channel (such as sharp bends) where the potential for on-going in-channel erosion is deemed to be significant.
ACTION BY	Construction Manager to ensure the implementation of all mitigation measures.
TIMING	Construction Period
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Wooden Cribs ▸ Geotextile Material
HSE COMPETENCE AND TRAINING	None required.
COST	Included in the normal construction costs - Construction Contractor to cost for: • Re-surfacing, • Re-vegetating, and • Providing straw bales, wooden cribs, geotextile material, etc..
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ The Supervising Team's Clerk of Works to oversee the extent of site clearing. ▸ The Supervising Team's Engineer to conduct weekly site inspections for signs of erosion on a weekly basis and following rainfall events.
SPECIALIZED EQUIPMENT OR MATERIAL	Inspection Checklist
HSE COMPETENCE AND TRAINING	None required.
RECORD KEEPING	Inspection Checklists by Contractor's HSE Officer and Supervising Team's HSE Professional.
REPORTING	Supervising Team's Engineer to report signs of erosion; and the Clerk of Works to report on clearing activity to Supervising Team's Project Manager so that the Construction Contractor can be instructed to take corrective and preventive action.

5.2.1.2 Slope Instability

5.2.1.2 POTENTIAL IMPACT	SLOPE INSTABILITY
MITIGATION MEASURES	▸ Ensure that slopes are cut to a safe angle of repose based on soil strength as determined by geotechnical investigation and install shoring as necessary.
ACTION BY	Construction Manager
TIMING	▸ Slope angles to be determined prior to the start of construction works. ▸ Other measures during the construction period.
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Wooden Cribs, ▸ Geotextile Material, and Shoring.
HSE COMPETENCE AND TRAINING	None Required.
COST	Included in normal construction costs. Construction Contractor to cost for: • Re-surfacing, • Re-vegetating, • Straw bales, wooden cribs, geotextile material, etc., and • Shoring.
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ The Supervising Team's Engineer to: - verify that the slopes are cut at a safe angle of repose, - conduct site inspections on a weekly basis and after rainfall events to identify any signs of slope failure, and - conduct weekly site inspections for signs of erosion and following heavy rainfall. - The Supervising Team's Clerk of Works to oversee the extentof site clearing.
SPECIALIZED EQUIPMENT OR MATERIAL	Inspection Checklist
HSE COMPETENCE AND TRAINING	None required.
RECORD KEEPING	Inspection Checklists by Supervising Team's HSE Professional.
REPORTING	• Supervising Team's Engineer to report on signs of erosion and slope failure; and Clerk of Works to report on clearing activity to their Project Manager so that the Construction Contractor can be instructed to take corrective and preventive action.

5.2.1.3 Impaired Water Quality (Siltation)

5.2.1.3	POTENTIAL IMPACT	IMPAIRED WATER QUALITY (SILTATION)
MITIGATION MEASURES		Erosion and slope instability may contribute to siltation. The mitigation measures to address these include: <u>Erosion</u> ▸ To the extent practical, conduct major earthworks during the dry season; ▸ Maintain natural vegetation to the extent practical. Only clear areas that are needed for construction or stockpiling; ▸ Re-surface roadway and re-vegetate cleared areas as early as practical; and ▸ Keep temporarily stored stockpiles of construction aggregate to a safe distance away from watercourses and ensure that they are confined (using straw bales, wooden cribs etc.). <u>Slope Instability</u> ▸ Ensure that slopes are cut to a safe angle of repose based on soil strength as determined by geotechnical investigation and install shoring as necessary. Additionally: ▸ Install silt barriers downstream of the work area (to the extent practical) to limit the introduction of silt into the nearshore marine environment.
ACTION BY		Construction Supervisor
TIMING		▸ Slope angles to be determined prior to the start of construction works. ▸ Other measures during the construction period.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Wooden Cribs, ▸ Geotextile Material, ▸ Shoring, and ▸ Silt Barriers.
HSE COMPETENCE AND TRAINING		Knowledge and experience in installing silt barriers, shoring, etc.
ESTIMATED COST		Construction Contractor to cost for: ▸ Re-surfacing, ▸ Re-vegetating, ▸ Straw bales, wooden cribs, geotextile material, etc., ▸ Shoring, and ▸ Silt barrier (typical cost - USD 500.00).
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ The Supervising Team's Clerk of Works to oversee the extent of site clearing. ▸ The Contractor's HSE Officer to inspect onsite stockpiles of excavated material twice weekly to ensure that material is secured / contained.

5.2.1.3	POTENTIAL IMPACT	IMPAIRED WATER QUALITY (SILTATION)
		▸ The Supervising Team's HSE Professionals to monitor Turbidity at the outfall of the Agrika River and within the nearshore marine area fortnightly during the wet season and monthly during the dry season. ▸ The Supervising Team's Engineer to: o verify that the slopes are cut at a safe angle of repose, o conduct site inspections on a weekly basis and after rainfall events to identify any signs of failure, and ▸ conduct weekly site inspections for signs of erosion on and following rainfall events.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Inspection checklist. ▸ Water Quality Meter (Turbidity)
HSE COMPETENCE AND TRAINING		Training and Competence in the use of a handheld Water Quality Meter.
RECORD KEEPING		▸ Contractor's HSE Officer to keep record of inspections. ▸ Supervising Team's HSE Professional to keep record of Turbidity monitoring results.
REPORTING		Supervising Team's HSE Professionals to report instances of high turbidity and Clerk of Works, Engineers and HSE Professional to present weekly inspection reports to the Project Manager who will instruct the Contractor to take corrective and preventive action.

5.2.1.4 Impaired Water Quality (Hydrocarbon Spills and Leaks)

5.2.1.4 POTENTIAL IMPACT	IMPAIRED WATER QUALITY (HYDROCARBON SPILLS AND LEAKS)
MITIGATION MEASURES	▸ Prepare and implement a Spill Control Plan. ▸ Provide training in spill control procedures for relevant construction personnel and implement; and ensure that all resources are made available. ▸ Keep lube oil in sealed containers to minimize spills and leaks; store in bunded, covered area with impervious floor. ▸ Ensure vehicles and construction equipment/machinery are routinely serviced to prevent mechanical issues that can lead to spills and leaks; ▸ Designate a specific area located away from the river for storage of fuels and fuelling of vehicles and equipment. Such areas should be bunded and paved; ▸ Use appropriate pumps, hoses an nozzles for refuelling and place disconnected hoses in containers after refuelling to prevent spills; ▸ Keep spill kits with absorbent pads on site to respond to spills, rather than "washing down" the area; and ▸ For small spills, such as spills whilst refuelling vehicles, the contaminated material should be removed and hauled to an authorized landfill.
ACTION BY	▸ Construction Manager to designate area for refuelling. ▸ Contractor's HSE Manager and Construction Supervisor to oversee implementation of mitigation measures.
TIMING	▸ The area for refuelling should be designated prior to the start of construction works. ▸ All other mitigation measures to be implemented throughout the construction phase.
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Spill kits. ▸ Appropriately sized and sealed containers for the storage of spent lubricants.
HSE COMPETENCE AND TRAINING	Training and competence in the use of Spill Kits.
COST	Included in the normal construction costs - Construction Contractor to cost for: ▸ Preparing Spill Control Plan, ▸ Training of spill response personnel, ▸ Construction of paved and bunded refuelling area, ▸ Spill kits, ▸ Sealed containers for the storage of spent lubricants.
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ The Supervising Team's Clerk of Works to approve the area designated for refuelling. ▸ Contractor's HSE Officer to conduct daily visual inspections on vehicles and equipment for evidence of spills and leaks in

5.2.1.4	POTENTIAL IMPACT	IMPAIRED WATER QUALITY (HYDROCARBON SPILLS AND LEAKS)
		the terrestrial environment and the presence of oil sheens on the surface of the river. ▸ The Supervising Team's HSE Professionals to: – review Contractor's records (including maintenance records, log of spills and leaks, disposal manifests, etc.) not less frequently than weekly. – conduct weekly inspections to ensure that all mitigation measures are being implemented, and that they are effective. – monitor Total Petroleum Hydrocarbons (TPH) within the river (downstream of new bridge) and within the nearshore marine area fortnightly during the wet season and monthly during the dry season.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Inspection Checklist. ▸ Suitable sampler for retrieving samples to be tested for TPH, ▸ Sealed, sterilized sample bottles, and ▸ Cooler for storing samples in transit to the lab.
HSE COMPETENCE AND TRAINING		Training and Competence in surface water sampling. Accredited laboratory to conduct TPH testing.
COST		Supervising Engineer to cost for sampling and testing of TPH.
RECORD KEEPING		▸ Contractor's HSE Officer to keep records of vehicle and equipment inspections. ▸ Supervising Team's HSE Professional to keep records of spills and TPH results.
REPORTING		Supervising Team's HSE Professionals to report: ▸ Large Hydrocarbon Spills and TPH test results to the Environmental Safeguard Specialist. ▸ TPH results and inspection reports to his Project Manager to be submitted to the Construction Contractor for corrective and preventive action.

5.2.1.5 Impaired Water Quality (Concrete Washings)

5.2.1.5 POTENTIAL IMPACT	IMPAIRED WATER QUALITY (CONCRETE WASHINGS)
MITIGATION MEASURES	▸ Prohibit the discharge from concrete washings directly in the environment. ▸ Establish a well-defined earthen pit on the site into which concrete washings will be poured. This pit should be lined with plastic to avoid soil and groundwater contamination. After evaporation of the water, the hardened material should be removed and disposed at an approved landfill. ▸ All tools and equipment that come into contact with concrete must also be washed such that the wash water flows into the pit, or they must be washed in a designated area where the wash water can similarly be allowed to evaporate, and the hardened material sent for disposal at an approved landfill.
ACTION BY	▸ Construction Manager to designate area for concrete wash pit. ▸ Construction Supervisor to oversee implementation of mitigation measures.
TIMING	▸ Establish pit prior to the start of concrete works. ▸ Implement all other measures throughout the construction phase.
SPECIALIZED EQUIPMENT OR MATERIAL	None Required.
HSE COMPETENCE AND TRAINING	None Required.
ESTIMATED COST	Included in the normal construction costs – Construction Contractor to cost for constructing lined pit..
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ The Supervising Team's Clerk of Works to: – Approve area for concrete wash pit. – Verify that the concrete wash pit is adequately sized and impermeable. ▸ The Supervising Team's HSE Professionals to conduct daily site inspections to ensure the proper implementation of mitigation measures by workers.
SPECIALIZED EQUIPMENT OR MATERIAL	None Required.
HSE COMPETENCE AND TRAINING	None Required.
RECORD KEEPING	Inspection records to be kept on file by the Supervising Team's HSE Professionals.
REPORTING	The Supervising Team's HSE Professional to provide inspection reports to his Project Manager on any observation of non-compliance to be forwarded to the Construction Manager for corrective and preventive action.

5.2.1.6 Impaired Water Quality (Toilet Waste)

5.2.1.6 POTENTIAL IMPACT	IMPAIRED WATER QUALITY (TOILET WASTE)
MITIGATION MEASURES	▸ Provide portable toilets on site for workers and ensure they are routinely cleaned by an approved contractor.
ACTION BY	Construction Manager to arrange for provision of portable toilets and designate areas for their placement.
TIMING	▸ The area for placement of the portable toilets should be designated prior to the start of works. ▸ The routine removal of the units for emptying and cleaning and disposal of faecal matter to be implemented throughout the construction period.
SPECIALIZED EQUIPMENT OR MATERIAL	Portable Toilets
HSE COMPETENCE AND TRAINING	None Required.
ESTIMATED COST	Included in normal construction costs – Construction Contractor to cost for portable toilets (approximately USD 180.00 per day per unit).
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ Contractor's HSE Officer to undertake daily visual inspections of portable toilets and maintain records of inspections. ▸ Supervising Team's HSE Professionals to review inspection and cleaning records and also conduct independent inspections weekly.
SPECIALIZED EQUIPMENT OR MATERIAL	None Required.
HSE COMPETENCE AND TRAINING	None Required.
RECORD KEEPING	Inspection records by the Contractor's HSE Officer and the Supervising Team's HSE Professionals to be kept on site.
REPORTING	The Supervising Team's HSE Professional to provide inspection reports to his Project Manager on any observation of non-compliance to be forwarded to the Construction Manager for corrective and preventive action.

5.2.1.7 Impaired Air Quality (Dust)

5.2.1.7	POTENTIAL IMPACT	IMPAIRED AIR QUALITY (DUST)
MITIGATION MEASURES		▸ To the extent practical, clear only areas needed for construction, which would reduce the size of exposed areas from which dust can be released. ▸ Reinstate road surface or re-vegetate cleared areas as soon as practical. ▸ Minimize the size of stockpiles; cover smaller stockpiles or store fine aggregate material in bins or silos, to prevent exposure to wind. ▸ Optimize truck loads to reduce trips in and out of the site, which would reduce dust emissions from granular material. ▸ Implement traffic speed regulations within the construction zone, which will reduce the strength of winds created from the movement of vehicles, therefore reducing the release of dust into the air. ▸ Cover all transport vehicles (with tarpaulins etc.) moving granular materials to and from the site to prevent material load being emitted into the air as dust. ▸ Implement dust control measures at sources, including frequently wetting and/or the application of dust palliatives to bare surfaces and access ways, thereby limiting opportunities for the formation of atmospheric dust. ▸ The concrete batching and mixing plant should be located downwind of and a minimum of 500 m away from residential areas and sensitive receptors and be fitted with a high stack (30 m) to allow adequate dispersion of emissions.
ACTION BY		Construction Supervisor to ensure the implementation of all mitigation measures.
TIMING		Throughout the construction phase.
SPECIALIZED EQUIPMENT OR MATERIAL		Tarpaulins and Dust Palliatives
HSE COMPETENCE AND TRAINING		Knowledge and experience in implementing relevant mitigation measures.
COST		Included in normal construction costs – Construction Contractor to cost for: - Reinstating road surfaces, - Revegetating, - Tarpaulin (approx. USD 16.00 for 3.0 m X 3.7 m), and - Dust palliative (approx. USD 83.00 per 5-gallon bottle).
MONITORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ The Supervising Team's Clerk of Works to ensure that the area that is cleared does not exceed what is required. ▸ The Contractor's HSE Officer to conduct daily inspections to ensure that all dust control measures are implemented and maintain a Complaints register.

5.2.1.7	POTENTIAL IMPACT	IMPAIRED AIR QUALITY (DUST)
		▸ Environmental Safeguard Specialist to maintain a complaints register. ▸ The Supervising Team's HSE Professionals to: – Undertake air quality monitoring for PM_{10} and $PM_{2.5.}$ – Inspect the site weekly to ensure that mitigation measures are effective and to review the complaints register.
SPECIALIZED EQUIPMENT OR MATERIAL		• Complaints Register. • Dust monitoring equipment.
HSE COMPETENCE AND TRAINING		▸ Knowledge and experience in the use of air quality monitoring equipment. ▸ Communication skills for interacting with the public on complaints.
COST		Supervising Engineer to cost for air quality monitoring (PM_{10} and $PM_{2.5.}$)
RECORD KEEPING		▸ Contractor's HSE Officer to maintain inspection records. ▸ Environmental Safeguard Specialist to maintain complaints register. Supervising Team's HSE Professionals to maintain results of air quality monitoring.
REPORTING		Supervising Team's HSE Professionals to report air quality monitoring results to the Environmental Safeguard Specialist; and to his Project Manager to be forwarded to the Construction Manager for corrective and preventive action.

5.2.1.8 Impaired Air Quality (Exhaust Emissions)

5.2.1.8	POTENTIAL IMPACT	IMPAIRED AIR QUALITY (EXHAUST EMISSIONS)
MITIGATION MEASURES		▸ Properly service all construction equipment and machinery and transport vehicles to ensure that there are no visible exhaust emissions; ▸ Remove defective vehicles from fleet until they are repaired; ▸ Optimize trips for bringing material and/or transporting waste from the site by ensuring that the use of part-filled trucks is minimized (to the extent practical); and ▸ Turn off all engines from vehicles and equipment when not in use to reduce exhaust emissions into the atmosphere.
ACTION BY		Construction Manager to schedule the use of vehicles on site and routine servicing and maintenance. Contractor's Construction Supervisor and HSE Officer to implement all other mitigation measures.
TIMING		▸ Prepare a maintenance schedule prior to the start of works. ▸ Implement all other mitigation measures throughout the construction phase.
SPECIALIZED EQUIPMENT OR MATERIAL		None Required.
HSE COMPETENCE AND TRAINING		None Required
COST		Included in construction cost - Construction Contractor to provide for proper servicing and maintenance of vehicles.
MONTORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ The Contractor's HSE Officer (in collaboration with the Construction Manager) to maintain a log book of records of vehicle and equipment maintenance. ▸ The Contractor's HSE Officer to maintain complaints register relating to exhaust emissions from the passage of vehicles and equipment. ▸ The Supervising Team's HSE Professional to: - Undertake daily inspections on the site and note any instances of vehicles and equipment emitting abnormal quantities and quality of exhaust. - Review maintenance records for vehicles and equipment.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Vehicle Maintenance Log book. ▸ Inspection Checklist. ▸ Complaints Register.
HSE COMPETENCE AND TRAINING		▸ Competence in inspection of vehicles and equipment to observe "sooty" exhaust. ▸ Communication skills for interacting with the public on complaints.
RECORD KEEPING		▸ Contractor's HSE Officer to maintain log book inspection records.

5.2.1.8	POTENTIAL IMPACT	IMPAIRED AIR QUALITY (EXHAUST EMISSIONS)
		▸ Environmental Safeguard Specialist to maintain complaints register. ▸ Supervising Team's HSE Professionals to maintain inspection records and review complaints register.
REPORTING		Supervising Team's HSE Professionals to draw instances of persistent presence of equipment with "smoky" exhaust to the attention of the Project Manager of the Supervising Team, so that the Construction Manager can be instructed to take corrective action.

5.2.1.9 Noise and Vibration

5.2.1.9	POTENTIAL IMPACT	NOISE AND VIBRATION
MITIGATION MEASURES		▸ Regularly inspect and maintain construction vehicles and equipment (including mufflers on the equipment) to ensure noise emission control systems are properly functioning; ▸ Schedule work, particularly noise-intense construction activities during the daytime hours (e.g.7 a.m.-7 p.m.) to the extent practical; ▸ Ensure that existing acoustic controls on all noise-generating equipment are functional; ▸ Encourage operators to turn off or throttle down equipment (such as excavators, loaders etc.) whenever they are not in use; ▸ Choose alternative, low-impact equipment or methods where practical; ▸ Inform residents and other sensitive receptors such as schools and places of worship of proposed construction activities prior to the start of work; and ▸ Conduct a condition survey of nearby residential homes and provide a mechanism by which feedback can be received from affected residents so that steps can be taken to address noise and vibration complaints whenever possible.
ACTION BY		▸ Construction Manager to: – Notify adjacent receptors of any noisy activities. – Set up a vehicle and equipment maintenance schedule. ▸ Contractor's Construction Supervisor and HSE Officer to implement all other mitigation measures.
TIMING		▸ Condition Survey and informing/notifying residents and sensitive receptors of proposed noisy works to be conducted before the start of construction. ▸ All other measures throughout the Construction Period.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Knowledge in performing condition surveys. ▸ Communication skills.

5.2.1.9 POTENTIAL IMPACT	NOISE AND VIBRATION
HSE COMPETENCE AND TRAINING	▸ Construction Contractor to include the cost of the condition survey.
COST	Construction Contractor to include the cost of the condition survey.
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ The Contractor's HSE Manager or Officer to maintain a log of vehicle and equipment maintenance records. ▸ The Environmental Safeguard Specialist to enter noise complaints in the complaints register during bridge construction works. ▸ The Supervising Team's HSE Professionals to: – Conduct daily inspections and note any instances of vehicles and equipment creating excessive noise. – Review the maintenance records of vehicles and equipment and complaints register. – Conduct periodic noise monitoring at the nearest sensitive receptor.
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Complaints Register. ▸ Vehicle Maintenance Log Book. ▸ A Sound Pressure Meter.
HSE COMPETENCE AND TRAINING	▸ Training and Competence in the use of the Sound Pressure Meter. ▸ Communication skills for interacting with the public on complaints.
COST	Supervising Engineer to cost for periodic noise monitoring.
RECORD KEEPING	▸ Contractor's HSE Manager to keep record of Vehicle and Equipment Maintenance Log Book ▸ Environmental Safeguard Specialist to maintain a complaints register relating to noise during the construction phase. ▸ Supervising Team's HSE Professionals to keep record of ambient noise monitoring results and inspections.
REPORTING	▸ Instances of persistent noisy equipment and vehicles, to be reported by the Supervising Team's HSE Professionals to the Project Manager of the Supervising Team so that instructions can be given to the Construction Manager to remedy the situation. ▸ Noise monitoring reports to be submitted to the Environmental Safeguard Specialist.

5.2.1.10 Flooding

5.2.1.10	POTENTIAL IMPACT	FLOODING
MITIGATION MEASURES		▸ To the extent practical, bridge construction and associated works should be conducted during the dry season. ▸ Construct cofferdams upstream and downstream to create a dry working area. and excavate a diversion to allow water to flow around the work area, or pump water from above the upstream cofferdam back into the channel downstream of the work area.
ACTION BY		Construction Manager.
TIMING		Construct cofferdams prior to the start of works
SPECIALIZED EQUIPMENT OR MATERIAL		None Required.
HSE COMPETENCE AND TRAINING		None Required.
ESTIMATED COST		Included in the normal construction costs – Construction Contractor to cost for constructing coffer dams and supply of pumps.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ The Supervising Team's Clerk of Works and Engineer to: – Verify that cofferdams are adequately sized and properly constructed. – Conduct site inspections following heavy rainfall events.
SPECIALIZED EQUIPMENT OR MATERIAL		None Required.
HSE COMPETENCE AND TRAINING		None Required.
RECORD KEEPING		Inspection Checklists by Supervising Team's Engineer
REPORTING		Supervising Team's Engineer and Clerk of Works to report any non-compliances to their Project Manager so that the Construction Manager can be instructed to take corrective and preventive action.

5.2.1.11 Soil Contamination

5.2.1.11	POTENTIAL IMPACT	SOIL CONTAMINATION
MITIGATION MEASURES		Soil contamination can arise from the release of hydrocarbons and concrete. Mitigation measures include: <u>Hydrocarbon Spills and Leaks:</u> ▸ Prepare and implement a Spill Control Plan; ▸ Provide training in spill control procedures for relevant construction personnel and implement; and ensure that all resources are made available; ▸ Keep lube oil in sealed containers to minimize spills and leaks; store in bunded, covered area with impervious floor; ▸ Ensure vehicles and construction equipment/machinery are routinely serviced to prevent mechanical issues that can lead to spills and leaks; ▸ Designate a specific area located away from the river for storage of fuels and fuelling of vehicles and equipment. Such areas should be bunded and paved; ▸ Use appropriate pumps, hoses an nozzles for refuelling and place disconnected hoses in containers after refuelling to prevent spills; ▸ Keep spill kits with absorbent pads on site to respond to spills, rather than "washing down" the area; and ▸ For small spills, such as spills whilst refuelling vehicles, the contaminated material should be removed and hauled to an authorized landfill. <u>Concrete Washings:</u> ▸ Prohibit the discharge from concrete washings directly in the environment; ▸ Establish a well-defined earthen pit on the site into which concrete washings will be poured. This pit should be lined with plastic to avoid soil and groundwater contamination. After evaporation of the water, the hardened material should be removed and disposed at an approved landfill; and ▸ All tools and equipment that come into contact with concrete must also be washed such that the wash water flows into the pit, or they must be washed in a designated area where the wash water can similarly be allowed to evaporate, and the hardened material sent for disposal at an approved landfill.
ACTION BY		▸ Construction Manager to designate areas for refuelling and for the concrete wash pit. ▸ Contractor's HSE Manager and Construction Supervisor to oversee implementation of mitigation measures.

5.2.1.11 POTENTIAL IMPACT	SOIL CONTAMINATION
TIMING	▸ The areas for refuelling and the concrete pit should be designated and established prior to the start of construction works. ▸ All other mitigation measures to be implemented throughoutthe construction phase.
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Spill kits. ▸ Appropriately sized and sealed containers for the storage of spent lubricants.
HSE COMPETENCE AND TRAINING	Training and competence in the use of Spill Kits.
ESTIMATED COST	Included in the normal construction costs – Construction Contractor to cost for: ▸ Spill kits, ▸ Sealed storage containers for spent lubricants, ▸ Constructing lined pit for concrete washings, and ▸ Constructing paved bunded refuelling area.
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ The Supervising Team's Clerk of Works to: - Approve the areas designated for refuelling. - Approve area for concrete wash pit. - Verify that the concrete wash pit is adequately sized and impermeable. ▸ Contractor's HSE Officer to conduct daily visual inspections on vehicles and equipment for evidence of spills and leaks in the terrestrial environment and the presence of oil sheens on the surface of the river. ▸ The Supervising Team's HSE Professionals to: – Review Contractor's records (including maintenance records, log of spills and leaks, disposal manifests, etc.) not less frequently than weekly. – Conduct weekly inspections to ensure that all mitigation measures are being implemented, and that they are effective. – Monitor Total Petroleum Hydrocarbons (TPH) within the river (downstream of new bridge) and within the nearshore marine area fortnightly during the wet season and monthly during the dry season.
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Inspection Checklist, ▸ Suitable sampler for retrieving samples to be tested for TPH, ▸ Sealed, sterilized sample bottles, and ▸ Cooler for storing samples in transit to the lab.
HSE COMPETENCE AND TRAINING	▸ Training and Competence in water sampling. ▸ Accredited laboratory to conduct TPH testing.
COST	Supervising Engineer to cost for sampling and testing of TPH.

5.2.1.11	POTENTIAL IMPACT	SOIL CONTAMINATION
RECORD KEEPING		▸ Contractor's HSE Officer to keep records of vehicle and equipment inspections. ▸ Supervising Team's HSE Professional to keep records of spills, inspections and TPH results.
REPORTING		Supervising Team's HSE Professionals to report: ▸ Large Hydrocarbon Spills and TPH test results to the Environmental Safeguard Specialist. ▸ TPH results and inspection reports to his Project Manager to be submitted to the Construction Contractor for corrective and preventive action.

5.2.1.12 Groundwater Contamination

5.2.1.12	POTENTIAL IMPACT	GROUNDWATER CONTAMINATION
MITIGATION MEASURES		Groundwater contamination can arise from the release of hydrocarbons, improper disposal of concrete washings and the improper disposal of toilet waste. Mitigation measures include: <u>Hydrocarbon Spills and Leaks:</u> ▸ Prepare and implement a Spill Control Plan; ▸ Provide training in spill control procedures for relevant construction personnel and implement; and ensure that all resources are made available; ▸ Keep lube oil in sealed containers to minimize spills and leaks; store in bunded, covered area with impervious floor; ▸ Ensure vehicles and construction equipment/machinery are routinely serviced to prevent mechanical issues that can lead to spills and leaks; ▸ Designate a specific area located away from the river for storage of fuels and fuelling of vehicles and equipment. Such areas should be bunded and paved; ▸ Use appropriate pumps, hoses an nozzles for refuelling and place disconnected hoses in containers after refuelling to prevent spills; ▸ Keep spill kits with absorbent pads on site to respond to spills, rather than "washing down" the area; and ▸ For small spills, such as spills whilst refuelling vehicles, the contaminated material should be removed and hauled to an authorized landfill. <u>Concrete Washings:</u> ▸ Prohibit the discharge from concrete washings directly in the environment; ▸ Establish a well-defined earthen pit on the site into which concrete washings will be poured. This pit should be lined

5.2.1.12	POTENTIAL IMPACT	GROUNDWATER CONTAMINATION
		with plastic to avoid soil and groundwater contamination. After evaporation of the water, the hardened material should be removed and disposed at an approved landfill; and ▸ All tools and equipment that come into contact with concrete must also be washed such that the wash water flows into the pit, or they must be washed in a designated area where the wash water can similarly be allowed to evaporate, and the hardened material sent for disposal at an approved landfill. <u>Improper disposal of toilet waste:</u> < Provide portable toilets on site for workers and ensure they are routinely cleaned by an approved contractor.
ACTION BY		▸ Construction Manager to designate areas for refuelling and for the concrete wash pit and arrange for provision of portable toilets and designate areas for their placement. ▸ Contractor's HSE Manager and Construction Supervisor to oversee implementation of mitigation measures.
TIMING		▸ The areas for refuelling and the concrete pit should be designated and established prior to the startof construction works. ▸ The area for placement of the portable toilets should be designated prior to the start of works. ▸ The routine removal of the units for emptying and cleaning and disposal of faecal matter to be implemented throughout the construction period. ▸ All other mitigation measures to be implemented throughout the construction phase.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Spill kits. ▸ Appropriately sized and sealed containers for the storage ofspent lubricants. ▸ Portable toilets.
HSE COMPETENCE AND TRAINING		Training and competence in the use of Spill Kits.
ESTIMATED COST		Included in the normal construction costs – Construction Contractor to cost for: ▸ Preparing Spill Control Plan, ▸ Training of spill response personnel, ▸ Construction of paved and bunded refuelling area, ▸ Spill kits, ▸ Sealed containers for storage of spent lubricants, ▸ Constructing lined pit, and ▸ Portable toilets (approximately USD 180.00 per day per unit).

5.2.1.12	POTENTIAL IMPACT	GROUNDWATER CONTAMINATION
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ The Supervising Team's Clerk of Works to: - Approve the areas designated for refuelling. - Approve area for concrete wash pit. - Verify that the concrete wash pit is adequately sized and impermeable. ▸ Contractor's HSE Officer to: - conduct daily visual inspections on vehicles and equipment for evidence of spills and leaks in the terrestrial environment and the presence of oil sheens on the surface of the river. - undertake daily visual inspectionsof portable toilets and maintain records of inspections. ▸ The Supervising Team's HSE Professionals to: – Review Contractor's records (including maintenance records, log of spills and leaks, disposal manifests, etc.) not less frequently than weekly. – Review records of cleaning of portable toilets and also conduct independent inspections weekly. – Conduct weekly inspections to ensure that all mitigation measures are being implemented, and that they are effective. – Monitor Total Petroleum Hydrocarbons (TPH) within the river (downstream of new bridge) and within the nearshore marine area fortnightly during the wet season and monthly during the dry season.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Inspection Checklist. ▸ Suitable sampler for retrieving samples to be tested for TPH, ▸ Sealed, sterilized sample bottles. ▸ Cooler for storing samples in transit to the lab.
HSE COMPETENCE AND TRAINING		▸ Training and Competence in surface water sampling. ▸ Accredited laboratory to conduct TPH testing.
COST		Supervising Engineer to cost for sampling and testing of TPH
RECORD KEEPING		▸ Contractor's HSE Officer to keep records of vehicle and equipment inspections. ▸ Supervising Team's HSE Professional to keep records of spills, inspections and TPH results.
REPORTING		Supervising Team's HSE Professionals to report: ▸ Large Hydrocarbon Spills and TPH test results to the Environmental Safeguard Specialist. ▸ TPH results and inspection reports to his Project Manager to be submitted to the Construction Contractor for corrective and preventive action.

5.2.1.13 Improper Disposal of Solid Waste

5.2.1.13	POTENTIAL IMPACT	IMPROPER DISPOSAL OF SOLID WASTE (Cleared Vegetation, Demolition Rubble & Other Construction Waste)
MITIGATION MEASURES		▸ Develop and implement a Waste Management Plan (WMP) specific to the construction of the new bridge at Noel; ▸ Clear only areas required for construction. Maintain natural vegetative cover as far as practical in areas adjacent to the construction work; ▸ As far as practical, do not store cleared vegetation onsite instead schedule clearing to coincide with transportation to approved landfill; ▸ Cleared vegetation should be sent to approved compost sites / landfills; ▸ Temporarily store demolition rubble in a suitable area, away from water courses, until it can be transported to another site for beneficial reuse or an approved landfill for disposal; ▸ Remove demolition rubble from site as soon as practical; ▸ Collect all domestic garbage in secure receptacles for disposal at an approved landfill. No garbage should be left open or accessible to animals or allowed to litter the ground or water courses; and ▸ Avoid the burning felled vegetation and waste material (packaging materials, construction scraps etc.), on site, as burning will produce unacceptable air emissions and also poses the risk of bush/forest fires.
ACTION BY		▸ Construction Manager to prepare WMP. ▸ Construction Supervisor to ensure the implementation of all mitigation measures
TIMING		▸ WMP to be developed prior to the start of works. ▸ All other mitigation measures to be implemented throughout the construction period.
SPECIALIZED EQUIPMENT OR MATERIAL		Secure containers for the collection of food waste and other waste for temporary storage on-site.
HSE COMPETENCE AND TRAINING		Training and competence in separating recyclable waste from other waste.
ESTIMATED COST		Included in the normal construction costs – Construction Contractor to cost for: ▸ Preparing and implementing Waste Management Plan, and ▸ Storage and removal of solid waste.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ The Environmental Safeguard Specialist and Supervising Team's HSE Professionals to approve WMP and conduct inspections of the site to verify that the WMP is adhered to ▸ The Supervising Team's Clerk of Works to oversee the extent of site clearing.

5.2.1.13	POTENTIAL IMPACT	IMPROPER DISPOSAL OF SOLID WASTE (Cleared Vegetation, Demolition Rubble & Other Construction Waste)
		▸ The Contractor's HSE Officer to conduct daily site inspections to ensure that: – There is no vegetative debris within the watercourse. – Temporarily stored rubble is away from the watercourse. – All waste is adequately contained and there is no trash strewn on the ground or water course. ▸ The Contractor's HSE Manager to maintain a file of Waste Manifests on the site, and to enter any complaints concerning improperly-disposed waste into the Complaints Register. ▸ The Supervising Team's HSE Professionals to conduct inspections of the site to: – Verify that there is no vegetative debris within the watercourse. – Verify that temporarily stored rubble is away from the watercourse. – Review the Waste Manifests and the Complaints Register at least once per week, and to undertake daily inspections on the site and note any instances of improper waste disposal.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Inspection Checklist ▸ File of Waste Manifests ▸ Complaints Register
HSE COMPETENCE AND TRAINING		Communication skills for interacting with the public on complaints.
RECORD KEEPING		The following to be kept on site: ▸ The File of Waste Manifests, ▸ The Complaints Register, and ▸ Records of Site Inspections by the Contractor's HSE Officer and the Supervising Team's HSE Professionals.
REPORTING		Instances of poor housekeeping at the project site to be reported to the Project Manager of the Supervising Team who will convey this information to the Contractor for immediate corrective and preventive action.

5.2.1.14 Artificial Light

5.2.1.14	POTENTIAL IMPACT	ARTIFICIAL LIGHT
MITIGATION MEASURES		▸ Nighttime lighting should only be used to the extent that is required; and ▸ Use shielded and downward focused lighting fixtures.
ACTION BY		Construction Supervisor
TIMING		Throughout the Construction Period
SPECIALIZED EQUIPMENT OR MATERIAL		Shielded and down-ward focused lighting fixtures.
HSE COMPETENCE AND TRAINING		None Required.
ESTIMATED COST		Included in the normal construction costs – Construction Contractor to cost for appropriate lighting.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ Environmental Safeguard Specialist to receive complaints concerning “stray lighting” into the Complaints Register. ▸ Supervising Team’s HSE Professionals to review complaints register and investigate persistent complaints about light disturbance.
SPECIALIZED EQUIPMENT OR MATERIAL		Complaints Register
HSE COMPETENCE AND TRAINING		Communication skills for interacting with the public on complaints.
RECORD KEEPING		Complaints Register by the Environmental Safeguard Specialist
REPORTING		The Supervising Team’s HSE Professional(s) will report on any non-compliances to be forwarded to his Project Manager. Reports indicating non-compliance will be forwarded to the Construction Manager for corrective and preventive action.

5.2.2 Biological Environment

This Section provides procedures to address impacts to the biological environment under the following headings:

- Loss of Vegetated Areas;
- Disturbance to Wildlife; and
- Impacts to Nearshore Marine Ecosystems.

5.2.2.1 Loss of Vegetated Areas

5.2.2.1	POTENTIAL IMPACT	LOSS OF VEGETATED AREAS
MITIGATION MEASURES		▸ Clear only areas required for construction. Maintain natural vegetative cover as far as practical in areas adjacent to the construction works; and ▸ Re-vegetate temporarily cleared areas as early as practical.
ACTION BY		Contractor's Construction Supervisor
TIMING		Throughout the Construction Period
SPECIALIZED EQUIPMENT OR MATERIAL		None Required.
HSE COMPETENCE AND TRAINING		None Required.
ESTIMATED COST		Included in normal construction cost – Construction Contractor to cost for revegetating.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ The Supervising Team's Clerk of Works to oversee the extent of site clearing. ▸ The Supervising Team's HSE Inspectors to verify that no burning of vegetation occurs on site.
SPECIALIZED EQUIPMENT OR MATERIAL		Inspection Checklist.
HSE COMPETENCE AND TRAINING		None required.
RECORD KEEPING		Inspection Checklists by Supervising Engineer's Clerk of Works and HSE Inspectors.
REPORTING		Supervising Engineer's Clerk of Works and HSE Inspectors to report on any non-compliances to their Project Manager who will forward these to the Construction Contractor for corrective and preventive action.

5.2.2.2 Disturbance to Wildlife

5.2.2.2	POTENTIAL IMPACT	DISTURBANCE TO WILDLIFE
MITIGATION MEASURES		Disturbance to wildlife can occur from noise and vibration and artificial lighting and the mitigation measures to address these include: <u>Noise:</u> ▸ Regularly inspect and maintain construction vehicles and equipment (including mufflers on the equipment) to ensure noise emission control systems are properly functioning; ▸ Schedule work, particularly noise-intense construction activities during the daytime hours (e.g.7 a.m.-7 p.m.) to the extent practical; ▸ Ensure that existing acoustic controls on all noise-generating equipment are functional; ▸ Encourage operators to turn off or throttle down equipment (such as excavators, loaders etc.) whenever they are not in use; and ▸ Choose alternative, low-impact equipment or methods where practical. <u>Artificial Lighting:</u> ▸ Nighttime lighting should only be used to the extent that is required; and ▸ Use shielded and downward focused lighting fixtures.
ACTION BY		< Construction Manager to set up a vehicle and equipment maintenance schedule. < Contractor's Construction Supervisor and HSE Officer to implement all other mitigation measures.
TIMING		Throughout the Construction Period
SPECIALIZED EQUIPMENT OR MATERIAL		Shielded and down-ward focused lighting fixtures.
HSE COMPETENCE AND TRAINING		None Required.
ESTIMATED COST		Included in the normal construction costs – Construction Contractor to cost for: ▸ Appropriate lighting. ▸ Properly servicing and maintenance of vehicles and machinery.
MONITORING/VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		< The Contractor's HSE Manager or Officer to maintain a log of vehicle and equipment maintenance records. < Supervising Team's HSE Professionals to: – Observe arrangement of lighting. – Conduct daily inspections and note any instances of vehicles and equipment creating excessive noise. – Review the maintenance records of vehicles and equipment and complaints register.

5.2.2.2 POTENTIAL IMPACT	DISTURBANCE TO WILDLIFE
	– Conduct periodic noise monitoring at the nearest sensitive receptor.
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Vehicle Maintenance Log Book. ▸ A Sound Pressure Meter.
HSE COMPETENCE AND TRAINING	Training and Competence in the use of the Sound Pressure Meter.
COST	Supervising Engineering to cost for periodic noise monitoring during construction
RECORD KEEPING	< Contractor's Construction Manager to keep record of Vehicle and Equipment Maintenance Log Book. < Supervising Team's HSE Professionals to keep record of ambient noise monitoring results.
REPORTING	▸ Instances of persistent noisy equipment and vehicles, to be reported by the Supervising Team's HSE Professionals to the Project Manager of the Supervising Team so that instructions can be given to the Construction Manager to take corrective and preventive action. ▸ Noise monitoring reports to be submitted to the Environmental and Safeguard Specialist.

5.2.2.3 Impacts to Nearshore Marine Ecosystems

5.2.2.3	POTENTIAL IMPACT	IMPACTS TO NEARSHORE MARINE ECOSYSTEMS
MITIGATION MEASURES		Impacts to nearshore marine ecosystems can occur from the impairment of water quality by silt, hydrocarbons, concrete washings, improperly disposed toilet waste and solid waste and the mitigation measures for these include: <u>Silt</u> < To the extent practical, conduct major earthworks during the dry season; < Maintain natural vegetation to the extent practical. Only clear areas that are needed for construction or stockpiling; < Re-surface roadway and re-vegetate cleared areas as early as practical; < Keep temporarily stored stockpiles of construction aggregate to a safe distance away from watercourses and ensure that they are confined (using straw bales, wooden cribs etc.) and < Install silt barriers downstream of the work area (to the extent practical) to limit the introduction of silt into the nearshore marine environment. <u>Hydrocarbon Spills and Leaks:</u> ▸ Prepare and implement a Spill Control Plan; ▸ Provide training in spill control procedures for relevant construction personnel and implement; and ensure that all resources are made available; ▸ Keep lube oil in sealed containers to minimize spills and leaks; store in bunded, covered area with impervious floor; ▸ Ensure vehicles and construction equipment/machinery are routinely serviced to prevent mechanical issues that can lead to spills and leaks; ▸ Designate a specific area located away from the river for storage of fuels and fuelling of vehicles and equipment. Such areas should be bunded and paved; ▸ Use appropriate pumps, hoses an nozzles for refuelling and place disconnected hoses in containers after refuelling to prevent spills; ▸ Keep spill kits with absorbent pads on site to respond to spills, rather than “washing down” the area; and ▸ For small spills, such as spills whilst refuelling vehicles, the contaminated material should be removed and hauled to an authorized landfill. <u>Concrete Washings:</u> ▸ Prohibit the discharge from concrete washings directly in the environment; ▸ Establish a well-defined earthen pit on the site into which concrete washings will be poured. This pit should be lined with plastic to avoid soil and groundwater contamination. After evaporation of

5.2.2.3	POTENTIAL IMPACT	IMPACTS TO NEARSHORE MARINE ECOSYSTEMS
		the water, the hardened material should be removed and disposed at an approved landfill; and ▸ All tools and equipment that come into contact with concrete must also be washed such that the wash water flows into the pit, or they must be washed in a designated area where the wash water can similarly be allowed to evaporate, and the hardened material sent for disposal at an approved landfill. <u>Improper disposal of toilet waste:</u> ▸ Provide portable toilets on site for workers and ensure they are routinely cleaned by an approved contractor. <u>Solid waste</u> ▸ Develop and implement a Waste Management Plan (WMP) specific to the construction of the new bridge at Noel; ▸ Clear only areas required for construction. Maintain natural vegetative cover as far as practical in areas adjacent to the construction work; ▸ As far as practical, do not store cleared vegetation onsite instead schedule clearing to coincide with transportation to approved landfill; ▸ Cleared vegetation should be sent to approved compost sites / landfills, ▸ Temporarily store demolition rubble in a suitable area, away from water courses, until it can be transported to another site for beneficial reuse or an approved landfill for disposal; ▸ Remove demolition rubble from site as soon as practical; ▸ Collect all domestic garbage in secure receptacles for disposal at an approved landfill. No garbage should be left open or accessible to animals or allowed to litter the ground or water courses; and ▸ Avoid the burning felled vegetation and waste material (packaging materials, construction scraps etc.), on site, as burning will produce unacceptable air emissions and also poses the risk of bush/forest fires.
ACTION BY		▸ Construction Manager to ensure the implementation of all mitigation measures. ▸ Construction Manager to designate areas for refuelling, for the concrete wash pit and placement of the portable toilets. ▸ Contractor's HSE Manager and Construction Supervisor to oversee implementation of mitigation measures.
TIMING		Prior to start of construction: ▸ Determine slope angles. ▸ Designate areas for refuelling, the concrete pit and placement of the portable toilets. ▸ Development of Waste Management Plan. During construction: ▸ The routine removal of the units for emptying and cleaning and

5.2.2.3 POTENTIAL IMPACT	IMPACTS TO NEARSHORE MARINE ECOSYSTEMS
	disposal of faecal matter to be implemented throughout the construction period. ▸ All other mitigation measures to be implemented throughout the construction phase.
SPECIALIZED EQUIPMENT OR MATERIAL	< Wooden Cribs < Geotextile Material < Shoring < Silt barriers < Spill kits < Appropriately sized and sealed containers for the storage of spent lubricants < Secure containers for temporary collection and storage of food and other waste < Portable toilets
HSE COMPETENCE AND TRAINING	Knowledge and Experience in installing Silt Barriers Training and competence in the use of Spill Kits.
COST	Included in the normal cost of construction – Construction Contractor to cost for: ▸ Portable toilets (approx. USD 180.00 per day per unit), ▸ Typical cost of a Silt Trap (approx. USD 500.00), ▸ Constructing lined pit, and ▸ Preparing and implementing Waste Management Plan.
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ The Supervising Team's Clerk of Works to: - Oversee the extent of site clearing. - Approve the areas designated for refuelling. - Approve area for concrete wash pit. - Verify that the concrete wash pit is adequately sized and impermeable. ▸ The Supervising Team's Engineer to: - Verify that the slopes are cut at a safe angle of repose. - Conduct weekly site inspections and following rainfall events for signs of erosion and slope failure. - Conduct weekly site inspections and after heavy rainfall ▸ The Supervising Team's HSE Professionals to: - Collaborate with the Environmental Safeguard Specialist in reviewing the Contractor's Waste Management Plan (WMP). - Monitor Turbidity at the outfall of the Noel River and within the nearshore marine area fortnightly during the wet season and monthly during the dry season. - Monitor Total Petroleum Hydrocarbons (TPH) within the river (downstream of new bridge) and within the nearshore marine area fortnightly during the wet season and monthly during the dry season.

5.2.2.3	POTENTIAL IMPACT	IMPACTS TO NEARSHORE MARINE ECOSYSTEMS
		- Review Contractor's records (including maintenance records, log of spills and leaks, disposal manifests, etc.) weekly. - Review inspection and cleaning records for portable toilets and also conduct independent inspections weekly. - Review complaints register at least once/week and conduct site inspections noting any instances of improper waste disposal. - Verify there is no vegetative debris in the watercourse and rubble is temporarily stored away from the watercourse. - Conduct weekly inspections to ensure that all mitigation measures are being implemented, and that they are effective. ▸ The Contractor's HSE Officer to conduct daily site inspections: - To ensure that stockpiles of excavated material are secured / contained. - Of vehicles and equipment for evidence of spills and leaks in the terrestrial environment and the presence of oil sheens on the surface of the river. - Of portable toilets and maintain records of inspections. - To ensure that there is no vegetative debris within the watercourse and that temporary stockpiles of rubble are stored away from the watercourse. - To ensure that all waste is adequately contained and there is no trash strewn on the ground or in the watercourse. ▸ The Contractor's HSE Manager to maintain a file of waste manifests. ▸ The Environmental Safeguard Specialist to: - Approve the WMP and conduct site inspections to verify that the measures are adhered to. - Receive complaints concerning improperly disposed waste and maintain these into the Complaints Register.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Inspection Checklist ▸ Water quality meter (turbidity) ▸ Suitable sampler for retrieving samples to be tested for TPH ▸ Sealed, sterilized sample bottles ▸ Cooler for storing samples in transit to the lab ▸ File of waste manifests ▸ Complaints register
HSE COMPETENCE AND TRAINING		▸ Training and Competence in: - The use of a handheld Water Quality Meter. - Water sampling. ▸ Accredited laboratory to conduct TPH testing.
COST		The Supervising Engineer to cost for: ▸ Measurement of turbidity (or alternatively the purchase of a suitable water quality meter), and ▸ Sampling and testing of TPH.

5.2.2.3 POTENTIAL IMPACT	IMPACTS TO NEARSHORE MARINE ECOSYSTEMS
RECORD KEEPING	▸ Contractor's HSE Officer to keep records of vehicle and equipment inspections. ▸ Supervising Team's HSE Professional to keep records of: - Turbidity and TPH monitoring results. - Spills. - Inspection reports. - Waste manifests. ▸ Environmental Safeguard Specialist to keep record of complaints.
REPORTING	▸ Supervising Team's HSE Professionals to report to the Project Manager: - instances of high turbidity and TPH results to Large Hydrocarbon Spills and TPH test results to the Environmental Safeguard Specialist. - Site inspections. ▸ Supervising Team's Engineer to report signs of erosion and slope instability. Project Manager to instruct the Contractor to take corrective and preventive action. ▸ Large Hydrocarbon Spills to be reported to the Environmental Safeguard Specialist.

5.2.3 Human Environment

This Section addresses the potential impacts to the human environment during site preparation and the construction phase under the following headings:

- Land Acquisition and Displacement of Landowners and Households;
- Inadequate Community Engagement and Relations;
- Subproject Concerns and Grievances;
- Low Local Employment Levels;
- Under Representation of Women in the Subproject Construction Workforce;
- Occupational Health and Safety Impacts specific to Female Workers;
- Community Gender Based Violence;
- Worker Gender Based Violence; and
- Discovery of Unknown Cultural Heritage Assets.

5.2.3.1 Land Acquisition and Displacement of Landowners and Households

5.2.3.1	POTENTIAL IMPACT	LAND ACQUISITION AND DISPLACEMENT OF LANDOWNERS AND HOUSEHOLDS
MITIGATION MEASURES		▸ Fully engage the affected household members throughout all stages of the land acquisition and resettlement process, from planning, implementation to operation. ▸ Conduct field surveys, including a census, asset inventory and socio-economic survey of affected properties and households. ▸ Identify landowners and conduct a condition survey on properties that will be temporary acquired for use (as a pre-stressed pre-cast concrete yard and laydown areas for the temporary storage of construction equipment and material). ▸ Complete and implement a Resettlement Action Plan with the land acquisition and resettlement process prior to the start land clearance at the London Bridge subproject site. ▸ Hold meetings with the affected household and landowners with a view to reaching an agreement regarding land acquisition and resettlement arrangements, including the terms and conditions for resettlement and the roles and responsibilities of each party. ▸ Ensure that any compensation housing provided to the affected household and other assets are of equivalent or higher quality than their existing home and are provided within the AOI or environs. ▸ Provide relocation assistance suited to the needs of the displaced households and sufficient for them to improve or at least restore their standard of living at an alternative site.

5.2.3.1	POTENTIAL IMPACT	LAND ACQUISITION AND DISPLACEMENT OF LANDOWNERS AND HOUSEHOLDS
		This assistance must take into consideration the needs of vulnerable household members, such as older adults, persons with acute health concerns or with disabilities. ▸ Establish the use of the subproject grievance redress mechanism that is accessible to all for addressing land procurement and resettlement issues in keeping with VEEP guidelines.
ACTION BY		▸ PIU Project Engineer to conduct conditions surveys of targeted properties. ▸ Supervising Team's Social Safeguard Specialist to conduct field surveys affected properties – census, asset inventory and socio-economic survey. ▸ The Land and Survey Department to valuate properties and provide technical advice to the PIU in negotiating with affected property owners, land users, and households. ▸ PIU to pay compensation to affected parties.
TIMING		Actions to be undertaken during the pre-construction phase of the Subproject.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		Competence in: ▸ Conducting condition surveys; ▸ Conducting social surveys; ▸ Land and quantity surveys.
ESTIMATED COST		Cost of the compensation package will be determined during the preconstruction stage.
MONITORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ The PIU to maintain an inventory of affected landowners, lessees and households, including value of land and other assets and compensation and other assistance. ▸ Department of PIU and legal department to maintain database of legal documentation.
SPECIALIZED EQUIPMENT OR MATERIAL		Land Resettlement Inventory.
COMPETENCE AND TRAINING		None required
ESTIMATED COST		The cost has not been estimated and will be covered by the State.
RECORD KEEPING		Records of properties, landowners, households and individuals, assets, and compensations.
REPORTING		Draft and final report on land acquisition process and outcomes and lessons learnt.

5.2.3.2 Inadequate Community Engagement and Relations

5.2.3.1 POTENTIAL IMPACT	INADEQUATE COMMUNITY ENGAGEMENT AND RELATIONS
MITIGATION MEASURES	▸ Recruit a Community Liaison Officer (CLO) to engage stakeholders, facilitate communications with AOI communities during the construction phase and be responsible for finalising and implementing the Subproject Community Engagement Plan (CEP), including establishing a Grievance Mechanism (see Appendix A) in accordance with VEEP Stakeholder Engagement Plan and Grievance Redress Mechanism. ▸ Engage residents in discussions and reach an agreement on the scheduling of and conditions under which bridge construction works can be conducted that will ensure minimum disturbance to residents' daily lives (e.g., scheduling of construction work (days and times), access to private properties, and address nuisances and health, safety, and other community concerns relating to bridge construction, etc.).
ACTION BY	▸ Construction Contractor to recruit CLO (see Outline Subproject CEP in Appendix A). ▸ The CLO to detail and implement the CEP.
TIMING	▸ The recruitment of the CLO should be conducted prior to the start of construction.
SPECIALISED EQUIPMENT OR MATERIAL	None required.
COMPETENCE AND TRAINING	▸ Competence in Sociology and stakeholder engagement methods. ▸ Gender equality and conflict management training.
ESTIMATED COST	No separate cost. Included in the overall contract costs.
MONITORING / VERIFICATION	
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY	The Client's Communications Office to record stakeholder engagement activities in accordance with the CEP and Subproject GM.
SPECIALIZED EQUIPMENT OR MATERIAL	None required.
COMPETENCE AND TRAINING	None required.
ESTIMATED COST	No separate costs. Included in the overall construction contract costs.

5.2.3.1	POTENTIAL IMPACT	INADEQUATE COMMUNITY ENGAGEMENT AND RELATIONS
RECORD KEEPING		Reports (records) of community engagement activities (date, duration, number of participants (M/F), reason for engagement, engagement summary, follow-up actions, progress of follow-up actions).
REPORTING		Quarterly reporting on community engagement activities by. Communications Office to PIU.

5.2.3.3 Subproject Concerns and Grievances

5.2.3.3	POTENTIAL IMPACT	SUBPROJECT CONCERNS AND GRIEVANCES
MITIGATION MEASURES		Establish a transparent, fair, and impartial Subproject grievance mechanism (GM) for addressing concerns and grievances that is accessible to all residents and is in keeping with the VEEP GRM.
ACTION BY		Supervising Engineer to ensure that the CLO contract stipulates the Officer's role and responsibility toward the establishment of the Subproject GM.
TIMING		▸ The PIU, guided by the VEEP GRM, to deal with land acquisition and resettlement concerns and grievances of the affected homeowners during pre-construction. ▸ The CLO to establish the Subproject GM by the start of the construction.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required.
COST		No separate cost to implement the VEEP GRM and Subproject GM. Supervising Engineer to cost for providing Community Liaison Officer.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ The CLO to verify the number of grievances received and addressed on a monthly basis. ▸ The Supervising Team to confirm grievances by type.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required.

RECORD KEEPING	Database fields to include Grievance Reference Number; Date and Time of Grievance Submission; Preferred Mode of Communication (CLO, Grievance Box, Telephone, etc.); Type of Grievance (Labour, Service, Social, Environmental, Health and Safety, Project Execution); Grievance Details; Investigative Details (approach and methods); Classification of Grievance Level, Investigation Results; Resolution; Resolution Outcome.
REPORTING	Any non-compliance with contract conditions and the type and number of grievances by type and grievance level to be reported monthly to the Supervising Engineer's CLO to the Project Coordinator who will determine corrective and preventive action in collaboration with the Supervising Engineer and the Construction Contractor.

5.2.3.4 Low Local Employment Levels

5.2.3.4	**POTENTIAL IMPACT**	**LOW LOCAL EMPLOYMENT LEVELS**
MITIGATION MEASURES		► Include provisions in the Construction Contractor's contract to: 1. Prioritize the employment of local people, especially in qualified semi-skilled and unskilled occupations and give equal opportunity for employment to both local women and men. 2. Establish labour hiring practices, in collaboration with local leadership, that are transparent, made public, and non-discriminatory of all people seeking employment (e.g., gender, age or disability (ability). ► Advertise the Subproject throughout the AOI, ensuring that residents are fully aware of the available positions. The communication needs of the different social groups (women, youth, persons with disabilities, etc.) should be incorporated into the advertisement of employment opportunities. ► Provide appropriate skills training for persons in the AOI to increase their employment eligibility.

5.2.3.4	POTENTIAL IMPACT	LOW LOCAL EMPLOYMENT LEVELS
ACTION BY		▸ The PIU to maximise employment opportunities for AOI residents and guarantee equal access to these opportunities to all through an appropriate contractual agreement with the Construction Contractor. ▸ Construction Contractor to maximise employment of local workers and to establish a fair and transparent hiring system in collaboration with local leaders. ▸ PIU and an appropriate service provider to provide a skills training programme to increase the employability of local persons seeking jobs on the Subproject.
TIMING		▸ Provisions to maximise local employment and ensure equal employment opportunities for all to be established in the construction contract during the preconstruction phase. ▸ Guaranteed local employment opportunity levels to be established during Contractor Contract negotiations. ▸ Semi-skilled training programme to be developed and implemented during the pre-construction and construction phases. ▸ A hiring system for rotational employment of local workers to be agreed on by local leaders before the start of construction.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required.
ESTIMATED COST		No separate cost. Included in the overall construction costs.
MONITORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ Supervising Engineer to verify the number of local workers employed on a quarterly basis. ▸ Training provider to report on the implementation of training programme at the end of each training course. ▸ PIU to verify progress of the design and implementation of the training programme. ▸ Supervising Engineer's CLO to document and monitor the type and number of local employment concerns and grievances monthly. ▸ The Social Safeguard Specialist to review grievances.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required.

5.2.3.4	POTENTIAL IMPACT	LOW LOCAL EMPLOYMENT LEVELS
ESTIMATED COST		No separate cost. Included in the overall construction costs. Training programme; 185 USD per person. Assistance for transportation to and from venue should be considered for AOI persons outside of the training community.
RECORD KEEPING		Records on (Name, Age, Sex, Address, Course, Attendance (Days), Completion (Y/N), etc.). Local workers employed and type of jobs occupied by local workers.
REPORTING		▸ Supervising Engineer's CLO to report quarterly on local employment numbers by type of job to the Project Coordinator. ▸ Training provider to report on the number of individuals completing training (by sex, course and community) at end of training cycle to the Project Coordinator. ▸ The Project Coordinator will discuss corrective and preventive action with the Supervising Engineer and the Construction Contractor.

5.2.3.5 Under Representation of Women in the Subproject Construction Workforce

5.2.3.5	POTENTIAL IMPACT	UNDER-REPRESENTATION OF WOMEN IN THE SUBPROJECT CONSTRUCTION WORKFORCE
MITIGATION MEASURES		▸ Ensure qualified women are afforded equal access to job and skills training opportunities. ▸ Include a provision in the Construction Contractor's Contract encouraging the recruitment of local women for semi-skilled and unskilled positions, with a strong commitment to achieving meaningful female participation. The contractor should actively advertise job opportunities within the local community and collaborate with local organizations and training programmes to attract and prepare women for available positions ▸ Encourage the participation of local women in skills training programs within the AOI by setting a target of 40 percent female participation. Where this target is not initially met, implement outreach and awareness efforts to promote enrollment and address potential barriers to participation. ▸ Integrate gender considerations into the design, planning and implementation of the training programme and use of resources. ▸ Take proactive measures to promote job and training opportunities in a way that will attract local women.

5.2.3.5	POTENTIAL IMPACT	UNDER-REPRESENTATION OF WOMEN IN THE SUBPROJECT CONSTRUCTION WORKFORCE
		▸ Work with local organisations and community leaders to encourage women's greater participation in job opportunities and training programmes.
ACTION BY		▸ The PIU to include a stipulation in the Construction Contractor's Contract that at least 30 percent of semi-skilled and unskilled positions go to women and ensure that there is no bias against the employment of women in the construction workforce. ▸ PIU and training provider to ensure at least 40 percent of persons trained are women. ▸ The CLO to work with local organisations and community leaders to promote the semi-skilled training programme to women.
TIMING		▸ Provisions for the hiring of women as part of the construction workforce and providing equal employment opportunities for all to be established in the construction contract during the preconstruction phase. ▸ The promotion of job opportunities to women to start at least one month before hiring begins. ▸ The short-term semi-skilled training programme to be promoted at least six weeks before the start of the training courses.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		Training provider has experience in providing intense technical vocational training services in rural areas and integrating gender into training programme and courses.
ESTIMATED COST		PIU to provide for training at an estimated cost of USD450 per person.
MONITORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ The Social Safeguard Specialist to: - Confirm the number of local women that participated in and completed skills training programme. - review the gender-related employment grievances. ▸ Supervising Engineer to confirm the number of local women workers employed. ▸ The Supervising Engineer's CLO to document and monitor the type and number of gender-related local employment complaints.

5.2.3.5	POTENTIAL IMPACT	UNDER-REPRESENTATION OF WOMEN IN THE SUBPROJECT CONSTRUCTION WORKFORCE
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required
ESTIMATED COST		No separate cost. Included in the overall costs.
RECORD KEEPING		Employee records providing information on Name, Age, Sex, Address, Job Position, Job Time Tracking.
REPORTING		Supervising Engineer's CLO to report quarterly to the Project Coordinator on job numbers by worker sex, and number and type of gender-related GM complaints. The Project Coordinator will determine corrective and preventive action in collaboration with the Supervising Engineer and the Construction Contractor.

5.2.3.6 Occupational Health and Safety Impacts Specific to Female Workers

5.2.3.6	POTENTIAL IMPACT	OCCUPATIONAL HEALTH AND SAFETY IMPACTS SPECIFIC TO FEMALE WORKERS
MITIGATION MEASURES		▸ Provide separate sanitary facilities for women and men, including access to potable water and handwashing facilities with an adequate supply of soap, and ensure that the facilities are maintained and kept clean and orderly. ▸ Ensure the use of protective equipment and wear (e.g., safety goggles, helmets, etc.) suitable for use by women. ▸ Include information and sessions in the skills training programme to sensitise workers to human rights and gender sensitivity and how they relate to national laws. The sessions should be designed to be easily understood and interpreted by all.
ACTION BY		▸ The PIU to include provisions in the Construction Contractor contract to establish separate sanitary facilities for women and men and provide access to potable water and handwashing facilities. ▸ The Construction Contractor to provide separate sanitary facilities, as mandated in the construction contract, with access to potable water and handwashing facilities and ensure that women, along with men, have access to suitable protective equipment and wear. ▸ The CLO to conduct sensitisation sessions on human rights and gender sensitivity and how they relate to national laws as part of the worker HSE training.

5.2.3.6	POTENTIAL IMPACT	OCCUPATIONAL HEALTH AND SAFETY IMPACTS SPECIFIC TO FEMALE WORKERS
TIMING		▸ Provisions for sanitary facilities, including potable water and handwashing facilities for women and men, to be part of the construction contract during the preconstruction phase. ▸ Access to separate sanitary facilities, potable water and handwashing facilities to be provided at the start of construction. ▸ Worker HSE training, along with human rights and gender sensitisation sessions, to be conducted at the start of construction.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		Communication and skills training competence by Programme Instructors.
ESTIMATED COST		Included in the overall construction costs: - Construction Contractor to cost for sanitary facilities and PPE for workers. - Supervising Engineer to provide for sensitization sessions.
MONITORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ The Social Safeguard Specialist to: - confirm the conduct of sensitisation session on human rights and gender sensitivity. - review the HSE-related grievances. ▸ The Supervising Engineer's HSE Inspectors to verify the establishment of sanitary facilities, potable water and handwashing facilities.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required.
ESTIMATED COST		No separate cost. Included in the overall construction costs.
RECORD KEEPING		▸ Inspection Checklists by Contractor's HSE Officer and Supervising Team's HSE Professional. ▸ Training resources prepared by the HSE Officer and the CLO.
REPORTING		Any non-compliance observations will be relayed by Social Safeguard Specialist and the HSE Inspectors to the Supervising Engineer who will instruct the Construction Contractor on corrective and preventive action.

5.2.3.7 Community Gender-Based Violence

5.2.3.7	POTENTIAL IMPACT	COMMUNITY GENDER-BASED VIOLENCE
MITIGATION MEASURES		▸ Adopt a zero-tolerance approach toward all forms of gender-based violence (GBV) and violence against children (VAC), bullying and sexual harassment in the community to create a hassle-free, safe and positive environment for female and male workers and others at the construction site to maintain good relations with the communities. ▸ Establish a Code of Conduct for all workers and sub-contractors that promotes the respect of women, children and men and prohibits all forms of GBV in keeping with the VEEP Labour Management Plan. ▸ Ensure that all Subproject workers are compliant with the Code of Conduct. ▸ During community consultations, ensure that the residents are aware of the Worker Code of Conduct that all Subproject workers are expected to follow. ▸ Promote the use of the Subproject GM to receive and address all forms of GBV committed by workers on residents and visitors.
ACTION BY		▸ The PIU to include provisions in the Construction Contractor contract to ensure compliance with the Worker Code of Conduct. ▸ The Contractor to implement measures that ensure compliance with the GBV provisions in the contract. ▸ The CLO to increase community awareness of the Worker Code of Conduct and the Subproject zero tolerance policy towards all forms of GBV and the use of the GM.
TIMING		▸ GBV provisions to be established in the construction contract during the preconstruction phase. ▸ Implementation of the GBV measures to be guaranteed during construction. ▸ Community awareness of GBV provisions and use of the GM to be increased before and during construction.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required.
ESTIMATED COST		Included in the overall construction costs – Supervising Engineer to cost for Community Liaison Officer.

5.2.3.7	POTENTIAL IMPACT	COMMUNITY GENDER-BASED VIOLENCE
MONITORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ The Supervising Engineer's CLO to monitor GBV related concerns reported during community engagement activities and grievances received and addressed through the GM and sexual criminal offences committed by workers that are handled by the Royal St. Vincent and the Grenadines Police Force. ▸ Supervising Contractor Team to review the GBV worker-related grievances and offences.
SPECIALIZED EQUIPMENT OR MATERIAL		Electronic Grievance redress database.
COMPETENCE AND TRAINING		None required.
ESTIMATED COST		No separate cost. Included in the overall construction costs.
RECORD KEEPING		Information on the number of GBV concerns, grievances, and offences committed by Subproject employees within the communities.
REPORTING		▸ Monthly reporting of community GBV-related grievances and offences by the Supervising Engineer's CLO to the Project Coordinator. ▸ Social Safeguard Specialist to review grievances and report to the Project Coordinator. ▸ The Project Coordinator will determine corrective and preventive action in collaboration with the Supervising Engineer and the Construction Contractor.

5.2.3.8 Worker Gender-Based Violence

5.2.3.8	POTENTIAL IMPACT	WORKER GENDER-BASED VIOLENCE
MITIGATION MEASURES		▸ Adopt a zero-tolerance approach toward all forms of GBV among workers to create a hassle-free, safe and positive environment for female and male workers at the construction site. ▸ Establish a Code of Conduct for all workers and sub-contractors that promotes the respect of women and men and prohibits all forms of GBV at the construction site in keeping with the VEEP Labour Management Plan requirements and procedures. ▸ Conduct worker training regarding national law and regulations regarding GBV.

5.2.3.8	POTENTIAL IMPACT	WORKER GENDER-BASED VIOLENCE
		▸ Ensure that all Subproject workers are compliant with the Code of Conduct and the use of the Subproject GM.
ACTION BY		▸ The PIU to include provisions in the Construction Contractor contract to ensure compliance with the Subproject Code of Conduct. ▸ The Contractor to implement measures that ensure compliance with the contract's GBV provisions. ▸ The Contractor Supervisor to ensure compliance with the Code of Conduct at the construction site.
TIMING		▸ GBV provisions to be established in the construction contract prior to construction. ▸ Implementation of the GBV measures to be guaranteed during construction.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required.
ESTIMATED COST		No separate cost. Included in the overall construction costs.
MONITORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ The Supervising Engineer's CLO to monitor workplace GBV related grievances received and addressed through the GM. ▸ Social Safeguard Specialist to review the GBV worker-related concerns and grievances.
SPECIALIZED EQUIPMENT OR MATERIAL		Electronic Grievance Redress database.
COMPETENCE AND TRAINING		None required.
ESTIMATED COST		No separate cost. Included in the overall construction costs.
RECORD KEEPING		Information on the number of on-site GBV grievances and criminal offences.
REPORTING		▸ Monthly reporting of community GBV-related grievances and offences by the Supervising Engineer's CLO to the Project Coordinator. ▸ Social Safeguard Specialist to review grievances and report to the Project coordinator. ▸ The Project Coordinator will determine corrective and preventive action in collaboration with the Supervising Engineer and the Construction Contractor.

5.2.3.9 Discovery of Unknown Cultural Heritage Assets

5.2.3.9	POTENTIAL IMPACT	DISCOVERY OF UNKNOWN CULTURAL HERITAGE ASSETS
MITIGATION MEASURES		▸ Collaborate with the National Trust during the planning and construction phases on matters relating to the identification and preservation of heritage resources at the construction site. ▸ Sign off on the *Chance Finds Procedure* which sets out how the discovered finds associated with the project will be managed. The procedure includes a set of requirements if unknown cultural resources are discovered during construction. ▸ Include the Chance Finds Procedure in Construction Contractor contract which covers the construction works to be undertaken including the works conducted by sub-contractors, including excavations and earthworks, diversion of the river or other changes to the environment to accommodate or as a result of construction activities. The contract should also include requirements for training and penalties that will be incurred for the deliberate destruction and theft of discovered materials. ▸ Train project personnel, the Construction Contractor and Subproject workers on chance find procedures. ▸ Provide training to all employees and contractors on identifying and recognizing cultural heritage resources; the Chance Finds Procedure notification requirements and procedures; the identification of finds and handling of artefacts, remains, or sites identified during construction activities.
ACTION BY		▸ The PIU to finalise the Chance Finds Procedure in collaboration with the National Trust. ▸ The PIU to include a Chance Finds Procedure as part of Construction Contractor contract. ▸ The PIU, in collaboration with the National Trust, to sensitise Subproject personnel regarding the Chance Finds Procedure. ▸ The PIU, in collaboration with the National Trust, to train all construction workers on the Chance Finds Procedure and on identifying and recognizing cultural heritage resources.

5.2.3.9	POTENTIAL IMPACT	DISCOVERY OF UNKNOWN CULTURAL HERITAGE ASSETS
TIMING		► The Chance Finds Procedure to be finalised during preconstruction. ► The Chance Finds Procedure to be included in the Contractor contract during preconstruction. ► Sensitisation of the Subproject personnel about the Chance Finds Procedure to be conducted during preconstruction. ► Workers to be trained on Chance Finds Procedure during preconstruction. ► The Chance Finds Procedure to be implemented during construction.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		Competence in training persons to identify cultural heritage resources, handling of artefacts and the Chance Finds Procedure notification requirements.
ESTIMATED COST		No separate cost. Included in the overall construction costs.
		MONITORING / VERIFICATION
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		The Supervising Engineer's HSE Professional to: ► Verify Chance Finds Procedure worker training at the end of each training cycle. ► Monitor the implementation of Chance Finds Procedure.
SPECIALIZED EQUIPMENT OR MATERIAL		None required.
COMPETENCE AND TRAINING		None required.
ESTIMATED COST		No separate cost. Included in the overall construction costs.
RECORD KEEPING		Records of discovered cultural heritage finds, including destroyed and stolen assets and breach of Chance Finds Procedure.
REPORTING		► The Construction Contractor to report quarterly to the Supervising Engineer on discovered finds, methods of protection and the progress of their implementation, and any non-compliance with contract conditions regarding Chance Finds Procedure. ► The Supervising Engineer will inform the Project Coordinator who will determine the necessary actions.

5.3 Maintenance Actions

Procedures for implementing the necessary mitigation measures to address potential impacts which may arise during maintenance provided in three parts:

- Physical Environment
- Biological Environment and
- Human Environment

5.3.1 Physical Environment

This Section provides procedures to address impacts to the physical environment under the following headings:

- Impaired Water Quality (Siltation);
- Impaired Water Quality (Hydrocarbon Spills and Leaks);
- Impaired Air Quality (Dust);
- Impaired Air Quality (Exhaust Emissions);
- Noise and
- Improper Disposal of Silt/ Debris.

5.3.1.1 Impaired Water Quality (Siltation)

5.3.1.1	POTENTIAL IMPACT	IMPAIRED WATER QUALITY (SILTATION)
MITIGATION MEASURES		▸ Install silt barriers downstream of the bridge during maintenance works to limit the introduction of silt into the nearshore marine area. ▸ Avoid temporary placement of excavated silt in close proximity to the banks of the channel, from where they can be washed into the watercourse.
ACTION BY		Maintenance Supervisor or Maintenance Contractor
TIMING		During Maintenance works
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Silt Barriers
HSE COMPETENCE AND TRAINING		Knowledge and Experience in installing Silt Barriers
ESTIMATED COST		Maintenance Supervisor or Contractor to cost for silt trap (approx. USD 500.00).
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ HSE Officer to conduct daily site inspections to verify the effectiveness of silt barriers. ▸ MoTW Field Officers to conduct periodic inspections of the work site.
SPECIALIZED EQUIPMENT OR MATERIAL		Inspection Checklist.
HSE COMPETENCE AND TRAINING		None Required.
RECORD KEEPING		HSE Officer to keep record of inspections.
REPORTING		▸ Releases of silt into the nearshore marine area to be reported by the HSE Officer to the Engineer. ▸ The Engineer to instruct the Maintenance Supervisor or Contractor to take corrective and preventive action.

5.3.1.2 Impaired Water Quality (Hydrocarbon Spills and Leaks)

5.3.1.2 POTENTIAL IMPACT	IMPAIRED WATER QUALITY (HYDROCARBON SPILLS AND LEAKS)
MITIGATION MEASURES	▸ Ensure vehicles and construction equipment/machinery are routinely serviced to prevent mechanical issues that can lead to spills and leaks; ▸ Keep spill kits with absorbent pads on site to respond to spills, rather than "washing down" the area; and ▸ For small spills, such as spills whilst refuelling vehicles, the contaminated material should be removed and hauled to an authorized landfill.
ACTION BY	Maintenance Supervisor or Maintenance Contractor
TIMING	During Maintenance works
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Spill kits. ▸ Appropriately sized and sealed containers for the storage of spent lubricants.
HSE COMPETENCE AND TRAINING	Training and competence in the use of Spill Kits.
COST	Maintenance Supervisor or Contractor to cost for: ▸ Spill kits. ▸ Appropriately sized and sealed containers for the storage of spent lubricants.
MONITORING / VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ Project Manager to approve the area designated for refuelling. ▸ HSE Officer to conduct daily visual inspections to ensure that all mitigation measures are being implemented and that they are effective and for evidence of spills and leaks in the terrestrial environment and the presence of oil sheens on the surface of the river. ▸ MoTW Field Officers to conduct periodic inspections of the work site.
SPECIALIZED EQUIPMENT OR MATERIAL	Inspection Checklist.
HSE COMPETENCE AND TRAINING	None Required.
RECORD KEEPING	Inspection checklists, Record of spills
REPORTING	▸ Large Hydrocarbon Spills to be reported by the Project Manager to Ministry of Health and Environment. ▸ HSE Officer and Field Officers to report on evidence of spills to the Engineer. ▸ The Engineer to instruct the Maintenance Supervisor or Contractor to take corrective and preventive action.

5.3.1.3 Impaired Air Quality (Dust)

5.3.1.3	POTENTIAL IMPACT	IMPAIRED AIR QUALITY (DUST)
MITIGATION MEASURES		► Immediately remove excavated silt from the site in appropriate vehicles. If it cannot be done immediately, berm and cover at a suitable location until it can be removed to prevent exposure of material to the wind. ► Optimize truck loads to reduce trips in and out of the site, which would reduce dust emissions from granular material. ► Cover all transport vehicles (with tarpaulins etc.) moving granular materials to and from the site to prevent material load being emitted into the air as dust. ► Implement dust control measures at sources, including frequently wetting bare surfaces and access ways, thereby limiting opportunities for the formation of atmospheric dust.
ACTION BY		Maintenance Supervisor or Maintenance Contractor
TIMING		During Maintenance works
SPECIALIZED EQUIPMENT OR MATERIAL		Tarpaulins.
HSE COMPETENCE AND TRAINING		Knowledge and experience in implementing relevant mitigation measures.
COST		Maintenance Contractor to cost for tarpaulin (approx. cost of 3.0 m X 3.7 m Tarpaulin is USD 16.00).
MONITORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		► HSE Officer to conduct daily inspections to ensure that all dust control measures are implemented and maintain a Complaints register. ► MoTW Field Officers to conduct periodic inspections of the work site.
SPECIALIZED EQUIPMENT OR MATERIAL		► Inspection Checklist ► Complaints Register.
HSE COMPETENCE AND TRAINING		None Required.
RECORD KEEPING		HSE Officer to maintain inspection records and complaints register.
REPORTING		Instances of dusty site conditions to be reported by the HSE Officer and Field Officers to the Engineer so that Maintenance Supervisor or Contractor can be instructed to take corrective and preventive action.

5.3.1.4 Impaired Air Quality (Exhaust Emissions)

5.3.1.4	POTENTIAL IMPACT	IMPAIRED AIR QUALITY (EXHAUST EMISSIONS)
MITIGATION MEASURES		▸ Properly service all construction equipment and machinery and transport vehicles to ensure that there are no visible exhaust emissions; ▸ Remove defective vehicles from fleet until they are repaired; ▸ Optimize trips for bringing material and/or transporting waste from the site by ensuring that the use of part-filled trucks is minimized (to the extent practical); and ▸ Turn off all engines from vehicles and equipment when not in use to reduce exhaust emissions into the atmosphere.
ACTION BY		Maintenance Supervisor or Maintenance Contractor
TIMING		During Maintenance works.
SPECIALIZED EQUIPMENT OR MATERIAL		None Required.
HSE COMPETENCE AND TRAINING		None Required.
COST		Maintenance Supervisor or Contractor to cost for properly servicing vehicles, equipment and machinery.
MONTORING / VERIFICATION		
HOW / BY WHOM/, WHAT / WHERE/, FREQUENCY		▸ HSE Officer to: - Undertake daily inspections on the site and note any instances of vehicles and equipment emitting abnormal quantities and quality of exhaust and - Maintain complaints register relating to exhaust emissions from the passage of vehicles and equipment. ▸ MoTW Field Officers to conduct periodic inspections of the work site.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Inspection Checklist. ▸ Complaints Register.
HSE COMPETENCE AND TRAINING		Competence in inspection of vehicles and equipment to observe “sooty” exhaust.
RECORD KEEPING		HSE Officer to maintain inspection records and complaints register.
REPORTING		Instances of persistent presence of equipment with “smoky” exhaust to the attention of the Engineer by the HSE Officer and Field Officers so that the Maintenance Supervisor or Contractor can be instructed to take corrective and preventive action.

5.3.1.5 Noise

5.3.1.5	POTENTIAL IMPACT	NOISE
MITIGATION MEASURES		▸ Regularly inspect and maintain construction vehicles and equipment (including mufflers on the equipment) to ensure noise emission control systems are properly functioning; ▸ Schedule work, particularly noise-intense activities during the daytime hours (e.g.7 a.m.-7 p.m.) to the extent practical; ▸ Ensure that existing acoustic controls on all noise-generating equipment are functional; ▸ Encourage operators to turn off or throttle down equipment (such as excavators, loaders etc.) whenever they are not in use; ▸ Choose alternative, low-impact equipment or methods where practical; ▸ Inform residents and other sensitive receptors such as schools and places of worship of proposed construction activities prior to the start of work; and ▸ Provide a mechanism by which feedback can be received from affected residents so that steps can be taken to address noise complaints whenever possible.
ACTION BY		Maintenance Supervisor or Maintenance Contractor
TIMING		During Maintenance works
SPECIALIZED EQUIPMENT OR MATERIAL		None Required.
HSE COMPETENCE AND TRAINING		None Required.
COST		Maintenance Supervisor or Contractor to cost for properly servicing vehicles, equipment and machinery.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ HSE Officer to: – Conduct daily inspections and note any instances of vehicles and equipment creating excessive noise. – Enter noise complaints in the complaints register during bridge construction works. ▸ MoTW Field Officers to conduct periodic inspections of the work site.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Inspection Checklist. ▸ Complaints Register.
HSE COMPETENCE AND TRAINING		None Required.
RECORD KEEPING		HSE Officer to maintain inspection records and complaints register.
REPORTING		Instances of persistent noisy equipment and vehicles to be reported to Engineer by the HSE Officer and Field Officers so that the Maintenance Supervisor or Contractor can be instructed to take corrective and preventive action.

5.3.1.6 Improper Disposal of Silt/Debris

5.3.1.6	POTENTIAL IMPACT	IMPROPER DISPOSAL OF SILT/ DEBRIS
MITIGATION MEASURES		▸ Avoid temporary placement of silt or soil in close proximity to the banks of the watercourse, from where they can be washed into the watercourse. ▸ Beneficially reuse soil at other locations, whenever practical. ▸ Where beneficial reuse is not possible, select disposal sites where the silt or soil can be adequately contained.
ACTION BY		Maintenance Supervisor or Maintenance Contractor
TIMING		During Maintenance Works
SPECIALIZED EQUIPMENT OR MATERIAL		None Required
HSE COMPETENCE AND TRAINING		None Required
ESTIMATED COST		Maintenance Supervisor or Contractor to cost for removal of soil to an approved disposal site.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ HSE Officer to - Conduct daily site inspections to ensure that excavated silt is placed a safe distance away the watercourse; - Enter any complaints related to improper disposal of silt/debris into the complaints register and - Verify that silt/debris is being taken to the selected disposal site. ▸ MoTW Field Officers to conduct periodic inspections of the work site.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Inspection Checklist ▸ Complaints Register
HSE COMPETENCE AND TRAINING		None Required.
RECORD KEEPING		HSE Officer to maintain inspection records and complaints register
REPORTING		Improper disposal of silt/ debris to be reported to the Engineer by the HSE Officer and Field Officers so that the Maintenance Supervisor or Contractor can be instructed to take corrective action.

5.3.2 Biological Environment

The only potential impact on the biological environment that may arise during the maintenance works is Disturbance to Wildlife. Procedures to address this impact are provided below.

5.3.2.1 POTENTIAL IMPACT	DISTURBANCE TO WILDLIFE
MITIGATION MEASURES	Given that disturbance to wildlife can occur from noise, the mitigation measures listed to address noise are: ▸ Regularly inspect and maintain construction vehicles and equipment (including mufflers on the equipment) to ensure noise emission control systems are properly functioning; ▸ Schedule work, particularly noise-intense activities during the daytime hours (e.g.7 a.m.-7 p.m.) to the extent practical; ▸ Ensure that existing acoustic controls on all noise-generating equipment are functional; ▸ Encourage operators to turn off or throttle down equipment (such as excavators, loaders etc.) whenever they are not in use; ▸ Choose alternative, low-impact equipment or methods where practical; ▸ Inform residents and other sensitive receptors such as schools and places of worship of proposed construction activities prior to the start of work; and ▸ Provide a mechanism by which feedback can be received from affected residents so that steps can be taken to address noise complaints whenever possible.
ACTION BY	Maintenance Supervisor or Maintenance Contractor
TIMING	During Maintenance works
SPECIALIZED EQUIPMENT OR MATERIAL	None Required.
HSE COMPETENCE AND TRAINING	None Required.
ESTIMATED COST	Maintenance Supervisor or Contractor to cost for properly servicing vehicles, equipment and machinery.
VERIFICATION	
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY	▸ HSE Officer to: – Conduct daily inspections and note any instances of vehicles and equipment creating excessive noise. – Enter noise complaints in the complaints register during bridge construction works. ▸ MoTW Field Officers to conduct periodic inspections of the work site.
SPECIALIZED EQUIPMENT OR MATERIAL	▸ Inspection Checklist. ▸ Complaints Register.
HSE COMPETENCE AND TRAINING	None Required.

5.3.2.1	POTENTIAL IMPACT	DISTURBANCE TO WILDLIFE
RECORD KEEPING		HSE Officer to maintain inspection records and complaints register.
REPORTING		Instances of persistent noisy equipment and vehicles to be reported to Engineer by the HSE Officer and Field Officers so that the Maintenance Supervisor or Contractor can be instructed to take corrective and preventive action.

5.3.3 Human Environment

This Section provides procedures to address impacts to the human environment under the following headings:

- Increased Traffic Volume; and
- Community Health and Safety.

5.3.3.1 Increased Traffic Volume

5.3.3.1	POTENTIAL IMPACT	Increased Traffic Volume
MITIGATION MEASURES		▸ Prepare a Traffic Management Plan (TMP) in consultation the Royal St. Vincent and the Grenadines Police Force and the MoTW. ▸ Implement TMP throughout the duration of maintenance works.
ACTION BY		Maintenance Supervisor or Maintenance Contractor.
TIMING		Plan to be developed prior to the start of maintenance works
SPECIALIZED EQUIPMENT OR MATERIAL		None Required
HSE COMPETENCE AND TRAINING		None Required
ESTIMATED COST		Maintenance Supervisor or Maintenance Contractor to cost for preparing and implementing the TMP.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ Project Manager to approve TMP. ▸ Engineer to verify that the plan is being implemented during maintenance works. ▸ MoTW Field Officers to conduct periodic inspections of the work site.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Complaints Register
HSE COMPETENCE AND TRAINING		None Required.
RECORD KEEPING		HSE Officer to maintain complaints register

5.3.3.1	POTENTIAL IMPACT	Increased Traffic Volume
REPORTING		Instances of traffic congestion to be reported to the Engineer by the HSE Officer and Field Officers so that corrective and preventive action can be taken.

5.3.3.2 Community Health and Safety

5.3.3.2	POTENTIAL IMPACT	Community Health and Safety
MITIGATION MEASURES		▸ Install proper signage and lighting along the approach to the Noel bridge; ▸ Enforcement of vehicle speed limits along the Windward Highway; and ▸ Establish a community road safety awareness programme.
ACTION BY		▸ BRAGSA and Maintenance Contractor to install signage and lighting. ▸ RSVG Police Force to enforce speed limits and conduct road safety awareness.
TIMING		Before any maintenance work on the London Bridge is undertaken.
SPECIALIZED EQUIPMENT OR MATERIAL		None Required
HSE COMPETENCE AND TRAINING		None Required
ESTIMATED COST		Maintenance Supervisor or Contractor to cost for signage, lighting and community awareness programme.
MONITORING / VERIFICATION		
HOW / BY WHOM/ WHAT / WHERE/ FREQUENCY		▸ MoTW to: - Approve locations for placement of signs and lighting and - Conduct site inspections to verify that signage and lighting at the site are adequate.
SPECIALIZED EQUIPMENT OR MATERIAL		▸ Complaints Register
HSE COMPETENCE AND TRAINING		None Required.
RECORD KEEPING		MoTW to maintain inspection records and complaints register
REPORTING		Inadequate signage and/or lighting to be reported to the BRAGSA for corrective action by the Maintenance Supervisor or Contractor.

6 MONITORING PLAN

This section summarizes the monitoring (instrumental measurement or sampling) required in this ESMP, under the following headings:

- Pre-Construction Phase Monitoring;
- Construction Phase Monitoring and;
- Post-Construction Phase Monitoring.

6.1 Pre-Construction Phase Monitoring

Environmental monitoring to be conducted in the pre-construction stage to establish baseline air quality, noise, water quality. This is the responsibility of the PIU who may instruct the Supervising Engineer or the Construction Contractor to cost for and undertaken the specific monitoring.

TABLE 6-1: SUMMARY OF PRE-CONSTRUCTION PHASE MONITORING

MONITORING	LOCATIONS	PARAMETERS	INSTRUMENTS	MONITORING PERIOD
Air Quality	Upwind and Downwind of proposed project site.	Particulate Matter (PM_{10} and $PM_{2.5}$).	Dust Trak II or Minivol Air Sampler.	1 hour at each monitoring location during the daytime (7 a.m. to 7 p.m.)
Noise	At the nearest human receptor to the project site.	▸ Equivalent Continuous Sound Pressure Level (Leq), ▸ Instantaneous Unweighted Peak Sound Pressure Level (Lpeak), and ▸ Time Weighted Average (TWA).	Quest SoundPro DL (or equivalent).	1 hour during the daytime (7 a.m. to 10 p.m.) and 1 hour during the nighttime (10: p.m. to 7: a.m.)
Water Quality	Downstream of the proposed project site Outfall of Agrika River	▸ pH; ▸ Temperature; ▸ Dissolved Oxygen and ▸ Turbidity.	YSI EXO 3 handheld water quality meter or equivalent	Not Applicable

6.2 Construction Phase Monitoring

During the construction phase, the monitoring listed in Table 6-2 must be undertaken. Monitoring during construction is to be conducted by the Supervising Engineer and this must be costed for.

TABLE 6-2: SUMMARY OF Construction Phase Monitoring

POTENTIAL IMPACT	PARAMETER TO BE MONITORED	FREQUENCY OF MONITORING
Impaired Water Quality (Siltation)	Monitor turbidity at the outfall of the Agrika River and within the nearshore marine area	Fortnightly during the wet season and monthly during the dry season.
Impaired Water Quality (Hydrocarbon Spills and Leaks)	Monitor Total Petroleum Hydrocarbons (TPH) within the nearshore marine area fortnightly during the wet season and monthly during the dry season.	Fortnightly during the wet season and monthly during the dry season.
Impaired Air Quality (Dust)	Undertake air quality monitoring for Particulate Matter (PM_{10} and $PM_{2.5}$).	Fortnightly during the wet season and monthly during the dry season.
Noise	Conduct noise monitoring at the nearest sensitive receptor.	Monthly

The monitoring results obtained during the construction phase will be compared to the baseline values to assess changes brought about by the construction activities. In addition, the results can also be assessed for compliance by comparing with international guidelines.

6.3 Post-Construction Phase Monitoring

Monitoring subsequent to construction of the new bridge at the Noel site will consist of periodic inspections of all bridge components to identify any signs of impending failure and for debris that may slow/block flow of water which may cause local flooding. Inspections will also be conducted following heavy rainfall events and lahar flows. Based on such inspections, the frequency of maintenance cleaning will be adjusted. This monitoring is to be conducted by BRAGSA and the MOTW.