



DRAFT ENVIRONMENTAL AND SOCIAL ASSESSMENT AND ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

For the Design and Construction of a 12 IMGD
Water Treatment Plant and Transmission
Pipeline at Matura (with Salybia Component)

**TRINIDAD AND TOBAGO NATIONAL
WATER SECTOR TRANSFORMATION
PROGRAM PHASE 2 (TT-L1071)**

JUNE 2026

Prepared for:
Inter-American
Development Bank



TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

TABLE OF CONTENTS

LIST OF FIGURES	VIII
LIST OF TABLES	X
ACRONYMS AND ABBREVIATIONS.....	XI
EXECUTIVE SUMMARY	12
1 INTRODUCTION	18
1.1 OBJECTIVES	18
2 PROGRAMME AND PROJECT DESCRIPTION	20
2.1 BACKGROUND AND JUSTIFICATION	20
2.1.1 <i>Phase 1: National Water Sector Transformation Program (TT-L1055)</i>	20
2.1.2 <i>Phase 2: National Water Sector Transformation Program (TT-L1071)</i>	20
2.2 COMPONENTS OF THIS PROGRAMME (TT-L1071)	21
2.3 IMPLEMENTATION ARRANGEMENTS	21
2.4 PROJECT RATIONALE	22
2.5 DESCRIPTION OF THE PROJECT.....	23
2.5.1 <i>Project Timelines</i>	31
2.6 EXPECTED BENEFITS	32
3 LEGAL AND INSTITUTIONAL FRAMEWORK	34
3.1 LEGISLATIVE FRAMEWORK	34
3.2 IDB ENVIRONMENTAL AND SOCIAL POLICY FRAMEWORK.....	37
3.2.1 <i>ESPS 1 – Assessment and Management of Environmental and Social Risks and Impacts</i>	37
3.2.2 <i>ESPS 2 – Labor and Working Conditions</i>	38
3.2.3 <i>ESPS 3 – Resource Efficiency and Pollution Prevention</i>	38
3.2.4 <i>ESPS 4 – Community Health, Safety, and Security</i>	38
3.2.5 <i>ESPS 5 – Land Acquisition and Involuntary Resettlement</i>	39
3.2.6 <i>ESPS 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources</i> 39	
3.2.7 <i>ESPS 8 – Cultural Heritage</i>	39
3.2.8 <i>ESPS 9 – Gender Equality</i>	40
3.2.9 <i>ESPS 10 – Stakeholder Engagement and Information Disclosure</i>	40
4 ENVIRONMENTAL AND SOCIAL BASELINE	41
4.1 INTRODUCTION.....	41
4.1.1 <i>Area of Influence</i>	41
4.2 PHYSICAL ENVIRONMENT BASELINE	44
4.2.1 <i>Climate</i>	44
4.2.2 <i>Topography</i>	49
4.2.3 <i>Geology and Soils</i>	49

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)**

4.2.4	Hydrology.....	51
4.2.5	Disaster Risk	57
4.3	BIOLOGICAL ENVIRONMENT BASELINE	75
4.3.1	Terrestrial Ecosystems	77
4.3.2	Aquatic Ecosystems	81
4.3.3	Coastal and Marine Ecosystems	82
4.3.4	Protected and Key Biodiversity Areas	85
4.3.5	ESPS 6 Biodiversity Screening Analysis	91
4.4	SOCIOECONOMIC ENVIRONMENT BASELINE	93
4.4.1	Social Area of Influence	93
4.4.2	Demographic and Social Structure	95
4.4.3	Socio-Cultural Context	98
4.4.4	Socio-Economic Conditions.....	99
4.4.5	Cultural Heritage and Archaeological Resources	106
4.4.6	Natural and Built Resources and Use	106
4.4.7	Institutional Stakeholder Landscape.....	113
5	ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS	116
5.1	ASSESSMENT OF IMPACTS AND RISKS.....	116
5.1.1	The Construction Phase	118
5.1.2	The Operations Phase	130
6	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP).....	142
6.1	INTRODUCTION TO THE ESMP	142
6.2	OBJECTIVES OF THE ESMP	142
6.3	ROLES AND RESPONSIBILITIES	143
6.3.1	Construction Phase	143
6.3.2	Operation and Maintenance	144
6.3.3	Role of IDB	144
6.4	SCOPE OF THE ESMP.....	146
6.5	WATER QUALITY MANAGEMENT PLAN	149
6.5.1	Monitoring Equipment, Stations, and Frequency.....	149
6.5.2	Management Measures.....	150
6.5.3	Monitoring and Compliance	150
6.5.4	Indicators.....	151
6.5.5	Roles and Responsibilities	151
6.6	AIR QUALITY AND DUST CONTROL PLAN.....	152
6.6.1	Monitoring Equipment, Stations, and Frequency	152
6.6.2	Management Measures.....	153
6.6.3	Monitoring and Compliance	154
6.6.4	Indicators.....	155
6.6.5	Roles and Responsibilities	155
6.7	NOISE AND VIBRATION MANAGEMENT PLAN	156

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)**

6.7.1	<i>Management Measures</i>	156
6.7.2	<i>Monitoring and Compliance</i>	157
6.7.3	<i>Indicators</i>	158
6.7.4	<i>Roles and Responsibilities</i>	158
6.8	SOIL EROSION AND DRAINAGE MANAGEMENT PLAN	159
6.8.1	<i>Management Measures</i>	159
6.8.2	<i>Monitoring and Compliance</i>	160
6.8.3	<i>Indicators</i>	160
6.8.4	<i>Roles and Responsibilities</i>	160
6.9	WASTE MANAGEMENT PLAN (INCL. HAZARDOUS MATERIALS)	162
6.9.1	<i>Management Measures</i>	163
6.9.2	<i>Indicators</i>	164
6.9.3	<i>Roles and Responsibilities</i>	164
6.10	HAZARDOUS MATERIALS HANDLING MANAGEMENT PLAN	166
6.10.1	<i>Monitoring Frequency</i>	166
6.10.2	<i>Management and Mitigation Measures</i>	166
6.10.3	<i>Key Performance Indicators</i>	167
6.10.4	<i>Roles and Responsibilities</i>	168
6.10.5	<i>Data Analysis and Reporting</i>	168
6.11	BIODIVERSITY MANAGEMENT PLAN	168
6.11.1	<i>Management Measures</i>	168
6.11.2	<i>Monitoring and Compliance</i>	170
6.11.3	<i>Indicators</i>	171
6.11.4	<i>Roles and Responsibilities</i>	171
6.12	DISASTER RISK MANAGEMENT PLAN.....	173
6.12.1	<i>Management Measures</i>	173
6.12.2	<i>Monitoring and Compliance</i>	176
6.12.3	<i>Indicators</i>	176
6.12.4	<i>Roles and Responsibilities</i>	177
6.13	EMERGENCY MANAGEMENT PLAN	177
6.13.1	<i>The Incident Command System/Emergency Organization Structure and Responsibilities</i> ..	177
6.13.2	<i>Notification and communication procedures</i>	179
6.13.3	<i>Management Measures</i>	182
6.13.4	<i>Monitoring and Compliance</i>	184
6.13.5	<i>Indicators</i>	185
6.13.6	<i>Roles and Responsibilities</i>	186
6.14	LOCAL EMPLOYMENT AND GENDER INCLUSION MANAGEMENT PLAN (LEGIMP)	187
6.14.1	<i>Introduction and Objectives</i>	187
6.14.2	<i>Management Measures</i>	187
6.14.3	<i>Monitoring and Compliance</i>	189
6.14.4	<i>Indicators (KPIs)</i>	190
6.14.5	<i>Roles and Responsibilities</i>	190

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

6.15	WORKER HEALTH AND SAFETY MANAGEMENT PLAN (OCCUPATIONAL HEALTH AND SAFETY AND LABOUR MANAGEMENT)	191
6.15.1	<i>Introduction and Objectives</i>	191
6.15.2	<i>Management Measures</i>	191
6.15.3	<i>Monitoring and Compliance</i>	195
6.15.4	<i>Indicators (KPIs)</i>	195
6.15.5	<i>Roles and Responsibilities</i>	196
6.16	WORKER BEHAVIOUR AND ANTI-HARASSMENT PLAN	197
6.16.1	<i>Introduction and Objectives</i>	197
6.16.2	<i>Management Measures</i>	197
6.16.3	<i>Monitoring and Compliance</i>	199
6.16.4	<i>Indicators</i>	200
6.16.5	<i>Roles and Responsibilities</i>	201
6.17	COMMUNITY HEALTH AND SAFETY MANAGEMENT PLAN	202
6.17.1	<i>Management Measures</i>	202
6.17.2	<i>Monitoring and Compliance</i>	203
6.17.3	<i>Indicators</i>	204
6.17.4	<i>Roles and Responsibilities</i>	205
6.18	TRAFFIC AND ROAD SAFETY MANAGEMENT PLAN	206
6.18.1	<i>Management Measures</i>	206
6.18.2	<i>Monitoring and Compliance</i>	207
6.18.3	<i>Indicators</i>	208
6.18.4	<i>Roles and Responsibilities</i>	208
6.19	SECURITY MANAGEMENT PLAN	210
6.19.1	<i>Monitoring Standards</i>	210
6.19.2	<i>Monitoring Frequency</i>	210
6.19.3	<i>Management and Mitigation Measures</i>	210
6.19.4	<i>Key Performance Indicators</i>	211
6.19.5	<i>Roles and Responsibilities</i>	211
6.19.6	<i>Data Analysis and Reporting</i>	212
6.20	STAKEHOLDER ENGAGEMENT PLAN	212
6.20.1	<i>Management Measures</i>	212
6.20.2	<i>Monitoring and Compliance</i>	214
6.20.3	<i>Indicators</i>	215
6.20.4	<i>Roles and Responsibilities</i>	216
6.21	GRIEVANCE REDRESS PLAN	217
6.21.1	<i>Introduction and Objectives</i>	217
6.21.2	<i>Management Measures</i>	217
6.21.3	<i>Monitoring and Compliance</i>	220
6.21.4	<i>Indicators</i>	221
6.21.5	<i>Roles and Responsibilities</i>	222
6.22	LAND ACQUISITION AND RESETTLEMENT FRAMEWORK	222
6.22.1	<i>Avoidance and Minimisation Principles</i>	222

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)**

6.22.2	<i>Screening and Impact Identification</i>	223
6.22.3	<i>Land Acquisition Process</i>	224
6.22.4	<i>Census and Asset Inventory</i>	225
6.22.5	<i>Socio-Economic Surveys</i>	226
6.22.6	<i>Valuation Methodology</i>	227
6.22.7	<i>Eligibility Criteria</i>	227
6.22.8	Entitlement Framework	228
6.22.9	<i>Compensation Procedures</i>	229
6.22.10	<i>Special Assistance for Vulnerable Persons</i>	230
6.22.11	<i>Documentation and Recordkeeping</i>	230
6.22.12	<i>Monitoring and Compliance</i>	231
6.22.13	<i>Indicators (KPIs)</i>	231
6.22.14	<i>Roles and Responsibilities</i>	232
6.23	LIVELIHOOD PROTECTION	232
6.23.1	<i>Objectives</i>	232
6.23.2	Livelihood Risk Identification	233
6.23.3	<i>Construction-Related Livelihood Protection Measures</i>	233
6.23.4	<i>Communication and Public Information</i>	237
6.23.5	<i>Grievance Management</i>	237
6.23.6	<i>Monitoring of Livelihood Protection Measures</i>	238
6.23.7	<i>Indicators (KPIs)</i>	238
6.23.8	<i>Roles and Responsibilities</i>	239
6.24	LIVELIHOOD RESTORATION	239
6.24.1	<i>Objectives</i>	239
6.24.2	<i>Livelihood Restoration Planning Process</i>	240
6.24.3	<i>Eligibility for Livelihood Restoration Assistance</i>	240
6.24.4	<i>Livelihood Restoration Measures</i>	240
6.24.5	<i>Monitoring and Compliance</i>	242
6.24.6	<i>Indicators (KPIs)</i>	243
6.24.7	<i>Roles and Responsibilities</i>	243
6.25	CULTURAL HERITAGE MANAGEMENT PLAN	244
6.25.1	<i>Chance Find Program/ Watching Brief</i>	244
6.26	CONSULTATION EVENT OUTLINE	245
7	REFERENCES	248
8	APPENDICES	249
	<i>Appendix 1: Water Quality Analytical Report for the Matura River</i>	249
	<i>Appendix 2: Water Quality Bacteriological Report for the Matura River</i>	250
	<i>Appendix 3: Conditional Severity Occurrence of the Matura Water Treatment Plant</i>	252
	<i>Appendix 4: National Air Quality Standards (Max. Permissible Levels for Ambient Air Quality)</i>	253
	<i>Appendix 5: National Air Quality Standards (Stack Release Limits)</i>	255
	<i>Appendix 6: National Water Quality Standards (Water Pollutants)</i>	257
	<i>Appendix 7: National Water Quality Standards (Water Pollutants)</i>	258

**TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)**

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)**

<i>Appendix 8: Ambient Water Quality Standards for Freshwater.....</i>	<i>259</i>
<i>Appendix 9: Ambient Water Quality for Marine Environments.....</i>	<i>265</i>
<i>Appendix 10: Code of Conduct</i>	<i>268</i>
<i>Appendix 11: Stakeholder Engagement Schedule.....</i>	<i>272</i>
<i>Appendix 12: Grievance Submission Form.....</i>	<i>274</i>

DRAFT

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

LIST OF FIGURES

FIGURE 2-1: LOCATION OF THE PROPOSED NEW MATURA WATER TREATMENT PLANT, NEW INTAKE AND SUPPORTING PIPELINE ROUTE. PIPELINE ROUTE HAS BEEN ESTIMATED BASED ON DISCUSSIONS WITH THE CLIENT DURING THE SITE VISIT.....	29
FIGURE 2-2: LOCATION OF THE SUPPORTING PIPELINE ROUTE FROM THE NEW MATURA INTAKE TO THE EXISTING NORTH OROPOUCHE WTP. SECTIONS OF THE PIPELINE IN RED AND PURPLE HAVE BEEN ESTIMATED BASED ON DISCUSSIONS WITH THE CLIENT DURING THE SITE VISIT	30
FIGURE 2-3: AREAS TO BE SUPPLIED BY THE PROPOSED NEW MATURA WATER TREATMENT PLANT AND PIPELINE AND THE CLASS OF SUPPLY PROPOSED (SOURCE: WASA).....	33
FIGURE 4-1: EXTENT OF THE 1-KM ZONE OF INFLUENCE FOR EACH OF THE PROPOSED PROJECT WORKS	43
FIGURE 4-2 AVERAGE MONTHLY TEMPERATURES IN TRINIDAD AND TOBAGO (1991-2020)	45
FIGURE 4-3 TRINIDAD MEAN MAXIMUM TEMPERATURES BY DECADE	46
FIGURE 4-4 AVERAGE MONTHLY RAINFALL RECORDED AT PIARCO WEATHER STATION IN NORTHERN TRINIDAD BETWEEN 1991-2020 (SOURCE: TRINIDAD AND TOBAGO METEOROLOGICAL SERVICE)	47
FIGURE 4-5 AVERAGE TEMPERATURE AND PRECIPITATION OF SANGRE GRANDE, TRINIDAD AND TOBAGO BETWEEN 1991-2020 (SOURCE: WORLD BANK GROUP CLIMATE CHANGE KNOWLEDGE PORTAL)	48
FIGURE 4-6 GEOLOGICAL MAP OF TRINIDAD.....	50
FIGURE 4-7 WATERSHED BOUNDARIES IN TRINIDAD AND TOBAGO.....	52
FIGURE 4-8 MAP OF MATURA WATERSHED AND INTAKE	53
FIGURE 4-9 HISTORICAL HURRICANE PATHS BETWEEN 1856 AND 2024.....	57
FIGURE 4-10 CYCLONE EXPOSURE MAP OF SANGRE GRANDE (SOURCE: WORLD BANK THINKHAZARD PLATFORM)	58
FIGURE 4-11 EXTREME HEAT EXPOSURE OF SANGRE GRANDE (SOURCE: WORLD BANK THINKHAZARD PLATFORM)	59
FIGURE 4-12 URBAN FLOOD RISK IN SANGE GRANDE.....	61
FIGURE 4-13 COASTAL FLOOD RISK IN SANGE GRANDE.....	61
FIGURE 4-14 RIVERINE FLOOD RISK SANGRE GRANDE	61
FIGURE 4-15 FAULT MAP OF PROJECT AREA.....	63
FIGURE 4-16 EARTHQUAKE EXPOSURE IN SANGRE GRANDE (SOURCE: WORLD BANK THINKHAZARD PLATFORM)	64
FIGURE 4-17 LANDSLIDE EXPOSURE IN SANGRE GRANDE (SOURCE: WORLD BANK THINKHAZARD PLATFORM).....	65
FIGURE 4-18 DRAINAGE AND WATER SUPPLY SYSTEMS CRITICALITY AND VULNERABILITY CHART	68
FIGURE 4-19: PROPOSED SITE FOR THE NEW MATURA WTP (LEFT). EXISTING MATURA WTP PROPERTY (RIGHT).	75
FIGURE 4-20: EXAMPLES OF DISTURBED VEGETATION FOUND ALONG THE T&TEC UTILITY CORRIDOR THAT PASSES THROUGH INTERNATIONALLY RECOGNISED KEY BIODIVERSITY AREAS.....	77
FIGURE 4-21: LANDSCAPE ACROSS THE NORTHERN RANGE OF TRINIDAD, INCLUDING THE SALYBIA AND MATURA COMMUNITIES. SOURCE: KENNY, J., P. COMEAU, AND L. KATWARU. 1997. A SURVEY OF BIOLOGICAL DIVERSITY, TRINIDAD AND TOBAGO. UNDP, PORT OF SPAIN, TRINIDAD AND TOBAGO	78
FIGURE 4-24: VEGETATION TYPE ACROSS TRINIDAD. THE INSET SHOWS VEGETATION ACROSS THE STUDY AREA AND THE SURROUNDING AREAS. SOURCE: HELMER ET AL. (2012)	84
FIGURE 4-23: LOCATION OF THE MATURA NATIONAL PARK ENVIRONMENTALLY SENSITIVE AREA IN THE NORTHEASTERN REGION OF TRINIDAD. PROJECT AREA IS LOCATED WHERE AT THE POINT LABELLED MATURA. SOURCE: UWI, ST. AUGUSTINE	85
FIGURE 4-24: LOCATION OF THE PROPOSED PROJECT RELATIVE TO THE SURROUNDING ENVIRONMENT, INCLUDING KEY BIODIVERSITY AREAS. YELLOW AND WHITE POINTS REPRESENT AREAS WHERE THE PIPELINE WILL BE LAID ALONG THE ROADWAY. (SOURCE: UNEP-WCMC (2026). PROTECTED AREA PROFILE FOR MANZANILLA EXT. FROM THE WORLD DATABASE ON PROTECTED AREAS, JUNE 2026. AVAILABLE AT: WWW.PROTECTEDPLANET.NET).....	90

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)**

FIGURE 4-25 SOCIAL INDIRECT AND DIRECT AREAS OF INFLUENCE BOUNDARIES MAP DATA ©2026 GOOGLE. 94

DRAFT

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

LIST OF TABLES

TABLE 4-1 HAZARD EXPOSURE SUMMARY	66
TABLE 4-2 CHARACTERISING PROJECT CRITICALITY	69
TABLE 4-3: KEY FLORA SPECIES OF THE MATURA/SALYBIA STUDY AREA	79
TABLE 4-4: KEY BIRD SPECIES OF THE MATURA/SALYBIA STUDY AREA	80
TABLE 4-5: SPECIES OF CONSERVATION IMPORTANCE IN THE STUDY AREA	83
TABLE 4-6: SOCIAL AREA OF INFLUENCE DEFINITION AND ASSOCIATED RECEPTORS	93
TABLE 5-1: DEFINING THE NATURE OF THE POTENTIAL IMPACTS.....	116
TABLE 5-2: IMPACT RATING TABLE.....	116
TABLE 5-3: IMPACT SIGNIFICANCE OR SEVERITY CRITERIA	117
TABLE 5-4: IMPACTS, PROPOSED MITIGATION MEASURES, MANAGEMENT PLANS AND RESPONSIBLE PARTY FOR THE CONSTRUCTION PHASE OF THE PROJECT	120
TABLE 5-5: IMPACTS, PROPOSED MITIGATION MEASURES, MANAGEMENT PLANS AND RESPONSIBLE PARTY FOR THE OPERATIONS PHASE OF THE PROJECT	132
TABLE 6-1: ENVIRONMENTAL AND SOCIAL RESPONSIBILITIES FOR PROJECT INTERVENTION.....	145
TABLE 6-2 TRINIDAD AND TOBAGO NATIONAL AMBIENT WATER QUALITY STANDARDS – FRESHWATER (EMA)	149
TABLE 6-3 KEY PERFORMANCE INDICATORS (KPI) FOR WATER QUALITY MANAGEMENT	151
TABLE 6-4 WHO AND EMA AMBIENT AIR QUALITY GUIDELINES FOR PM2.5 AND PM10	154
TABLE 6-5 KEY PERFORMANCE INDICATORS (KPI) FOR AIR QUALITY AND DUST MANAGEMENT.....	155
TABLE 6-6 NOISE STANDARDS AS OUTLINED BY THE NOISE POLLUTION CONTROL RULES, 2001 (AS AMENDED)	157
TABLE 6-7 KEY PERFORMANCE INDICATORS FOR NOISE MANAGEMENT	158
TABLE 6-8 KEY PERFORMANCE INDICATORS FOR EROSION CONTROL MANAGEMENT	160
TABLE 6-9: KEY PERFORMANCE INDICATORS FOR WASTE MANAGEMENT.....	164
TABLE 6-10: ROLES AND RESPONSIBILITIES FOR WASTE MANAGEMENT	164
TABLE 6-11: KEY PERFORMANCE INDICATORS FOR HAZARDOUS MATERIALS HANDLING	167
TABLE 6-12: KEY PERFORMANCE INDICATORS FOR BIODIVERSITY AND HABITAT MANAGEMENT.....	171
TABLE 6-13: ROLES AND RESPONSIBILITIES FOR ECOSYSTEM/BIODIVERSITY MANAGEMENT	172
TABLE 6-14: KEY PERFORMANCE INDICATORS FOR TRAFFIC MANAGEMENT.....	208
TABLE 6-15: ROLES AND RESPONSIBILITIES FOR TRAFFIC MANAGEMENT	208

ACRONYMS AND ABBREVIATIONS

CCLIP	Conditional Credit Line for Investment Projects
CEC	Certificate of Environmental Clearance
EMA	Environmental Management Authority
ESA	Environmental and Social Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESPF	Environmental and Social Policy Framework
ESPS	Environmental and Social Performance Standards
IDB	Inter American Development Bank
IMGD	Imperial Million Gallons per Day
KBA	Key Biodiversity Area
MPU	Ministry of Public Utilities
PLC	Programmable Logic Controller
SCADA	Supervisory Control and Data Acquisition
SESA	Strategic Environmental and Social Assessment
T&TEC	Trinidad and Tobago Electricity Commission
WASA	Water and Sewerage Authority
WHO	World Health Organisation
WRA	Water Resources Agency
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

An Environmental and Social Assessment (ESA) and Environmental and Social Management Plan (ESMP) have been prepared for the proposed design and construction of a new Water Treatment Plant (WTP) at Matura, inclusive of a new raw water intake, associated transmission pipelines, network integration works, and a complementary water supply component at Salybia in North-East Trinidad. The project forms part of Phase 2 of the Trinidad and Tobago National Water Sector Transformation Program (TT-L1071), financed by the Inter-American Development Bank (IDB) and implemented by the Ministry of Public Utilities (MPU), which will serve as the executing agency and the Water and Sewerage Authority (WASA), which will serve as the sub executing agency. The intervention represents a strategic investment in national water security and climate resilience and is intended to strengthen the reliability, efficiency, and sustainability of potable water supply services within Trinidad and Tobago.

The project responds to longstanding challenges affecting water service delivery within the North-East Region, including ageing infrastructure, limited treatment capacity, high levels of non-revenue water, seasonal supply constraints, and increasing pressure on the existing North Oropouche Water Treatment Plant.

Project Scope and Description

The proposed project involves the decommissioning and removal of the existing 0.5 IMGD package water treatment plant at Matura and the construction of a new state-of-the-art Water Treatment Plant (WTP) in Salybia and Matura, North-East Trinidad. The new facility will be developed with an initial treatment capacity of 7 IMGD and designed for modular expansion to 12 IMGD to accommodate future increases in demand. Works will include the installation of comprehensive treatment processes such as coagulation, sedimentation, filtration, and disinfection systems to ensure compliance with national and international drinking water quality standards, including WHO guidelines. Supporting civil works will comprise site preparation, foundations, drainage infrastructure, access roads, utility connections, and ancillary operational facilities necessary for plant operation and maintenance.

In addition to the treatment facility, the project includes the construction of a new transmission pipeline network to convey treated water from the WTP to Sangre Grande, Manzanilla, Matura, and surrounding communities throughout North-East Trinidad. The transmission system will be hydraulically integrated with the existing North Oropouche Water Treatment Plant network to improve operational flexibility, strengthen regional water security, and reduce pressure on existing supply infrastructure. Associated works will include pipeline installation, interconnections, valves, chambers, and other appurtenant infrastructure required to ensure efficient conveyance and distribution of potable water.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

The primary objective of the project is to improve the efficiency, quality, sustainability, resilience, and reliability of potable water supply services while expanding equitable access to underserved and water-stressed communities. Upon completion, the project is expected to significantly improve levels of service for approximately 185,000 residents in Matura, Salybia, Sangre Grande, Manzanilla, Toco Road, La Horquetta, Malabar, Carapo, Maloney Gardens, and surrounding communities. Existing supply conditions, which in some areas are limited to once every eight days, are expected to improve substantially, with communities receiving water up to five to six days per week. The project will also provide important operational benefits through increased redundancy and resilience within the regional water supply system by supplementing the North Oropouche Water Treatment Plant, reducing network stress, improving pressure management, and enhancing overall service continuity.

The Existing Environment

The ESA establishes the environmental and social baseline conditions within the project's area of influence, which encompasses the Matura and Salybia watersheds, the proposed treatment plant site, intake location, and associated pipeline corridors. The area is characterized by a predominantly rural landscape with dispersed settlements, extensive forest cover, and ecologically significant freshwater and terrestrial ecosystems.

The project area contains forest habitats, riverine ecosystems, and species of conservation importance. The surrounding landscape also supports several biodiversity features of regional significance and forms part of an important watershed system that contributes to water supply and ecological functioning within North-East Trinidad.

Hydrological assessments indicate that the Matura River possesses sufficient flows to support the proposed abstraction requirements while maintaining environmental flow requirements and downstream ecological functions. Although sensitive habitats and protected areas occur within the broader area of influence, no confirmed critical habitat, as defined under the IDB Environmental and Social Performance Standard 6 (ESPS 6), has been identified within the direct footprint of the proposed infrastructure works. Nevertheless, the ecological sensitivity of the surrounding environment necessitates the implementation of stringent biodiversity protection and habitat management measures throughout the project lifecycle.

Environmental and Social Impacts and Risks

The assessment identified a range of environmental and social risks associated with both construction and operation of the proposed infrastructure. The principal environmental risks relate to vegetation clearing and habitat disturbance associated with treatment plant construction and pipeline installation, localized impacts to riparian and aquatic habitats near intake and watercourse crossing locations, soil erosion and sedimentation resulting from excavation activities, dust generation, noise and vibration, construction waste generation, accidental spills of fuels and hazardous materials, and potential impacts on water quality if construction activities are not

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

appropriately managed. During operation, key environmental risks include management of treatment sludge and filter backwash water, storage and handling of treatment chemicals, particularly chlorine, and maintaining sustainable abstraction rates to protect aquatic ecosystems. The transmission pipeline works introduce additional temporary risks related to trenching activities, roadside excavation, traffic disruption, access restrictions, and localized disturbance to adjacent properties and communities. These impacts are generally temporary, localized, and reversible in nature and are considered manageable through implementation of appropriate mitigation measures.

From a social perspective, the project is expected to generate significant positive benefits through improved public health, enhanced water security, increased reliability of potable water services, local employment opportunities during construction, and improved quality of life for residents and businesses throughout the service area. Potential adverse social impacts are largely associated with temporary construction-related disturbances, including traffic congestion, noise, dust, restricted access to properties and businesses, occupational health and safety risks, community health and safety concerns, and temporary disruptions to livelihoods where pipeline installation occurs adjacent to economic activities. At the time of assessment, detailed engineering designs and final pipeline alignments had not been completed; therefore, no physical resettlement or significant land acquisition requirements have been identified. However, the potential exists for localized land acquisition, temporary occupation of land, easement acquisition, economic displacement, or livelihood impacts associated with final infrastructure site and pipeline routing. To address this uncertainty and ensure compliance with IDB requirements, a Land Acquisition and Resettlement Framework has been incorporated into the ESMP, establishing procedures for screening, impact assessment, compensation, livelihood restoration, and stakeholder engagement should such impacts arise during detailed design and implementation.

The project area is also exposed to a range of natural hazards, including riverine flooding, urban flooding, landslides, earthquakes, tropical storms, extreme heat, and climate variability. Climate change projections indicate increasing temperatures, changing rainfall patterns, and greater hydrological variability, all of which may influence long-term water availability and infrastructure performance. Given the strategic importance of the proposed infrastructure and the hazard profile of the region, disaster and climate risk considerations have been integrated into project planning and design. The overall disaster and climate risk classification for the project is assessed as Moderate, reflecting the critical nature of the infrastructure and the manageable level of exposure to identified hazards when appropriate engineering and management measures are implemented.

Environmental and Social Management Plans

To address identified risks, a comprehensive Environmental and Social Management Plan (ESMP) has been developed. The summary table below presents the list of management plans, the risks they address and how they relate to the WTP and the transmission pipeline.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Category	Management Plan	WTP	Pipelines	Main Risks / Impacts Addressed
Environmental	Construction Environmental and Social Management Plan (C-ESMP)	✓	✓	Overall environmental and social management during construction activities
	Air Quality Management Plan (AQMP)	✓	✓	Dust generation, equipment emissions, and air quality deterioration
	Water Quality Management Plan (WQMP)	✓	✓	Sedimentation, runoff, contamination of rivers and watercourses, and protection of water resources
	Noise and Vibration Management Plan	✓	✓	Construction noise and vibration impacts on nearby receptors and communities
	Soil Erosion and Drainage Management Plan	✓	✓	Erosion, sediment transport, slope instability, and drainage disruption
	Waste Management Plan	✓	✓	Management of solid waste, hazardous waste, construction debris, and sludge
	Biodiversity Management Plan	✓	✓	Vegetation clearing, habitat disturbance, and protection of wildlife and sensitive ecosystems
Social	Hazardous Materials Management Plan	✓	✓	Storage, transport, and handling of fuels, oils, chemicals, and hazardous substances
	Local Employment and Gender Inclusion	✓	✓	Local employment, gender equality, social inclusion,

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

	Management Plan (LEGIMP)			and equitable distribution of project benefits
	Worker Health and Safety Management Plan (Occupational Health and Safety and Labour Management)	✓	✓	Occupational health and safety risks, labour conditions, worker welfare, and compliance
	Worker Behaviour and Anti-Harassment Plan	✓	✓	Workplace conduct, prevention of harassment, gender-based violence (GBV), and community-worker interactions
	Community Health and Safety Management Plan (CHSMP)	✓	✓	Public safety, community exposure to construction hazards, and security risks
	Traffic and Road Safety Management Plan	Limited	✓	Traffic congestion, road safety, access restrictions, and pedestrian safety
	Stakeholder Engagement Plan (SEP)	✓	✓	Stakeholder consultation, information disclosure, participation, and engagement
	Grievance Redress Plan (GRP)	✓	✓	Community complaints, dispute resolution, and stakeholder concerns
	Land Acquisition and Resettlement Framework (LARF)	Limited	✓	Land acquisition, easements, temporary land occupation, economic displacement, and livelihood restoration
Emergency / Operational	Disaster Risk Management Plan (DRMP)	✓	✓	Flooding, landslides, earthquakes, extreme weather events, and climate-related hazards

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Emergency Management Plan (EMP)	✓	✓	Fires, spills, accidents, chemical releases, natural disasters, and emergency response
Environmental and Social Management System (ESMS)	✓	✓	Environmental and social governance, implementation, compliance, and adaptive management
Monitoring and Compliance Programme	✓	✓	Environmental and social performance monitoring, auditing, corrective actions, and reporting
Capacity Building and Training Programme	✓	✓	Institutional strengthening, workforce competency, and environmental and social awareness
Operational Management and Maintenance Procedures	✓	✓	Long-term operational reliability, asset integrity, preventative maintenance, and operational performance

In conclusion, the proposed Matura–Salybia Water Treatment Plant and associated transmission pipeline project represents a strategically important intervention that will substantially improve water security, public health outcomes, climate resilience, and service reliability across North-East Trinidad. While the project presents a range of environmental and social risks, these risks are well understood, largely site-specific, and capable of being effectively mitigated through implementation of the proposed ESMP and ESMS. The anticipated long-term benefits, including improved access to potable water, enhanced system resilience, strengthened regional development, and improved quality of life for approximately 185,000 residents, are substantial and are expected to significantly outweigh the potential adverse impacts. The project is therefore considered environmentally and socially viable, provided that all mitigation measures, monitoring requirements, and IDB safeguard obligations are fully implemented throughout the project lifecycle.

1 INTRODUCTION

This Environmental and Social Assessment (ESA) has been prepared for the ***proposed Construction of a 12 Imperial Million Gallons per Day (IMGD) Water Treatment Plant (WTP) and Transmission Pipeline at Matura and Salybia***, North-East Trinidad, undertaken by the Water and Sewerage Authority (WASA) with funding support from the Inter-American Development Bank (IDB).

The ESA forms part of a broader environmental and social due diligence process required under the IDB Environmental and Social Policy Framework (ESPF) and relevant Environmental and Social Performance Standards (ESPS 1–10). It provides the analytical foundation to identify, predict, and evaluate the potential environmental and social impacts and risks associated with the design, construction, and operation of the proposed project, and to recommend appropriate mitigation and management measures through a comprehensive Environmental and Social Management Plan (ESMP).

The ESA and ESMP are also supported by a project-specific Environmental and Social Management System (ESMS) to guide WASA's ongoing compliance with national regulatory requirements and IDB safeguards throughout project implementation.

1.1 Objectives

Specifically, this report:

- Describes the proposed project and its site-specific environmental and social context at Matura and Salybia;
- Identifies and evaluates potential positive and adverse impacts and risks during construction, operation, and decommissioning;
- Establishes mitigation and monitoring measures through the ESMP;
- Provides a framework for institutional capacity, stakeholder engagement, and grievance redress;

**TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)**

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)**

- Demonstrates compliance with national legislation and international best practice, including IDB's ESPS and relevant Environmental Management Authority (EMA) requirements for the Certificate of Environmental Clearance (CEC).

The ESA essentially functions as both a decision-support tool for regulatory and financing approval and a management instrument for ensuring that the project contributes to sustainable water sector development while avoiding or minimising adverse impacts and risks on communities and ecosystems.

DRAFT

2 Programme and Project Description

2.1 Background and Justification

2.1.1 Phase 1: National Water Sector Transformation Program (TT-L1055)

In previous years, the National Water Sector Transformation Program (TT-L1055) for Trinidad and Tobago was approved with an aim to enhance the efficiency, reliability, and quality of potable water services. The project was launched because potable water is not supplied to all households in Trinidad and Tobago on a 24/7 basis; only 53% of customers receive water on a 24/7 basis in the wet season and 31% in the dry season (Water and Sanitation Division of the IDB, 2020). There is also a high-rate of non-revenue water (NRW) lost through leaks, inefficient operations of water treatment plants, and metering and billing issues. NRW is as high as 40-50% and in some cases estimated at 60% of total water produced. The lack of infrastructure in some areas limits the ability to take advantage of abundant water resources to meet dry season demand due to WASA's lack of storage capacity and the aging infrastructure and bottlenecks in the network inhibits the transmission of water from water rich areas to water scarce areas.

With the compounding issues and growing population, the Trinidad and Tobago successfully launched and received funding from the Inter-American Development Bank (IDB) through a Conditional Credit Line for Investment Projects (CCLIP) to address some of these major issues. The first operation focused on the North-Western region of Trinidad, including Diego Martin, San Juan/Laventille, and Port of Spain.

The first operation comprised three components:

- Component 1. Water Stabilization and Improvement: (US\$44 Million)
- Component 2. Support for Water Sector Transformation Plan: (US\$2.74 Million)
- Component 3. Network Optimization: (US\$31 Million)

In compliance with IDB safeguards, an Environmental and Social Assessment (ESA) and supporting instruments were prepared, including an Environmental and Social Management Plan (ESMP), Strategic Environmental and Social Assessment (SESA), and Environmental and Social Management Framework (ESMF). Funding was granted for this first loan operation.

2.1.2 Phase 2: National Water Sector Transformation Program (TT-L1071)

This current programme represents Phase 2, which is the second loan operation under the CCLIP TT-O0007 – Trinidad and Tobago National Water Sector Transformation Program with funding of US\$235M. This operation is designed to strengthen and build on the objectives and achievements of the first operation, TT-L1055. The General objective of the second operation is to improve the efficiency, quality, sustainability and resilience of potable water supply service and water security in Trinidad and Tobago. This second loan aims to build on the efforts of the first loan operation to ensure long-term sustainability and efficiency in the water sector. The overall objective of the second loan is to continue improving water services in Trinidad and Tobago. The specific objectives of the second

operation are to: (i) enhance the operational efficiency and financial sustainability of WASA; (ii) reduce non-revenue water through targeted investments in pipeline rehabilitation and leak detection; (iii) expand access to potable water services, especially to underserved communities in T&T; and (iv) strengthen regulatory frameworks and governance in the sector.

2.2 Components of this Programme (TT-L1071)

As outlined in the IDB preparation documents provided, the programme components associated with this loan include:

- **COMPONENT 1: WATER SERVICE IMPROVEMENT AND INFRASTRUCTURE UPGRADE:** This component aims to enhance water service reliability and efficiency through critical infrastructure upgrades. It will finance the development of a comprehensive program to prevent further service decline throughout the country and to ensure access to water, sanitation and hygiene to unserved and underserved households.
- **COMPONENT 2: NETWORK OPTIMISATION AND WATER LOSS REDUCTION:** This component is designed to improve network efficiency by reducing water losses and optimising system performance. Under this component, water loss reduction and monitoring will be improved through (i) the replacement of aged and fragile transmission and distribution networks to reduce water loss and high leakages; and (ii) Continuation of efforts to reduce Non-Revenue Water across Trinidad and Tobago to increase WASA operational efficiency and reliability.
- **COMPONENT 3: CAPACITY BUILDING AND STRENGTHENING REGULATORY FRAMEWORKS:** This component focuses on institutional strengthening to improve the governance, sustainability, and operational efficiency of the water sector. It includes capacity-building programs to modernise utility management practices. Additionally, it will support aspects of regulatory improvements towards strengthening oversight, promoting accountability, and ensuring long-term sector sustainability. In addition, this component will finance the institutional improvements to support the implementation of Integrated Water Resources Management (IWRM) strategies.

2.3 Implementation Arrangements

The Executing Agency for this loan operation will be the Water and Sewerage Authority (WASA), which will be responsible for the overall administration of the proposed operation, including:

- planning, monitoring, evaluating, and supervising the operation;
- conducting procurement for works, goods, consulting and non-consulting services;
- handling loan disbursement requests and maintaining financial records;
- managing work supervision and inspection;
- overseeing environmental and social management;

- preparing documents such as the multiyear execution plan, annual work plan, procurement plan, semi-annual progress reports, audited financial statements, midterm evaluation, and final evaluation;
- monitoring works and service contracts;
- supervising environmental and social aspects; and
- liaising with the IDB.

Essentially, WASA will implement a project-specific Environmental and Social Management System (ESMS) in accordance with ESPS 1, covering the full lifecycle of the Matura WTP and Transmission Pipeline project. The ESMS is a dynamic and continuous process organised around four cycles: Plan, Execute, Verify, and Act.

WASA has been the sub-executing or executing agency for several IDB-funded operations. The most recent of which was the Trinidad and Tobago National Water Sector Transformation Program (TT-L1055) for \$80Mn, currently under execution. Previous projects executed by WASA include the Multi-Phase Wastewater Rehabilitation Program (TT-L1026) for \$246 Mn and the WASA Modernisation and Wastewater Infrastructure Rehabilitation Program (TT-L1018) for \$50 Mn. WASA was a key partner in the recently executed Technical Cooperation, Support for the Preparation of Trinidad and Tobago Water Supply Improvement Program (TT-T1108) for US\$800,000.

2.4 Project Rationale

Trinidad and Tobago's north-eastern region has faced persistent challenges in meeting potable water demand due to ageing infrastructure, seasonal variability, and over-reliance on the North Oropouche Water Treatment Plant (WTP), which already operates under stress. The existing Matura WTP is a patented package plant commissioned in 2012 with a modest capacity of 0.5 IMGD (2400 m³/d). The current treatment process at Matura employs raw water intake (screening, pumping) to pressure filters, disinfection and storage/distribution. The sludge from the filter backwash water is piped to a backwash pit where the sludge is allowed to settle. The supernatant and solids from the process would then be used for land application within the site boundaries. Due to the limited treatment capacity, the backwash pit storage is minimal and facilitates the settling and drying of process sludge. The plant has long since reached the end of its useful life and struggles to maintain capacity, quality, and health and safety standards, with only 57% compliance recorded during the inspection conducted in February 2019 (see Appendix F - Health and Safety Inspection Report for Matura WTP located in the Matura Water Treatment Plant Conditional Assessment Report prepared by WASA). As such, it is inadequate to meet current and future service requirements. Additionally, the facility's limited treatment processes, primarily filtration without coagulation, sedimentation and disinfection stages, result in inconsistent water quality, particularly during high turbidity periods in the rainy season. Appendix 3 of this report provides a summary of the condition of the plant's assets.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

The proposed project aims to replace and expand the current facility with a new modern water treatment plant and associated transmission pipeline network, thereby improving water supply from the current 24/3 service and coverage to approximately 6,653 individuals across Matura, Salybia, Sangre Grande, Manzanilla and adjacent communities. This intervention aligns with national priorities for equitable access to safe water, enhance climate resilience, and modernise critical infrastructure in keeping with the national water security agenda and WASA's mandate to supply safe, adequate and potable water service. It also advances the National Development Strategy objectives related to universal access to clean water and sustainable infrastructure development.

2.5 Description of the Project

Phase 2 is a country-wide programme, however, this report focuses on the works to be undertaken in Matura. As outlined in the project brief prepared by the Water and Sewerage Authority, the primary focus is the construction of a new, full-process Water Treatment Plant (WTP) at Matura (10.681720°N, -61.055538°W), supported by a new intake (10.684443°N, -61.055666°W) and transmission systems (running from the new intake to the new Matura WTP and from the new intake to the existing North Oropouche WTP at 10.668013°N, -61.144995°W) (Figure 2-1 and Figure 2-2). Several key project design elements, including the final pipeline alignment from the new Matura intake, pipeline lengths, right-of-way widths, and other key engineering specifications, were not available at the time of this assessment. Where necessary, assumptions based on available project information and site reconnaissance were applied to support this preliminary assessment of environmental and social impacts and risks. A secondary component at Salybia is also meant to be considered within the programme scope, details about this portion of the project, including the alignment, length and diameter of the pipeline to be installed, will be provided in the final version of this document. Together, the works seek to improve the reliability, quality, and resilience of potable water service delivery while expanding equitable access to unserved and underserved households. The specific project objectives are as follows:

1. To decommission the existing 0.5 IMGD package water treatment plant at Matura (10.681294°N, -61.055436°W), which is currently limited to filtration-only processes and insufficient to meet community demand;
2. To design and construct a new modern full-process Water Treatment Plant (WTP) at Matura with an initial production capacity of 7 IMGD, with intended phased expansion capability to 12 IMGD (54,550 m³/d) on approximately 0.5 acres of greenfield land;
3. To incorporate complete treatment processes, including sedimentation, coagulation, filtration, and disinfection so as to achieve compliance with WHO drinking water quality standards. More specifically, sedimentation will be achieved using either horizontal-flow rectangular sedimentation tanks or upward-flow clarifiers designed to provide approximately 2–4 hours of hydraulic detention time (typically 3 hours) to facilitate the settling of suspended

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

solids and flocculated particles. The system is expected to comprise two basins, each approximately 15 m wide, 45 m long, and 3.5–4.0 m deep, operating at a surface overflow rate of 20–40 m³/m²/day under peak flow conditions and a weir loading rate of 9–13 m³/m/h. The coagulation system will comprise rapid-mix facilities designed to provide a detention time of approximately 10–30 seconds (not exceeding 60 seconds) to ensure effective dispersion of treatment chemicals and destabilization of suspended particles. Mixing will be achieved through hydraulic jumps, static mixers, or mechanical flash mixers operating at a velocity gradient greater than 700 s⁻¹. Where hydraulic mixing is employed, the system may consist of two compact mixing chambers, each approximately 1 m × 1 m in plan and 1.5 m deep. The filtration system will consist of rapid gravity filters designed to operate at filtration rates of approximately 5–15 m/h, with a total filter surface area of approximately 150–250 m² to accommodate the plant's design capacity. Filters will utilize either dual-media filtration comprising approximately 450 mm of anthracite over 300 mm of sand, or single-media sand filtration with media depths ranging from 600–900 mm. The system will be equipped with a backwash facility designed to achieve expansion rates of 20–30 m/h (0.5–1.0 m/min) to maintain filter performance and operational efficiency. As stated in the Technical Analysis Report, the design of the treatment process will be completed as part of the design build contract;

4. To construct a new raw water submerged intake on the Matura River and a transmission pipeline network designed for a maximum velocity of 0.15–0.3 m/s to prevent fish entrapment and connecting the Matura WTP to supply zones in Sangre Grande, Manzanilla, Matura, and adjoining communities. Raw Water Pumps may include 3–4 pumps (2 duty, 1–2 standby) and coarse screens (50–100 mm) followed by fine screens (6–10 mm) to remove debris;
5. Supporting distribution network from the new intake (including a 330m pipeline to the new Matura WTP and an 11km pipeline to the North Oropouche WTP). Hydraulic modelling will be required to determine the optimum diameter of the transmission system. Indicative diameters for this capacity, a 24-inch to 30-inch diameter pipe (600 mm to 750 mm) will be required;
6. To integrate automation, monitoring, and SCADA systems to ensure efficient, safe, and reliable operations;
7. To undertake feasibility assessments and hydraulic modelling studies to guide phased expansion, hydraulic integration with the North Oropouche WTP system, and long-term supply planning;
8. To deliver a complementary treatment and supply component at Salybia as part of the broader North-East Trinidad water security programme.

The detailed project scope is outlined below:

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Pre-Construction Surveys and Planning

1

- Conduct geotechnical investigations, topographic mapping, hydraulic modelling, and environmental and social impact assessments (ESIA) to optimise site design and treatment plant layout.
- Prepare Resettlement Action Plan (RAP) if required, and confirm final WTP site and pipeline routes per regulatory and stakeholder approval.

2

Decommissioning of Existing Infrastructure

- Retirement and safe removal of the existing 0.5 IMGD Matura package plant and associated pipework.
- Site clearing and preparation for new WTP construction.

3

Matura WTP – Design and Construction (Primary Component)

- Design and construct a new 7 IMGD Water Treatment Plant with modular expansion to 12 IMGD, incorporating full treatment processes: coagulation, sedimentation, filtration, and disinfection.
- Construct a new raw water intake structure on the Matura River, including screens, pumping facilities, and raw water transmission to the WTP.
- Civil works for WTP foundations, access roads, drainage, and site services.
- Installation of SCADA, automation, and water quality monitoring systems for real-time process control.
- Staff training and operational capacity development for WASA personnel

4

Transmission Network – Matura WTP to Supply Zones

- Construct new treated water transmission pipelines from the Matura WTP to Sangre Grande, Manzanilla, Matura, and adjoining communities.
- Hydraulic integration with the existing North Oropouche WTP network to optimise system-wide distribution and provide redundancy.
- Installation of flow control, metering, and pressure management appurtenances along the transmission network.

5

Salybia Component (Secondary)

- Delivery of a complementary treatment and supply component at Salybia, forming part of the broader North-East Trinidad water security programme. Detailed scope to be confirmed per feasibility and design studies.

6

Testing, Commissioning, and Handover

- Performance testing, flushing, disinfection, and system certification of the Matura WTP and transmission network.
- Comprehensive documentation: as-built drawings, GIS integration, O&M manuals, and SCADA configuration records

7

Defects Liability and Support

- 12-month defects liability period for monitoring, inspection, and rectification of issues to ensure long-term reliability of the new WTP and transmission infrastructure

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Construction of the WTP may include the following mechanical, electrical, and civil works.

MECHANICAL WORKS

The mechanical works necessary for the construction of the new Water Treatment Plant with all the required pumps, piping, valves, fitting, and appurtenances include but is not limited to following:

- Design, supply and construction of an intake and screening system;
- Design, supply, and construction of a weir downstream of the intake station;
- Design, supply, and construction of a new raw water pumping station (inclusive of at least two (2) raw water pumps, mechanical, electrical, process and civil works).
- Design, supply, and Installation of appropriately sized backwash pumps;
- Design, supply, and installation of treated water pumping station (inclusive of four (4) treated water pumps, suction, and discharge headers;
- Design, supply, and Installation of appropriately sized air blowers.
- Design, supply and Installation of appropriately sized chemical mixing and dosing equipment.
- Design, supply and Installation of appropriately sized chlorine booster and piping system;
- Design, supply, and installation of all mechanical works - pipelines, valves, fittings, and appurtenances required to interconnect all processes and equipment at the raw water intake, treatment processes and high-lift station.

ELECTRICAL WORKS

The works which will have to be completed to design, supply and install the required equipment to provide adequate electrical power and lighting to the new Intake and Water Treatment Plant include:

- Installation of a new T&TEC power supply- (3 phase) inclusive of a pad-mounted transformer;
- Design, supply, and Installation of all electrical works required to ensure full functionality of all the equipment on the raw water intake and water treatment plant (inclusive of starters and all associated electrical works for the backwash pumps and air blowers);
- Design, supply, and installation of a new lighting system to ensure adequate visibility throughout the entire raw water intake and water treatment plant;
- Design, supply, and installation of Local Control Panel (LCP) inclusive of a PLC System.

CIVIL WORKS

The civil works necessary for the construction of the new Treated Water Treatment Plant includes but is not limited to following:

- Design, supply, and construction of access roads inclusive of drainage, and perimeter fencing;
- Design, supply, and construction of an intake;

- Design, supply, and construction of the raw water pumps control room;
- Design, supply, and construction of a weir downstream of the intake station;
- Design, supply and construction of a chlorine storage and dosing facility;
- Design, supply, and construction of a chemical building;
- Design, supply, and construction of a Plant Operations Building and Guard Booth;
- Design, supply, and construction of a single story building inclusive of a Control/ MCC room and T&TEC metering room;

WATER TREATMENT PROCESSES

The water treatment processes which will have to be completed to ensure that the final treated water meets or exceeds the WASA's Drinking Water Quality Guidelines include:

- Design, supply, and installation of a high-rate coagulation/flocculation/clarification system.
- Design, supply, and installation of a rapid rate gravity filtration system.
- Design, supply, and construction of a new clear-well;
- Design, supply, and construction of a sludge handling facilities to treat sludge from the clarifiers and backwash water from the filters;
- Design, supply, and installation of a chlorine dosing equipment;
- Design, supply, and installation of a chemical mixing and dosing system.

The proposed treatment process of the raw water (inclusive of filtration, disinfection, and sludge treatment/disposal) is summarised as follows:

1. Raw Water Intake – Raw water is pumped to the Flocculator/ Clarifier;
2. Coagulation System – Aluminum Sulphate and a Polymer is injected into the raw water just before entering the flocculators. The coagulant is used to remove microscopic suspended matter (turbidity) from the raw water.
3. Flocculators – Slow rotating mixers with paddles are used to promote the agglomeration of microscopic suspended matter into larger more settleable particles called floc.
4. Clarifiers – The larger heavier particles settle to the bottom whilst the clearer water flows to the filters via troughs located at the top of the clarifier.
5. Filters – Used to remove all the remaining lighter particles that did not settle in the clarifiers.
6. Chlorination System – A chlorine gas solution is injected into the filtered water just before entering the clear-well. The purpose of the chlorine is to remove all disease-causing organisms.
7. Clearwell -
 - a. In the clear-well, the water is detained for a minimum period of thirty minutes (detention time). This ensure that all disease-causing organisms are removed from the treated water.

- b. The clear-well is also utilized as storage for the high-lift pump station and backwash water supply.
- 8. High-lift Station – The high-station station has several pumps which are used to pump the final treated water via the distribution system to consumers.
- 9. Distribution System – The distribution system consists of a piping network that is used to supply the customers with potable water.
- 10. Sludge Ponds – The semi-solid sludge that settled in the clarifiers is transferred to the sludge pond for detention and subsequent disposal.
- 11. The sludge pond is also used to receives water that was used to backwash the filters. The backwash water is allowed to settle before the effluent that is WPR compliant is discharge into a drainage system.

TRANSMISSION PIPELINE INSTALLATION

This section describes the method which will be employed for the installation of the transmission pipeline. The pipe laying works to be performed consists of all relevant construction for assembling, laying, and jointing of pipes, fittings, bends and tees and installation of thrust restraints and interconnections. It also includes excavating, backfilling, and compacting of the trench, disposing of surplus materials, road restoration, safety, and traffic control for pedestrian and local access to properties, restoration of other structures and surfaces to their original condition or better and all other miscellaneous works to ensure that the pipeline can be put into service.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

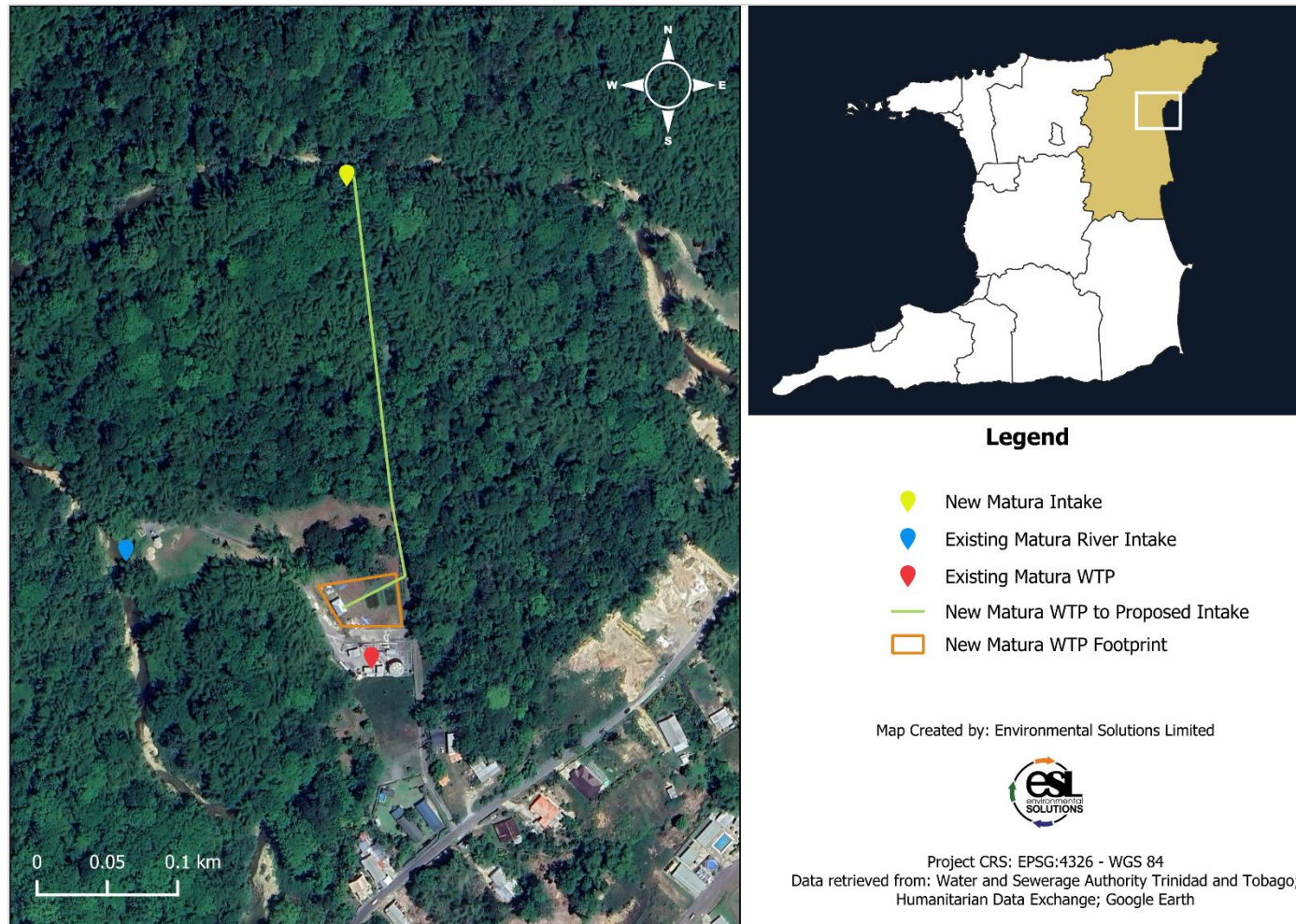


Figure 2-1: Location of the Proposed New Matura Water Treatment Plant, new intake and supporting pipeline route. Pipeline route has been estimated based on discussions with the client during the site visit.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

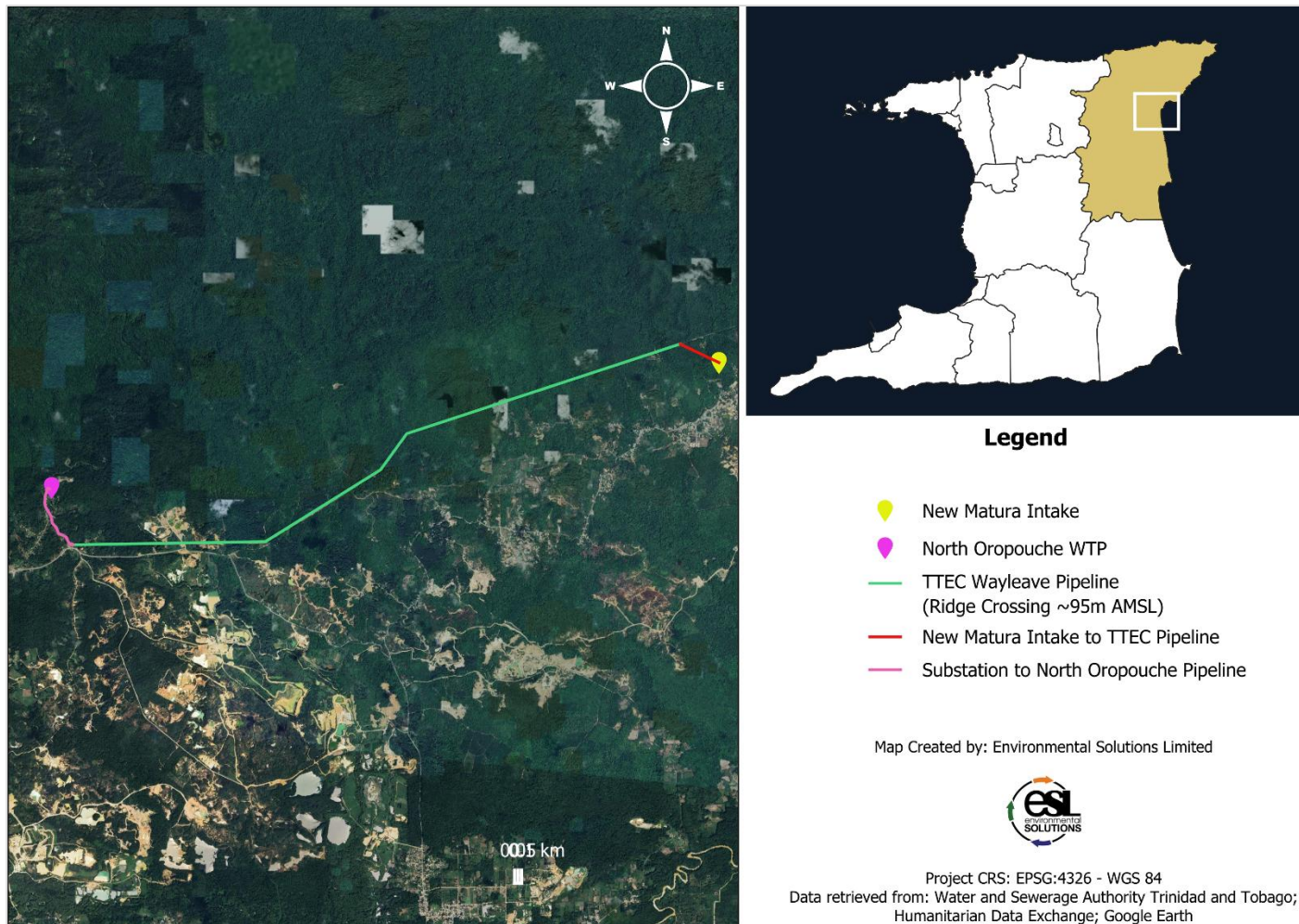


Figure 2-2: Location of the supporting pipeline route from the new Matura intake to the existing North Oropouche WTP. Sections of the pipeline in red and purple have been estimated based on discussions with the client during the site visit

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

2.5.1 Project Timelines

Milestone / Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Complete project feasibility (incl. ER, Engineering Estimate & Draft ITT)	█																							
◆ Approval to invite bids		█	█	█																				
Tendering process		█	█	█																				
◆ Award of contract					█																			
◆ Project kick off meeting					█																			
Site mobilisation						█																		
Design stage (incl. ESIA, hydraulic modelling, RAP)						█	█	█																
Procurement - long lead items								█	█	█	█	█	█											
Decommissioning - existing 0.5 IMGD Matura package plant									█	█														
Civil works - WTP foundations, access roads, site drainage									█	█	█	█	█	█	█	█								
Raw water intake structure on Matura River										█	█	█	█	█	█									
Treatment process installation (coagulation, sedimentation, filtration)													█	█	█	█	█	█						
Mechanical & electrical installation (pumps, generators, HV transformers)														█	█	█	█	█	█					
Transmission pipeline - Matura WTP to Sangre Grande / Manzanilla														█	█	█	█	█	█	█				
Salybia component - complementary treatment & supply works															█	█	█	█	█	█				
SCADA, automation & water quality monitoring systems																		█	█	█	█			

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Milestone / Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Test & commission WTP and transmission pipeline																								
◆ Handover of completed project																								
Defects liability period																								

Legend

 Pre-construction	 Design & procurement	 Construction / Works	 Commissioning & handover	 Milestone
--	--	--	--	---

2.6 Expected Benefits

The main expected benefit of this project is to increase potable water supply for over 185,000 residents from once every eight (8) days to supply water to residents up to 5-6 days per week in areas across Sangre Grande, Manzanilla, Matura, Toco Road, La Horquetta, Malabar, Brazil, Carapo, Maloney Gardens, and surrounding communities (Figure 2-3). With the enhancement in the community benefits, this would reduce the existing strain on community members and commercial operators who have an inadequate supply of water and limited on-site personal storage for themselves.

Additionally, this improvement will supplement the treated water capacity to the North Oropouche WTP system, significantly reducing network stress and improving supply redundancy across North-East Trinidad, while lowering maintenance costs and reducing unplanned outages through modern WTP equipment, SCADA automation, and real-time monitoring.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

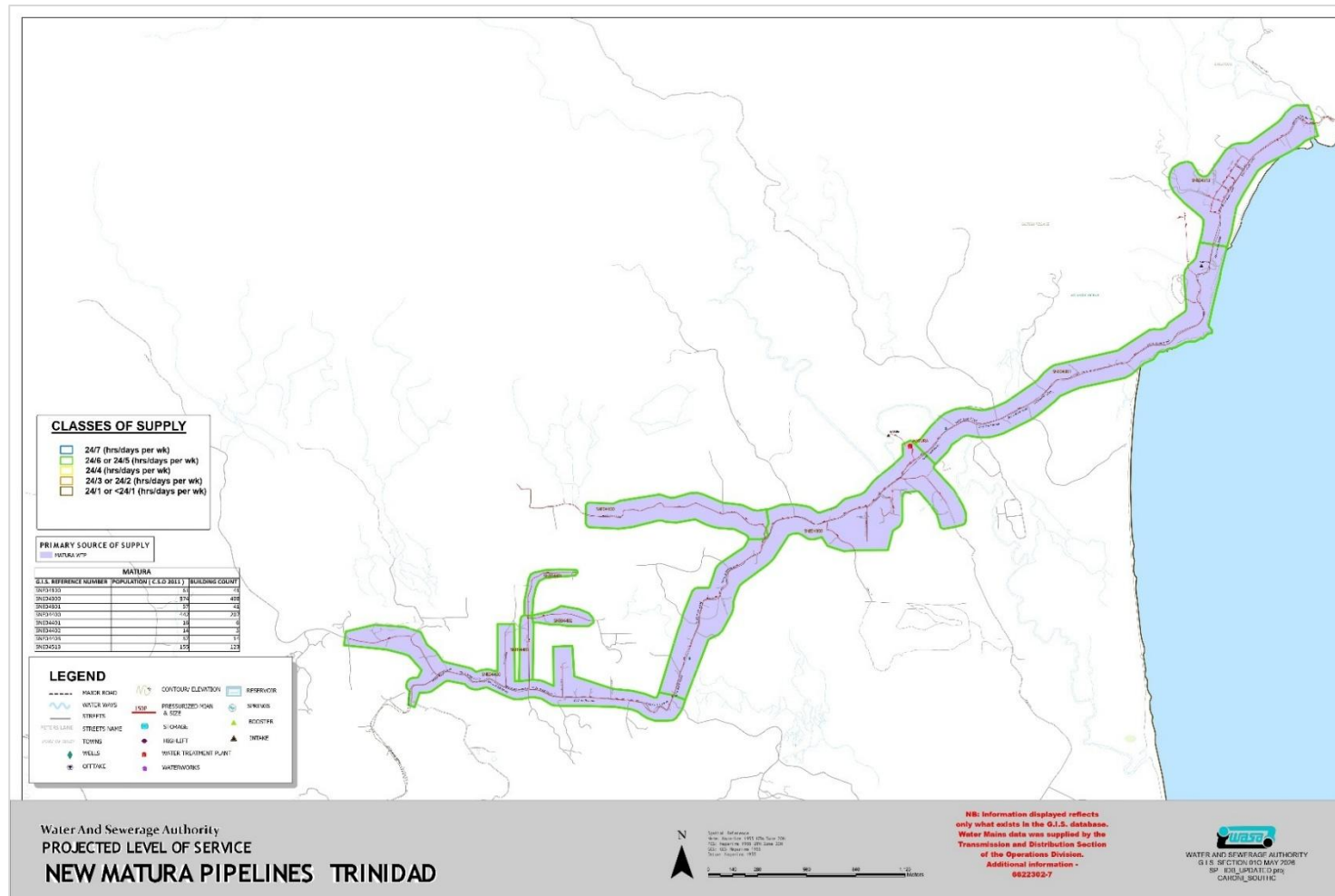


Figure 2-3: Areas to be supplied by the Proposed New Matura Water Treatment Plant and Pipeline and the class of supply proposed (Source: WASA)

3 Legal and Institutional Framework

3.1 Legislative Framework

Laws and Regulations	Relevance
ENVIRONMENTAL MANAGEMENT ACT (2000)	The Project must obtain a Certificate of Environmental Clearance (CEC) for the construction of the WTP, intake works, and pipeline. All activities must comply with Environmental Management Authority regulations and prescribed mitigation measures.
CERTIFICATE OF ENVIRONMENTAL CLEARANCE (DESIGNATED ACTIVITIES) ORDER (2001) (AS AMENDED)	The proposed Matura–Salybia WTP and associated pipelines fall within designated activities requiring CEC approval and environmental assessment.
ENVIRONMENTALLY SENSITIVE AREAS RULES (2001)	Provides the framework for designation, protection, and management of Environmentally Sensitive Areas under the Environmental Management Act; establishes requirements for conservation, sustainable use, and controlled activities within ESAs. The project is located near the Matura Environmental Sensitive Area, a nationally designated sensitive area as well as other internationally recognised Key Biodiversity Areas. Activities must avoid negative impacts on sensitive ecosystems, comply with site-specific management requirements, and implement strict mitigation to avoid habitat disturbance and biodiversity loss.
ENVIRONMENTALLY SENSITIVE SPECIES RULES (2001)	Establishes procedures for listing and protecting Environmentally Sensitive Species; prohibits harm, trade, or disturbance to listed species and their habitats; provides penalties for breaches. Several ESS may be associated with the Matura Forest. Construction and operation must avoid disturbance, implement biodiversity monitoring, and follow EMA protocols for chance finds or species protection.
CONSERVATION OF WILDLIFE ACT (1958), INCLUDING AMENDMENTS	Regulates the protection, hunting, capture, and trade of wildlife; prescribes offences and penalties for harming protected fauna. Guides management of wildlife during construction, especially the need to avoid disturbance to forest fauna, nesting species, and protected wildlife in the Matura National Park and surrounding forests. Also informs fauna relocation procedures and habitat protection.
WATER AND SEWERAGE ACT (CHAPTER 54:40)	WASA is both the executing agency and operator. WASA would need to acquire the approval from Water Resources Authority for abstraction of an agreed amount from the Salybia River to allow for the sustainability of the resource. Water quality monitoring and compliance with EMA standards would also be necessary.
WATER WORKS AND WATER CONSERVATION ACT (1944)	Provides regulatory control for the abstraction, treatment, distribution, and conservation of water resources; empowers the

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Laws and Regulations	Relevance
	Government and WASA to manage waterworks, water rights, and water conservation measures. This is central to project operation, as it governs raw water abstraction from the Matura River, pipeline operation, and water treatment processes. Ensures compliance with national water rights, water protection regulations, and operational standards for potable water systems.
PUBLIC HEALTH ORDINANCE (CHAPTER 12 No. 4)	Requires that potable water meet national public health standards; aligns with WHO Guidelines for Drinking Water Quality.
OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) (2004)	Applies to all phases of construction and operation; requires health and safety management plans, PPE, and worker training.
TOWN AND COUNTRY PLANNING ACT (CH. 35:01)	Planning permission must be obtained for the construction of the WTP and associated infrastructure.
STATE LANDS ACT (CH. 57:01)	The project involves state lands at Matura and Salybia; Access to the intake area at Salybia may require land acquisition.
FORESTS ACT (CH. 66:01) AND FORESTS (PROHIBITED AREAS) ORDER	The Salybia intake is located adjacent to the Matura National Park ESA; permits and buffers are required to prevent encroachment.
NATIONAL ENVIRONMENTAL POLICY (2018)	Guides environmental decision-making for the WTP and supports integration of sustainable and climate-resilient practices.
NOISE POLLUTION CONTROL RULES (2001)	Construction activities must comply with daytime and nighttime noise limits and mitigation measures.
AIR POLLUTION RULES (2014)	Applies to dust and exhaust emissions during construction; requires dust suppression and monitoring.
WASTE MANAGEMENT RULES (2014)	Applies to the management of sludge, construction debris, and chemical waste at the WTP site.
WATER POLLUTION RULES (2001)	Requires permits and controls for sludge handling and effluent discharge from backwash and process water.
FISHERIES ACT (CH. 67:51)	Protects aquatic habitats downstream of the Matura and Salybia Rivers; requires maintenance of environmental flows.
PLANNING AND FACILITATION OF DEVELOPMENT ACT (2014)	Ensures planning permissions are harmonised with EMA environmental clearances.
NATIONAL CLIMATE CHANGE POLICY (2020)	Guides the climate-resilient design and operation of the WTP and pipeline systems.
NATIONAL FOREST POLICY (2011)	Provides the strategic framework for conservation, sustainable management, and restoration of forest ecosystems. The project occurs near forested areas of Matura; requires adherence to sustainable land clearing, forest conservation, and replanting obligations.
NATIONAL INTEGRATED WATER RESOURCES MANAGEMENT POLICY (2022)	Establishes principles for the coordinated development, management, and protection of water resources to ensure sustainability. It can help to guide sustainable abstraction from the Matura River, watershed protection, and long-term water security considerations in WTP operations.
INTEGRATED SOLID WASTE MANAGEMENT POLICY (2014)	Defines national strategy for solid waste reduction, recycling, disposal, and hazardous waste control. Relevance: Informs waste

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Laws and Regulations	Relevance
	handling during construction (excavated material, packaging, hazardous waste), and operational waste such as sludge and chemicals.
NATIONAL TRUST OF TRINIDAD AND TOBAGO (ACT NO. 31 OF 1999)	
DRAFT NATIONAL POLICY ON GENDER AND DEVELOPMENT 2009	The National Policy on Gender and Development provides a framework for including gender perspectives in all activities of government and civil society, thereby promoting the full and equal participation of men and women in the development process. Therefore, the activities of WASA as the project is rolled out should be gender sensitive, accounting fully for and integrating the needs and interests of women and men into project activities.
NATIONAL POLICY ON PERSONS WITH DISABILITIES	This National Policy is necessary and critical to fully recognise the rights of all persons with disabilities and to support the organisations that serve them. The execution of this project, the impact assessment and the recommendations provided should take into consideration fair treatment and the inclusion of persons with disabilities.
LABOR LAW COMPLIANCE GUIDE FOR TRINIDAD AND TOBAGO	This outlines the obligations of employers and contractors to guidelines for written employment contracts, job description, salary and adherence to minimum wage rules, benefits, working hours, and conditions for termination. Labor laws in Trinidad and Tobago distinguish between employees and contractors, which need to be adhered to by WASA and its contractors.
THE CHILDREN (AMENDMENT) ACT, 2000	This act speaks to the definition of a 'child' as a person under the age of eighteen years and protects against child labour.
THE EQUAL OPPORTUNITY ACT, NO. 69 OF 2000	The Act prohibits discrimination of persons on grounds of sex, race, ethnicity, origin, marital status, religion or disability. Part III of the Act deals specifically with employment discrimination. In respect of persons seeking employment, an employer is prohibited from refusing or omitting to offer employment to a person based on the above grounds of discrimination.
LAND ACQUISITION ACT (CHAPTER 58:01)	Establishes the legal framework for compulsory acquisition of land for public purposes, including procedures for acquisition, valuation, compensation and dispute resolution.
REAL PROPERTY ACT (CHAPTER 56:02)	Provides the framework for land registration and ownership under the Torrens system. Relevant for verification of land ownership, registered interests and property rights.
MUNICIPAL CORPORATIONS ACT (ACT 21 OF 1990)	Establishes the powers and responsibilities of Municipal Corporations with respect to local infrastructure, roads, drains,

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Laws and Regulations	Relevance
	public spaces and community services. Relevant where Project activities interface with assets managed by local authorities.

INTERNATIONAL CONVENTIONS AND COMMITMENTS

	Relevance
CONVENTION ON BIOLOGICAL DIVERSITY (CBD)	Obligates conservation of biological diversity, sustainable use and benefit sharing. The project must consider all sensitive habitats within the sphere of influence.
CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES (CITES)	Relevant for protection of listed fauna (if encountered) and for controls on any trade/transfer of protected species or specimens found during works or salvage. Requires notifying authorities and following national wildlife regulations.
CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES (CMS / BONN CONVENTION)	Many birds, sea turtles and other migratory fauna occurring regionally (including leatherbacks and migratory birds) are covered by CMS commitments, relevant to protecting migratory routes, nesting beaches and reducing disturbance.
UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC) & PARIS AGREEMENT	Requires national climate adaptation and mitigation efforts. Relevant to the project's climate-resilient design (flooding, drought), greenhouse gas considerations (generators, energy-efficiency) and inclusion of climate risk considerations.
ROTTERDAM CONVENTION (PRIOR INFORMED CONSENT FOR CERTAIN HAZARDOUS CHEMICALS AND PESTICIDES)	Relevant to import, use and information exchange for pesticides and industrial chemicals. Informs selection, procurement and safe use of chemicals, and national controls on restricted substances.
STOCKHOLM CONVENTION (PERSISTENT ORGANIC POLLUTANTS - POPs)	Relevant where project activities might mobilize or generate POPs (e.g., contaminated soils) and for safe handling/disposal of POP-containing wastes; supports strict hazardous-waste controls and monitoring.

3.2 IDB Environmental and Social Policy Framework

This section evaluates the relevance of the project components to the Inter-American Development Bank's (IDB) Environmental and Social Performance Standards (ESPS), ensuring compliance with the IDB's Environmental and Social Policy Framework (ESPF).

3.2.1 ESPS 1 – Assessment and Management of Environmental and Social Risks and Impacts

This standard underpins the entire environmental and social due diligence process. The project involves civil works and infrastructure development (construction of a 12 IMGD WTP, raw and treated water pipelines, intake structures, and access roads) in environmentally sensitive areas near the Matura and Salybia Rivers and within proximity to the Matura Environmental Sensitive Area (MESA).

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

In accordance with ESPS 1, an Environmental and Social Assessment (ESA) should be prepared to systematically identify, assess, and manage potential environmental and social risks throughout the project lifecycle. The standard requires the preparation and implementation of an Environmental and Social Management System (ESMS) and associated management plans.

ESPS 1 also ensures meaningful stakeholder engagement, including consultation with local communities, relevant government agencies, and civil society organizations which are active in the study area. Overall, this standard ensures that environmental and social considerations are integrated into project design, construction, and operation, and that the project achieves compliance with both national legislation and IDB requirements.

3.2.2 ESPS 2 – Labor and Working Conditions

This standard is important as the project will employ construction workers, skilled technicians, and contractors, and will establish temporary work sites and camps during the construction phase. ESPS 2 ensures that the project provides safe, fair, and equitable working conditions consistent with local laws and international labour conventions. The standard requires the implementation of worker protection measures, including a Worker Health and Safety Management Plan; codes of conduct prohibiting discrimination, child labour, and harassment; grievance mechanisms for workers to report concerns; and measures for emergency preparedness and accident prevention.

Given the project's proximity to rural communities, ESPS 2 also underscores the need for local hiring and fair labour practices, supporting socioeconomic development in the region. The relevance of this standard is therefore high, as it ensures that the project maintains a safe, productive, and compliant work environment while minimising labour-related risks.

3.2.3 ESPS 3 – Resource Efficiency and Pollution Prevention

ESPS 3 focuses on the project's potential to generate pollutants and waste streams during construction and operation, including wastewater, sludge, chemical residues, noise, and dust. The construction phase will involve the use of heavy equipment, fuel, and lubricants, while the operational phase will use chemicals such as chlorine for water treatment.

In line with this standard, the project is required to implement measures to prevent and control pollution from construction and operational activities; promote efficient use of energy, water, and raw materials; manage solid and hazardous waste in accordance with local regulations; monitor and mitigate air, water, and noise emissions to remain within national and international guidelines; and integrate climate change resilience measures in design and operation. This standard is relevant as the project directly interacts with surface water systems and environmentally sensitive ecosystems that require protection from contamination.

3.2.4 ESPS 4 – Community Health, Safety, and Security

This standard is relevant due to the project's interface with local communities in the Matura and Salybia areas. Construction activities may involve increased vehicular movement, noise, dust, and

temporary access restrictions, which could affect nearby residents and road users. The presence of construction equipment and storage of hazardous substances also present potential safety risks to surrounding populations. ESPS 4 requires the project to identify and manage risks to community health and safety throughout all phases; develop and implement relevant plans; design infrastructure to withstand climate-related hazards such as flooding and hurricanes; maintain emergency preparedness and response systems that include community notification protocols; and ensure that security personnel, if engaged, act in a manner consistent with human rights principles. Given that the Matura and Salybia areas are ecotourism hubs and contain residential settlements and public roads, ESPS 4 ensures that project safety measures extend beyond the site boundary and protect community well-being.

3.2.5 ESPS 5 – Land Acquisition and Involuntary Resettlement

ESPS 5 may be triggered, as the project involves the construction of new pipelines, intake structures, and ancillary facilities that may require temporary access or occupation of privately used lands. While large-scale resettlement is not anticipated, minor land easements or compensation for temporary disturbance to roadside structures may be necessary. This standard ensures that any land acquisition or restriction of access follows voluntary, transparent, and fair procedures; livelihoods are restored or improved for any affected persons; and stakeholders are consulted meaningfully and compensated in accordance with national legislation and IDB policy. The project's compliance will be supported through a Land Access and Compensation Framework (LACF) and Grievance Redress Mechanism (GRM) established under the ESMS.

3.2.6 ESPS 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources

This standard is essential because the project is located within the Matura watershed, near the Matura Environmental Sensitive Area (MESA) and adjacent riparian habitats that support diverse flora and fauna, including endemic and migratory species. The Matura area is globally recognised for its leatherback turtle nesting beaches, as well as its tropical forest and riparian ecosystems. ESPS 6 requires that the project avoid and minimise impacts on natural habitats and critical biodiversity areas; implement relevant biodiversity plans; establish no-go zones and buffer areas around sensitive habitats; conduct fauna rescue and relocation where necessary; and achieve no net loss of biodiversity through restoration and monitoring programs. This standard has significant relevance given the project's environmental setting and underscores the need for ongoing ecological monitoring and collaboration with the EMA, Forestry Division, and local conservation groups.

3.2.7 ESPS 8 – Cultural Heritage

ESPS 8 may be relevant as the project will involve excavation and earthworks in areas with potential for archaeological or cultural artefacts. Trinidad and Tobago's National Trust Act (1991) and Heritage Preservation Policy emphasise the protection of cultural resources. In compliance with ESPS 8, the project must implement a Chance Finds Procedure to ensure that any cultural or archaeological

materials discovered during excavation are appropriately managed; halt works immediately if artefacts are found; and notify and collaborate with the National Trust of Trinidad and Tobago and the Ministry of Tourism, Culture and the Arts for proper evaluation and conservation. This standard ensures that project activities respect and preserve cultural heritage and traditional community values.

3.2.8 ESPS 9 – Gender Equality

ESPS 9 is relevant and should be considered during project planning and implementation to ensure that project benefits and risks are equitably distributed among women, men, and vulnerable groups. Water supply infrastructure projects often have differentiated impacts based on gender roles, particularly in rural communities where women frequently bear primary responsibility for household water management, caregiving, and domestic sanitation. Improved access to reliable potable water can improve health, well-being, and economic productivity. During construction, ESPS 9 requires the project to promote equal employment opportunities, prevent discrimination, and implement measures to address risks of sexual harassment, gender-based violence, and sexual exploitation and abuse. Stakeholder engagement activities should also ensure the meaningful participation of women and other potentially marginalised groups in consultations and decision-making processes. Accordingly, while the project is not expected to generate significant gender-specific adverse impacts, the application of ESPS 9 will help ensure inclusive project implementation and equitable access to project benefits throughout the project lifecycle.

3.2.9 ESPS 10 – Stakeholder Engagement and Information Disclosure

This standard is important as the project directly affects local communities, including residents, businesses, and conservation groups in Matura and Salybia. Effective stakeholder engagement is essential for building trust, managing expectations, and addressing concerns related to construction impacts, employment opportunities, and water supply reliability. ESPS 10 requires the development and implementation of a Stakeholder Engagement Plan (SEP), which includes identification and mapping of stakeholders and vulnerable groups; public disclosure of project information in accessible formats and languages; meaningful consultation prior to and during project implementation; and a functioning Grievance Redress Mechanism (GRM) accessible to all affected persons. This standard ensures continuous two-way communication between WASA, contractors, local communities, and institutional stakeholders, strengthening project transparency and social acceptance.

4 Environmental and Social Baseline

4.1 Introduction

This chapter describes the existing environmental and social conditions in the project area to establish a clear baseline for impact assessment and management planning. A thorough understanding of the baseline context is essential for identifying, predicting, and mitigating the potential environmental and social risks and impacts associated with the construction and operation of the proposed project in the Matura communities.

The findings and conclusions presented in this Environmental and Social Assessment (ESA) are based on the information available at the time of the assessment and are subject to several limitations. The availability of site-specific secondary environmental and social data was limited in some cases, requiring reliance on broader national datasets, publicly available information, and professional judgement to characterise baseline conditions. While reasonable efforts were made to obtain relevant and reliable information, data gaps remain for certain environmental and social parameters.

The assessment was also undertaken within a constrained timeframe, which limited the extent to which additional data collection, verification, and detailed analyses could be completed. Consequently, the study focused on identifying key environmental and social risks and impacts based on the best available information and a proportionate level of assessment commensurate with the project stage.

In addition, the level of detail available for some project components was limited at the time of assessment. In certain cases, project descriptions, design information, construction methodologies, and operational details were preliminary, incomplete, or subject to further refinement. As a result, some impact assessments have been undertaken using reasonable assumptions regarding project activities and footprints. Where uncertainties exist, a precautionary approach has been applied, and recommendations have been made for further assessment, data collection, and management planning during subsequent stages of project design and implementation.

These limitations do not preclude the identification of the project's principal environmental and social issues; however, they should be considered when interpreting the assessment findings. The ESA should therefore be regarded as a living document that will require updating as additional project information and baseline data become available

4.1.1 Area of Influence

The Area of Influence of the proposed project encompasses all geographic zones and environmental, social, and ecological receptors that may experience direct or indirect impacts from the project's construction, operation, and maintenance activities. Defining the Aoi is critical to understanding the spatial and temporal extent of project-related effects and to ensuring that environmental and social

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

risks and impacts are comprehensively assessed and managed in accordance with the Environmental Management Authority (EMA) requirements and IDB Performance Standards. The Area of Influence is categorised into two primary components, direct and indirect, each described below.

DIRECT AREA OF INFLUENCE

The Direct Area of Influence (DAoI) refers to the immediate project footprint and the surrounding environment that may experience direct, measurable, and site-specific impacts arising from project construction, operation, and maintenance activities. For the purposes of this assessment, the DAoI has been defined as a 1-kilometre buffer surrounding the proposed Water Treatment Plant (WTP) site and raw water intake structure, as well as a 1-kilometre corridor extending on either side of the proposed pipeline alignment (Figure 4-1). This area encompasses environmental and social receptors that may be directly affected by activities such as vegetation clearing, excavation, construction traffic, noise generation, dust emissions, surface water disturbances, habitat alteration, and other project-related activities. The defined DAoI provides the spatial boundary within which direct environmental and social impacts have been assessed and corresponding mitigation measures developed.

The DAoI encompasses the following in relation to the proposed location of the new WTP and pipelines provided by WASA as shown in Figure 2-1:

- The proposed Water Treatment Plant (WTP) site at Matura, where site clearing and preparation will occur to accommodate the new facility.
- The water intake and pumping station located along the Matura River.
- The pipeline extending from the intake in Matura to the new Matura WTP and to the existing North Oropouche WTP, including trenching zones, temporary laydown areas, and vegetation removed along T&TEC wayleave.
- Associated construction staging areas, temporary access routes equipment storage yards, access roads, and worker facilities.
- The electrical and control systems, and any temporary spoil disposal or storage sites.
- Riparian vegetation along the Matura and Salybia Rivers, which may be affected by clearing or runoff.
- Soil and slope systems potentially exposed to erosion or compaction.
- Surface water bodies subject to temporary increases in turbidity or sediment load during construction.
- Local access roads and nearby residential properties that may experience noise, dust, or traffic disturbance.
- Wildlife habitats that may be temporarily disturbed during land clearing or machinery operation.
- The supply zones outlined in Figure 2-3 during the operation of the new water treatment plant.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

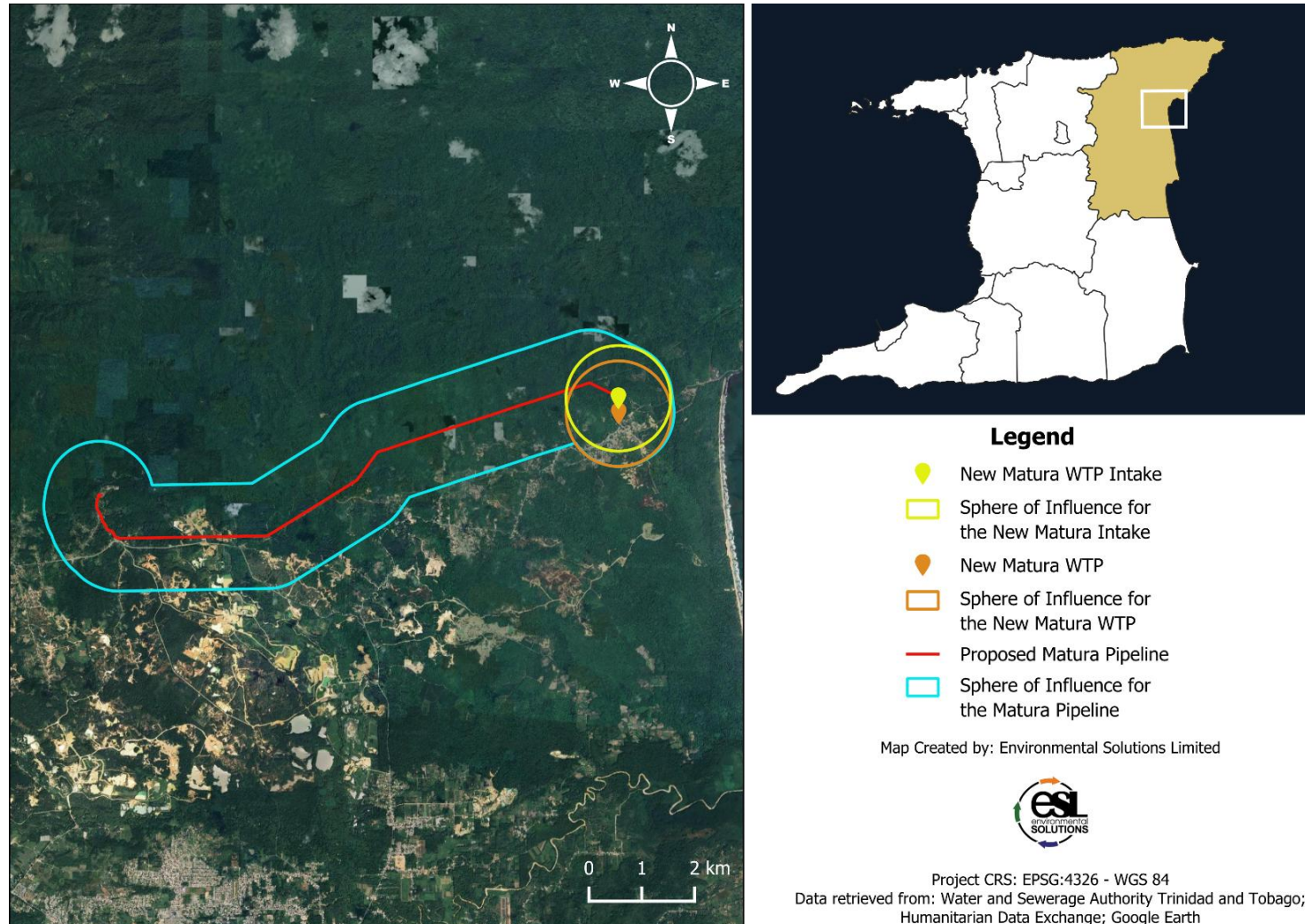


Figure 4-1: Extent of the 1-km Zone of influence for each of the proposed project works

4.2 Physical Environment Baseline

4.2.1 Climate

Trinidad and Tobago's geographic proximity to the equator affords it the influence of two prevailing climate regimes, giving rise to two contrasting seasonal patterns. These seasons are delineated by distinct dry and wet phases. The dry season, extending from January to May, is typified by a tropical maritime climate marked by moderate to strong low-level winds, elevated daytime temperatures, and comparatively cool nocturnal conditions, with precipitation occurring primarily as convective showers during the daytime (Climate Change Knowledge Portal, 2025). The wet season, spanning the months of June to December, is characterised by a modified moist equatorial climate distinguished by low wind velocities, persistently hot and humid conditions both day and night, and a pronounced increase in rainfall. This heightened precipitation primarily results from the migration and latitudinal shifting of equatorial weather systems (Trinidad and Tobago Meteorological Service, 2025). The months of late May and December are regarded as transitional periods leading into the wet and dry seasons, respectively. Variations in the manifestation of these two climatic regimes between the islands of Trinidad and Tobago are largely attributed to differences in landmass, topography, elevation, orientation relative to the prevailing trade winds, and overall geographical positioning. Embedded within the wet season is the Atlantic hurricane season, which extends from June to November and typically peaks between August and October (Trinidad and Tobago Meteorological Service, 2025). Owing to its geographical location along the southern margin of the North Atlantic hurricane basin, Trinidad experiences fewer direct storm impacts than Tobago; nevertheless, both islands are similarly influenced by peripheral weather effects associated with the passage of tropical storm systems.

Trinidad and Tobago's climate exhibits pronounced interannual and seasonal variability, with rainfall demonstrating considerable spatial and temporal fluctuations even across relatively small geographic areas. The principal climatic drivers and influencing mechanisms are illustrated in the accompanying schematic, though it does not encompass all contributing factors. The Figure above highlights the predominant systems governing rainfall and temperature variability across Trinidad and Tobago, including the El Niño–Southern Oscillation (ENSO), the North Atlantic Subtropical High-Pressure System (NASH), the Northeast Trade Winds, the North Atlantic Oscillation (NAO), the Intertropical Convergence Zone (ITCZ), the Madden–Julian Oscillation (MJO), the Caribbean Low-Level Jet (CLLJ), the Tropical Upper-Tropospheric Trough (TUTT), upper-level troughs, shear lines, tropical waves, tropical cyclones, and the Saharan Air Layer; however, these do not represent the full suite of influencing factors.

TEMPERATURE

Trinidad and Tobago has a uniformly hot, maritime tropical climate with only modest seasonal variation (Trinidad and Tobago Meteorological Service, 2025). The long-term (1991–2020) monthly mean temperatures at the Piarco (Trinidad) and Crown Point (Tobago) reference stations are plotted below (Figure 4-2). It shows May and September as the warmest months and February as the coolest (Trinidad and Tobago Meteorological Service, 2025). For example, Piarco's average daily high is about 33.0 °C in September and ~26 °C in February, while at Crown Point the highest

mean maxima are 31.5 °C (September) and 31.3 °C (May). Nights are also warm; the warmest average low temperatures (~25.1 °C) occur in May and September (Trinidad and Tobago Meteorological Service, 2025). National extremes (1959–2021) are 36.5 °C (record high at Piarco on 25 Sep 1990) and 16.1 °C (record low at Piarco on 21 Jan 1964). These conditions imply that communities like Salybia and Matura (on Trinidad’s northeast coast) experience persistently hot days in the wet season with only slightly cooler nights in the dry season.

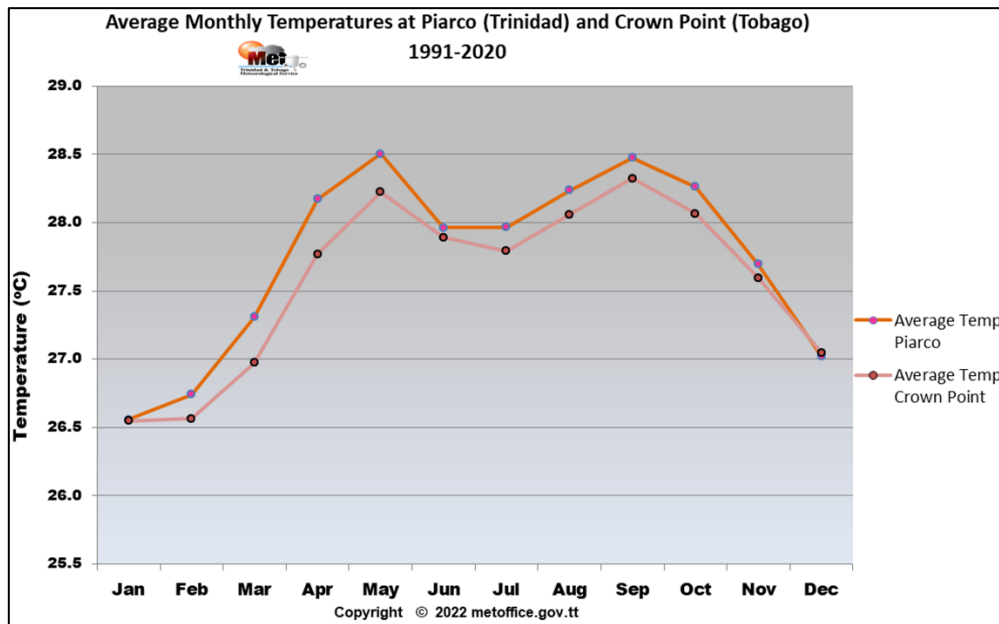


Figure 4-2 Average Monthly Temperatures in Trinidad and Tobago (1991-2020)

Additionally, the graph demonstrates a clear and sustained warming trend in Trinidad and Tobago’s mean maximum temperatures over the seven-decade period from 1951 to 2020. After minor fluctuations and a slight cooling between the 1960s and 1970s, temperatures began rising steadily from the 1980s onward. By the 2000s and 2010s, mean maximum temperatures had reached 32.2°C, approximately 1.1°C higher than the 1961–1990 baseline. This consistent upward trajectory reflects a long-term increase in temperature, indicative of the broader regional warming associated with climate change.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

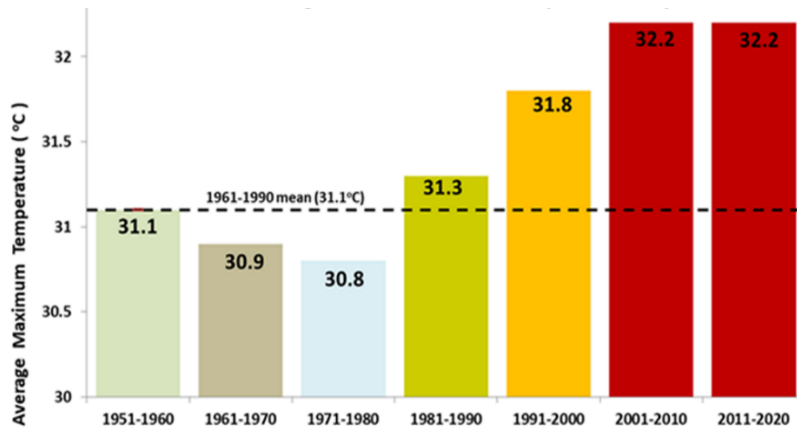


Figure 4-3 Trinidad Mean Maximum Temperatures by Decade

RAINFALL

On both an annual and seasonal basis, Trinidad experiences higher rainfall totals than Tobago; however, both islands exhibit a distinct bimodal rainfall pattern, with early (June) and late (November) seasonal maxima. Trinidad's primary rainfall peak typically occurs in June, while Tobago's main peak is observed in November. Annual rainfall distribution is largely governed by the interaction of multiple, often competing, atmospheric and oceanic systems. The principal drivers include the latitudinal position and intensity of the North Atlantic Subtropical High (NASH) pressure cell, the meridional movement of the Intertropical Convergence Zone (ITCZ), westward-propagating tropical waves and cyclonic systems (depressions, storms, and hurricanes), the mid-Atlantic upper-level trough, localized sea-breeze circulations, cloud clusters generated by large-scale low-level convergence, and orographic influences.

At Piarco (north Trinidad) the wettest month is August (avg. 255.3 mm), and the driest month of the year is March (40.6 mm) (Trinidad and Tobago Meteorological Service, 2025). Notably, September can have short dry spells even in the wet season (Trinidad and Tobago Meteorological Service, 2025). Figure 4-4 below shows Piarco's long-term average monthly rainfall totals which visually depict the stark difference in total rainfall observed in the wet and dry season. These patterns suggest that east-coast communities like Saybia and Matura receive most of their rain in mid-year and very little at the end of the year, making them vulnerable to both flooding in the wet season and water scarcity in the dry season.

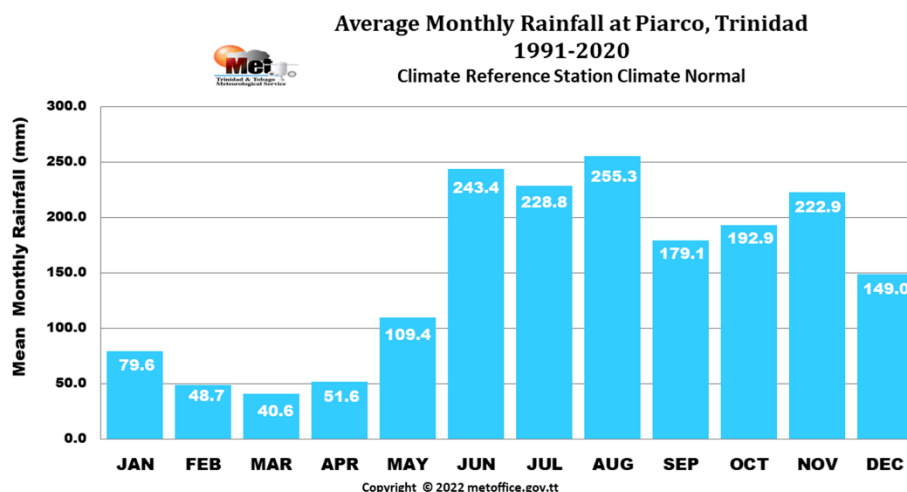


Figure 4-4 Average Monthly Rainfall Recorded at Piarco Weather Station in Northern Trinidad between 1991-2020
(source: Trinidad and Tobago Meteorological Service)

During the dry season, the NASH pressure cell typically shifts southward and expands toward the equator, promoting subsidence, low-level moisture divergence, and enhanced trade winds over Trinidad and Tobago, collectively producing drier atmospheric conditions. By contrast, in May, the gradual poleward migration of the NASH and the resulting convergence along its southern flank permit rain-bearing systems such as the ITCZ and tropical waves to advance northward and eastward, thereby facilitating the transition to, and eventual establishment of, the wet season regime.

The town of Sangre Grande, which encompasses the project areas of Salybia and Matura, has a slightly elevated average annual rainfall. According to (World Bank Group , 2026) the wettest month is November (avg. 262 mm) and the driest month of the year is March (59.8 mm). In comparison to the rainfall data recorded at the Piarco Weather station, the Sangre Grande area recorded higher average monthly rainfall in both the wettest and the driest month. Also, based on Figure 4-5 below, Sangre Grande experienced rainfall exceeding 200mm (on average) for 6 months of the year. The graph also highlights the immediate increase in monthly average temperatures from the month of June to December which coincides with the start and conclusion of the wet season.

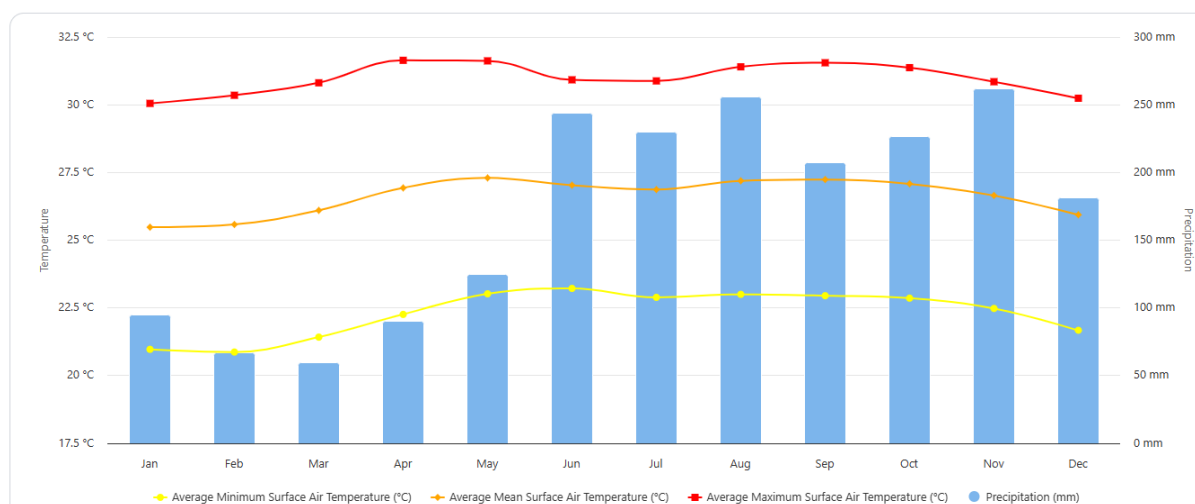


Figure 4-5 Average Temperature and Precipitation of Sangre Grande, Trinidad and Tobago between 1991-2020 (source: World Bank Group Climate Change Knowledge Portal)

This further highlight that there is a potential risk of flooding in the project area and surrounding communities.

CLIMATE CHANGE PROJECTIONS

Temperature

Statistical downscaling of the HadCM3 Global Climate Model (GCM) under the A2 and B2 emission scenarios indicates that mean surface temperatures across the Caribbean region, including Trinidad and Tobago, are projected to increase by approximately 1.5°C to 2.0°C by the 2080s, relative to the 1980–1999 baseline (Trinidad and Tobago Meteorological Service, 2025). This equates to an average warming rate of about 0.29°C per decade. Should these projections materialize, an estimated 8% extension of the dry season could occur by mid-century (2050), consequently shortening the wet season duration.

The projected warming is anticipated to exacerbate heat-related impacts, including increased evapotranspiration, higher agricultural irrigation demands, and elevated heat stress on both ecosystems and human populations. Furthermore, more intense but shorter rainfall events may diminish surface water quality and reduce groundwater recharge, thereby intensifying water resource constraints across the islands.

Rainfall

Projected rainfall trends for Trinidad and Tobago exhibit significant uncertainty, with model outputs displaying considerable variability. Among 21 global climate models assessed, the majority project an overall annual rainfall decline of approximately 15% by the 2080s, while a smaller subset (3–4 models) suggests a potential increase (Trinidad and Tobago Meteorological Service, 2025; The Republic of Trinidad and Tobago, 2023). The prevailing drying trend is linked to a modeled shift toward a more positive phase of the North Atlantic Oscillation (NAO) and the emergence of El Niño–like conditions in the Pacific, both associated with regional reductions in precipitation.

Despite this general drying signal, downscaled projections from the HadCM3 model (A2 and B2 scenarios) indicate a notable increase in early wet-season rainfall (June–August) for Trinidad and Tobago which is contrasting with much of the wider Caribbean, except Barbados. Such variability underscores the complexity of regional hydroclimatic responses.

If the drying projections are realized, Trinidad and Tobago may face more frequent and prolonged dry spells and droughts by the end of the century. These conditions, compounded by sea-level rise which is projected to exceed 0.35 m by 2100 may amplify coastal inundation, storm surge impacts, and saline intrusion, placing further pressure on freshwater resources and coastal infrastructure (Trinidad and Tobago Meteorological Service, 2025).

4.2.2 Topography

Trinidad's terrain is dominated by three east–west mountain ranges. The Northern Range along the north coast is the island's highest, reaching roughly 925 m at El Cerro del Aripo (HIPPOLYTE & Mann, 2021). Salybia and Matura lie at the northeastern terminus of this range, on the Atlantic coast. This eastern segment of the Northern Range is largely protected as the Matura National Park (about 9,000 ha) and its Environmentally Sensitive Area (The University of the West Indies, St. Augustine, 2026).

Elevation in the Salybia/Matura area ranges from sea level at the coast to about 580 m on the ridge tops (UWI St. Augustine, 2025). Three major east–west ridges (St. David–Zagaya, Main Ridge, and Rio Seco) dominate the landscape (as displayed in **Error! Reference source not found.**), with numerous shorter ridges running north–south. These ridges create deep, narrow valleys that are drained by fast-flowing streams. In the northern region of the park the streams feed the Grande Riviere and Shark River; on the southern side the tributaries converge into the Salybia and Matura rivers (UWI St. Augustine, 2025). These rivers originate in the highlands and discharge to the Atlantic near the villages of Salybia and Matura.

4.2.3 Geology and Soils

Trinidad is located on the southeastern edge of the Caribbean Plate and the South American Plate margins (Webber, et al., 2011). This plate boundary-zone represents an area of significant Neogene structural deformation. Several east-west strike-slip faults which cut across Trinidad

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

are associated with this plant-boundary margin. The island therefore sites within an active earthquake zone.

The geology of Trinidad can be described as three areas of uplifted ranges separated by flat lying basin filled areas which were produced by the erosion of uplifted ranges (Garcia-Caro, Mann, & Escalona, 2011). The project area is mostly situated within the Northern Range which has some of the oldest rocks in Trinidad. These consist of mostly metamorphic rock facies which sometimes show relic structures. The southern edge of the project area consists of young alluvial fan deposits within the Caroni Basin.

The northeastern portion of Trinidad, encompassing the Salybia and Matura area, lies within the eastern extension of the Northern Range, which represents the island's most geologically complex and tectonically active terrain. As shown on the map in Figure 4-6, the Northern Range is primarily composed of Cretaceous to early Tertiary metamorphic and igneous rocks, including schists, quartzites, phyllites, and gneisses (HIPPOLYTE & Mann, 2021). These formations are remnants of the Caribbean–South American plate interactions, and they form steep, rugged topography with elevations exceeding 500 m in several places (Garcia-Caro, Mann, & Escalona, 2011).

This area transitions southeastward into the Northern Basin, a structural depression bordered by major fault systems such as the El Pilar Fault Zone to the north and the Central Range Fault Zone to the south. The Northern Basin contains younger sedimentary deposits (mainly Pliocene and Quaternary formations) consisting of sandstones, clays, and gravels derived from the erosion of the Northern Range (Furrer, 1968). These alluvial and colluvial deposits underlie the coastal plains and river valleys around Matura and Salybia, where the proposed water treatment plant project is located.

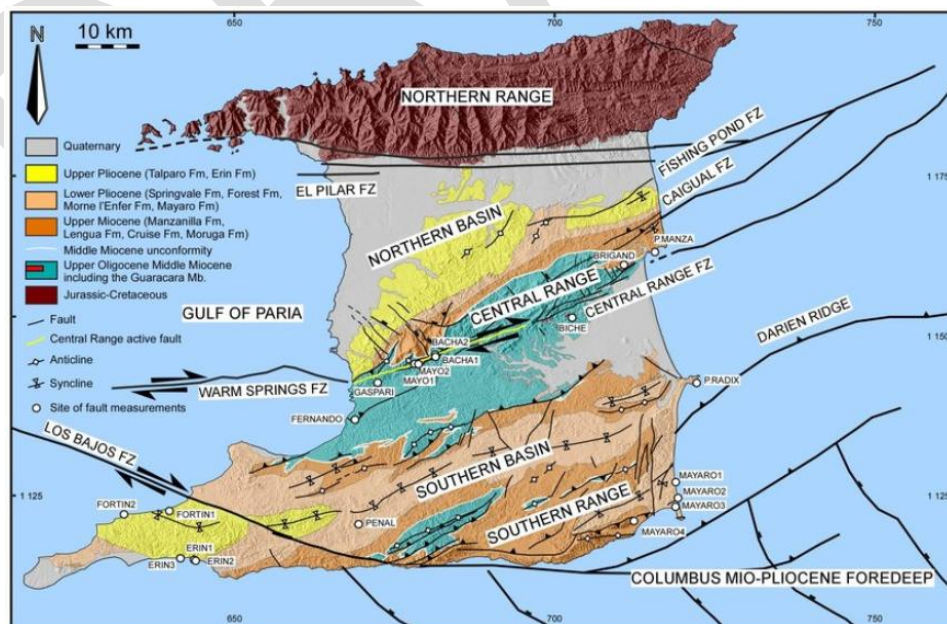


Figure 4-6 Geological Map of Trinidad

Geologically, the Salybia and Matura catchments are characterized by resistant metamorphic basement rocks in the uplands, overlain locally by thin colluvial and fluvial deposits near the river channels. These conditions influence drainage characteristics and slope stability. The steep slopes and weathered rock profiles in the Northern Range increase susceptibility to surface erosion, minor landslides, and sediment transport, particularly during heavy rainfall events common in the wet season.

4.2.4 Hydrology

The hydrology of north-east Trinidad is strongly influenced by the region's mountainous terrain, dense forest cover, and high rainfall. The area lies along the windward slopes of the Northern Range, which receives some of the highest annual rainfall totals in Trinidad, averaging between 2,600 and 2,800 millimetres (Trinidad and Tobago Weather Center, 2025). Moist north-east trade winds produce significant orographic rainfall, particularly from June to December, when approximately 70–80 percent of annual precipitation occurs. The dry season, extending from January to May, is typically characterized by markedly lower rainfall and reduced streamflow, though baseflows are sustained by groundwater discharge due to high infiltration within forested catchments.

Surface water systems in this region are defined by short, steep river catchments that drain south-westward from the Northern Range into the Atlantic Ocean (Figure 4-7). Major rivers include the Matura, Salybia, North Oropouche, and Rio Seco (Husain, Khazaei, & Brunner, 2009). These rivers exhibit strong seasonal flow variability—rapid runoff and high discharges during the wet season, and lower but continuous baseflows during the dry season. The forested upper catchments and permeable soils promote infiltration, reduce flood peaks, and help maintain water quality and streamflow stability throughout the year.

Groundwater plays a secondary but important role in the hydrology of the area. Shallow aquifers and subsurface flows within the weathered and fractured bedrock of the Northern Range contribute to river baseflows, particularly during the dry season (Husain, Khazaei, & Brunner, 2009). These subsurface reserves, though not heavily exploited, are vital for maintaining perennial flow conditions in the smaller watersheds of the region.

Overall, north-east Trinidad is hydrologically robust, with high rainfall, stable baseflows, and relatively undisturbed forested watersheds that together ensure reliable surface water availability. However, the steep topography and high rainfall intensity make the area prone to flash flooding, while prolonged dry seasons can limit water supply reliability in localized systems. The region's hydrological regime therefore offers strong potential for sustainable water abstraction—particularly from rivers such as the Matura and Salybia—provided that environmental flow requirements and watershed protection measures are maintained.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

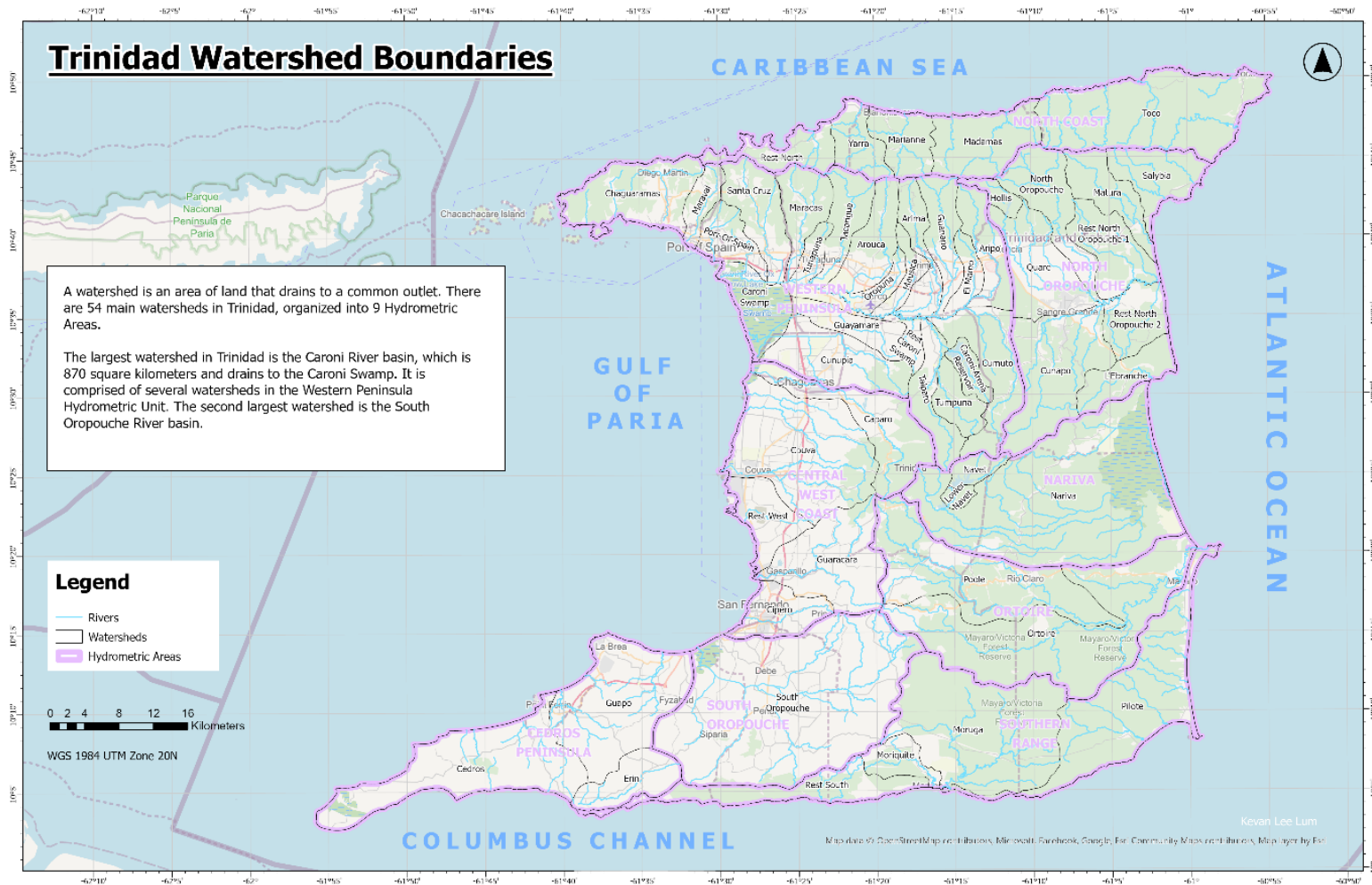


Figure 4-7 Watershed Boundaries in Trinidad and Tobago

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

MATURA RIVER

A hydrological assessment of the Matura River was undertaken by (Water and Sewerage Authority, 2025) to evaluate its capacity to support increased abstraction at the existing intake (which are displayed in Figure 4-8 below). The analysis was based on historical streamflow records from 1975 to 2015, supplemented by recession curve analyses for the 2010–2025 period and wet season discharge measurements between 2010 and 2024. A 20 per cent environmental flow requirement was applied to all calculations to maintain downstream ecological function.

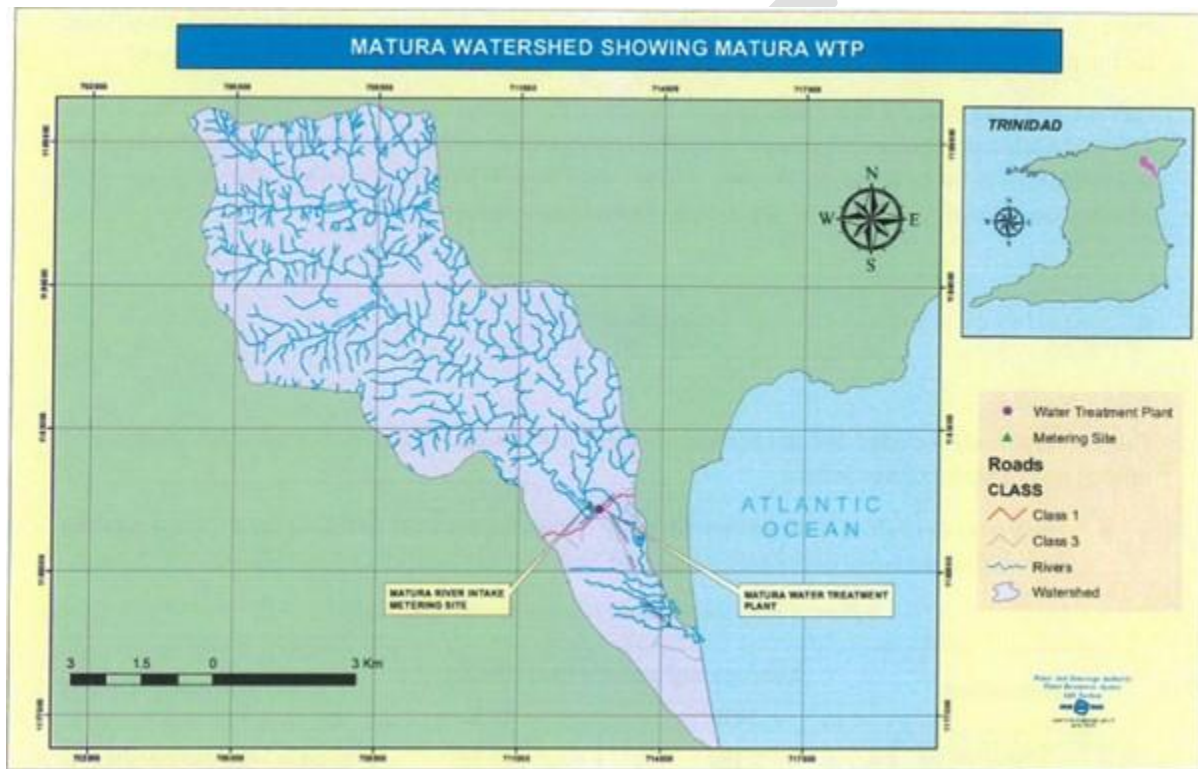


Figure 4-8 Map of Matura Watershed and Intake

The Matura River catchment covers approximately 52.27 square kilometres and receives an average annual rainfall of 2,700 millimetres, with about 675 millimetres during the dry season and 2,450 millimetres during the wet season. Hydrologically, approximately 45 per cent of annual rainfall contributed directly to surface runoff, equivalent to 1,215 millimetres per year of flow within the system. The basin's predominantly forested terrain and permeable soils facilitated infiltration, sustained baseflows, and preserved high water quality. The natural vegetation also moderated stormwater responses and reduced peak flows during heavy rainfall events.

The Matura Water Treatment Plant (WTP) serves a remote, low-density area of northeast Trinidad, tapping the Matura River and its Rio Negro tributary. The combined catchment is small (on the order

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

of 5–8 km²) but heavily forested. Annual rainfall is high (~2,000 mm on average) with a distinct wet season (June–December, monthly peaks ~300–400 mm) and a shorter dry season (Jan–May, monthly lows ~10–80 mm). A brief mid-wet-season dry spell (Petit Carême, ~Sep–Oct) is normal. Evapotranspiration is very high (~50–60% of rainfall).

Flow records calculated by WASA–WRA (2010–25) indicate mean dry-season flows of ~7.49 IMGD (~34 ML/day, 0.39 m³/s) in the Matura River and ~1.1 IMGD (~5 ML/day, 0.06 m³/s) in the Rio Negro; wet-season means are much higher (~20 and 9 IMGD, respectively). Even after releasing environmental flows, combined yields (~39 ML/day dry, 135 ML/day wet) greatly exceed the current treatment output (~1.7 ML/d, 0.38 IMGD), indicating ample resource availability under normal conditions. Water balance shows a significant surplus in the wet season; peak flows may exceed intakes, but low flows remain above abstraction rates. The North Oropouche WTP (at Navet) provides an alternate supply corridor for the basin.

Regarding Turbidity, steep upland topography suggests runoff-driven turbidity spikes during heavy rains. Groundwater resources are limited (shallow, low-yield alluvium near rivers); the WTP relies on surface water.

4.2.4.1 Surface Water Hydrology

The Matura River and its main tributary, the Rio Negro, form the raw water source. There are no major reservoirs or lakes upstream. Analysis of flow data (gauged and reconstructed) indicates mean annual yields greatly exceed current withdrawals. A 2010–2025 assessment by WASA's Water Resources Agency found:

- **Dry season mean flow:** ~7.49 IMGD (Matura) + 1.09 IMGD (Rio Negro) ≈ 8.58 IMGD total (~39 ML/day, or ~0.45 m³/s).
- **Wet season mean flow:** ~20.3 IMGD + 9.3 IMGD ≈ 29.
- **Current abstraction:** ≈0.38 IMGD (~1.7 ML/day) from the Matura WTP.

Even in the dry season, flows (~0.45 m³/s combined) are an order of magnitude higher than abstraction (0.015 m³/s), meaning the plant currently draws only a small fraction (~4%) of the flow. Older baseline data (DHV engineering report, 1990–2010) suggest dry-season flows on the Matura are ~0.27–0.54 m³/s and on the Salybia ~0.35–0.69 m³/s at intakes.

The results of the assessment showed that during the dry season, the average available flow was approximately 9.36 imperial gallons per day (IMGD). After accounting for environmental flow requirements, the 80 per cent reliable yield ranged between 7.1 and 8.5 IMGD. With current production levels estimated at 0.38 IMGD, the analysis indicated a potential surplus of roughly 7.1 IMGD during the dry period. In the wet season, average available flow was estimated at 25.4 IMGD, with an 80 per cent reliable yield between 20.1 and 20.9 IMGD. Current abstraction levels of 0.25 IMGD, therefore, suggested a potential surplus of approximately 20 IMGD.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

The hydrological regime of the Matura River demonstrated high reliability and resilience, supported by stable baseflows, consistent rainfall, and an intact watershed. These characteristics confirmed that the river possesses sufficient capacity to accommodate increased abstraction at the Matura Intake while maintaining ecological flow requirements and long-term sustainability. Water quality reports conducted along the Matura River between 2013 and 2022 are provided in Appendices 1 and 2.

SALYBIA RIVER

Building on the broader hydrological context previously discussed, further assessments were undertaken to evaluate specific surface water systems within the northeastern region of Trinidad. In addition to the Matura River, the Salybia River was also examined to determine its capacity to support future water supply interventions under the Water Sector Improvement Project. This subsection presents the findings of the hydrological assessment conducted by the Water Resources Agency (WRA), focusing on the river's catchment characteristics, flow regime, and overall potential for sustainable abstraction.

A hydrological assessment of the Salybia River was conducted to evaluate its suitability for supporting a surface water intake aimed at improving local water supply reliability. The analysis was based on historical discharge data collected between 1990 and 2010, complemented by a field discharge measurement carried out on 8 July 2025, approximately 200 metres downstream of the confluence of the Salybia and Rio Seco Rivers. Measurements were taken using standard area-velocity methods, and a 20 per cent environmental flow adjustment was applied to all computations to maintain downstream ecological function.

The Salybia River catchment covers approximately 28.2 square kilometres and receives between 2,600 and 2,800 millimetres of rainfall annually, with about 650–700 millimetres during the dry season and 2,100 millimetres in the wet season. The watershed is largely forested and influenced by the orographic effects of the Northern Range and the prevailing north-east trade winds, which generate high rainfall intensities in upper catchment areas. The forest cover and terrain characteristics promote infiltration and baseflow maintenance, contributing to the overall hydrological stability of the system.

The results of the assessment showed that historical dry season flows averaged approximately 4.05 imperial million gallons per day (IMGD), which reduced to 3.24 IMGD after accounting for the 20 percent environmental flow requirement. The Water Resources Potential Report (2009) provided similar estimates, identifying dry and wet season flows of 3.34 IMGD and 5.32 IMGD, respectively, while the Water Resources Management Strategy (1999) reported a higher 50 percent reliable dry season yield of 10.5 IMGD (after adjustment). The 2025 field measurement recorded a discharge of 1.85 cubic metres per second, equivalent to 35.2 IMGD, which, when adjusted for environmental flow, yielded 28.1 IMGD.

The results therefore indicated that the Salybia River has sufficient hydrological potential to support a surface water intake, particularly during the wet season when flows are high. However, given the limited historical monitoring and the ungauged status of the river, these values should be interpreted cautiously until further data collection is undertaken. Overall, the hydrological regime of the Salybia River demonstrated a stable flow system with strong seasonal variability, favourable rainfall inputs, and adequate catchment resilience to support controlled abstraction, provided that environmental flow thresholds are maintained and continuous monitoring is implemented.

DRAFT

4.2.5 Disaster Risk

The following analysis is guided by the IDB's Disaster and Climate Change Risk Assessment Methodology. It includes the identification and assessment of criticality and vulnerability within the context of the proposed project (i.e., the potential physical negative effects on the structure, population and services that a failure of the operation could cause due to natural hazards). This process will help to classify the level of disaster risk anticipated. A supporting Disaster Risk Management Plan is provided in Section 6.11 to guide the application of mitigative measures for the project.

4.2.5.1 Step 1: Hazard Exposure

TROPICAL CYCLONES

The Matura–Salybia area in northeast Trinidad is exposed to multiple climate and geologic hazards. **Tropical cyclones (storms and hurricanes)** occasionally affect Trinidad. Although major hurricanes rarely track directly over Trinidad, increasing tropical storm frequency and intensity is projected under climate change (Inter-American Development Bank, 2015). Historical records show only sporadic tropical storms passing near Trinidad (e.g. *TS Bret* in 1977) and no landfalls in recent decades, but IDB analyses expect higher tropical storm frequency in Trinidad and Tobago with associated coastal flooding, wind and heavy rainfall (Inter-American Development Bank, 2014). In particular, storm-driven wind and rain can cause runoff flooding of rivers feeding the WTP.

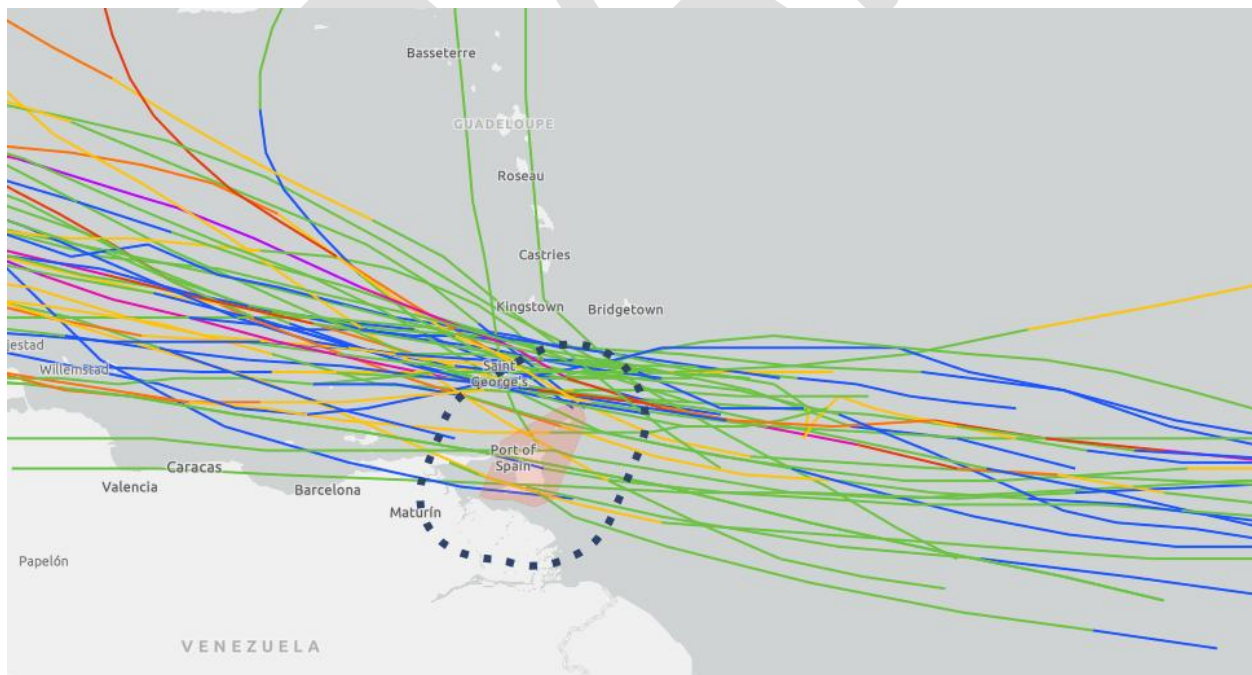


Figure 4-9 Historical Hurricane Paths between 1856 and 2024

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

The map above shows the historical paths of tropical cyclones between 1856 and 2024 that have entered the Caribbean. Of the 54 cyclones recorded in that time, 9 made landfall, most recently, Tropical Storm Bonnie in 2022, which was later upgraded to a Category 3 hurricane.

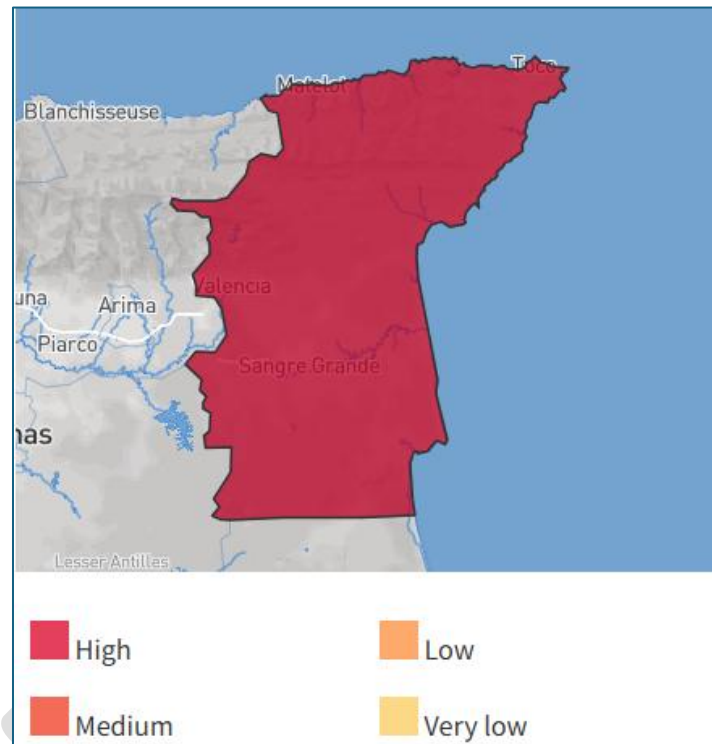


Figure 4-10 cyclone Exposure Map of Sangre Grande (source: World Bank ThinkHazard Platform)

The map displayed in Figure 4-10 shows that Sangre Grande has a high exposure to cyclone events according to the information that is currently available. This means that there is more than a 20% chance of potentially damaging wind speeds in your project area in the next 10 years. Based on this information, the impact of cyclones must be considered in all phases of the project, during design and construction. Project planning decisions, project design, and construction methods should take into account the level of cyclone hazard. Note that damages can not only occur due to wind but also cyclone induced heavy rainfall and subsequent flooding.

However, based on the inland location of the Matura WTP, the level of exposure is lower than the general classification of the Sangre Grande area.

Climate change impact: Global average tropical cyclone wind speed and rainfall are likely to increase in the future, and the global average frequency of tropical cyclones is likely to decrease or remain unchanged. It is possible that the frequency of the most intense tropical cyclones will increase substantially in some ocean regions (Intergovernmental Panel on Climate Change (IPCC), 2019). The

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

present hazard level in areas currently affected by tropical cyclones may increase in the long-term. Projects located in such areas should be robust to future increases in cyclone hazard.

EXTREME HEAT AND DROUGHT

Trinidad's climate features a pronounced dry season. Climate projections indicate hotter, drier conditions. Observations show Trinidad's temperature rising ~0.2–0.3°C per decade, and by mid-century, continued greenhouse gas emissions will make heat waves more frequent and intense. Meanwhile, meteorological droughts (prolonged rainfall deficits) are expected to become more common and severe (Inter-American Development Bank, 2014). Higher air temperatures will increase evapotranspiration, reducing surface water availability and river flows (Inter-American Development Bank, 2014). The IDB adaptation study notes that increased temperatures and decreased precipitation will reduce groundwater and aquifer recharge, and available water resources will be reduced. For the WTP, this means river intakes may see lower flow rates and higher turbidity during dry spells.

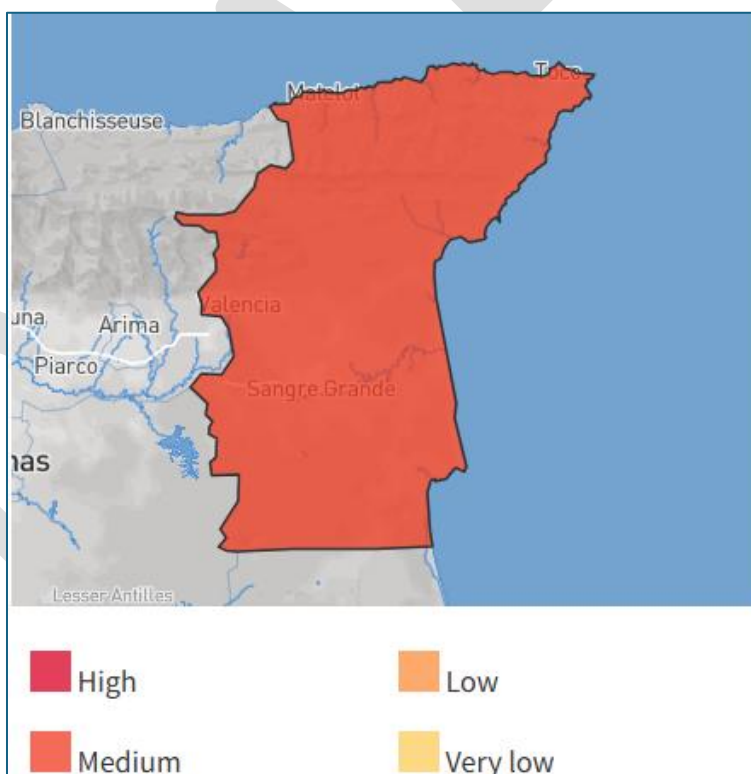


Figure 4-11 Extreme Heat Exposure of Sangre Grande (Source: World Bank ThinkHazard Platform)

According to the exposure map in Figure 4-11, in the Sangre Grande region, extreme heat exposure is classified as **Medium** based on modeled heat information currently available to this tool. This means

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

that there is more than a 25% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years. Project planning decisions, project design, and construction methods should take into account the level of extreme hazard. The following is a list of recommendations that could be followed in different phases of the project to help reduce the risk to your project.

According to the most recent assessment report of the Intergovernmental panel on Climate Change (IPCC, 2023), continued emissions of greenhouse gases will cause further warming, and it is virtually certain that there will be more frequent hot temperature extremes over most land areas during the next fifty years. Warming will not be regionally uniform. In the area you have selected, the temperature increase in the next fifty years will be much lower than the worldwide average, but still significant.

EXTREME RAINFALL AND FLOODING

Trinidad's wet seasons now bring intense, erratic rainfall. Between 2017 and 2018, the country saw five major flood events (Cari-Bois Environmental News Network, 2025), causing widespread damage to infrastructure. Heavy rains can overflow rivers and catchments, inundate low-lying plant sites (e.g. intake areas) and wash sediment/debris into systems. In past storms, WASA has reported that flooded rivers and clogged intake screens disrupted multiple treatment plants (Mendes-Franco, 2017). Landslides in upland watersheds (triggered by heavy rain) also threaten raw-water quality and quantity. Thus, flash floods and sustained heavy rains are an expected hazard that can shut down operations by flooding facilities or causing turbidity spikes.

Major Flooding Events

In 2025, the Matura Water Treatment Plant experienced a temporary shutdown following a major flood event associated with intense rainfall and elevated river conditions. (Trinidad and Tobago Guardian, 2025). The incident affected several communities within the service area, including Matura, Salybia, Pierre Street, Gray Trace, Orosco Bay Road, and Mendoza Street. This event demonstrates the susceptibility of critical water supply infrastructure to flood-related impacts, particularly where treatment facilities rely on surface water intakes that are vulnerable to debris accumulation, increased sediment loads, and mechanical damage during periods of intense rainfall and high river flows (Trinidad and Tobago Guardian, 2025).

There is also major flooding events recorded between 2018 and 2022 that have impacted the Sangre Grande community (Baig, 2018; Celestial, 2020; International Federation of Red Cross and Red Crescent Societies, 2022). Trinidad is currently averaging at least one major flood event annually. Flooding experienced in the general Sangre Grande region can be classified into 3 main categories (Riverine Flooding, Urban Flooding, and Coastal Flooding). The level of exposure to each type of flooding is varied across the region and is expressed in Figure 4-12, Figure 4-13, and Figure 4-14 below.



Figure 4-12 urban Flood Risk in Sangre Grande

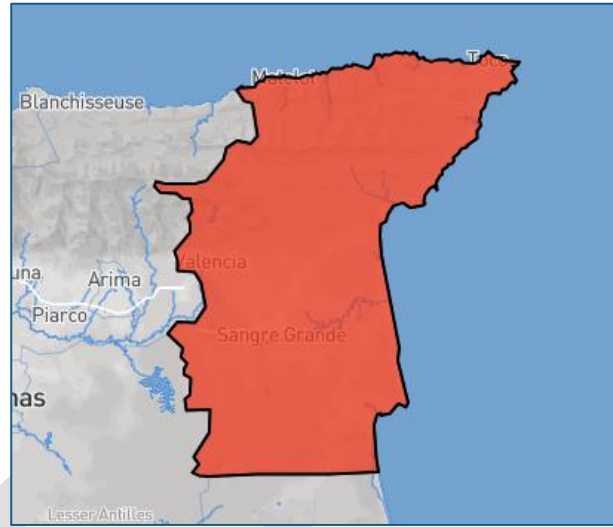


Figure 4-13 Coastal Flood Risk in Sangre Grande

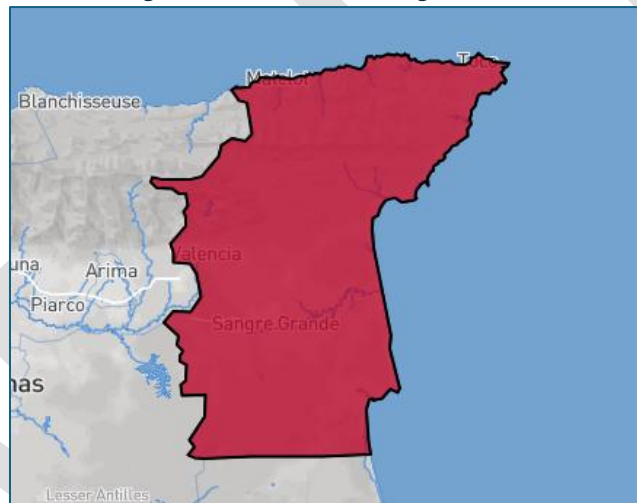


Figure 4-14 Riverine Flood Risk Sangre Grande

- Coastal Flooding:** Coastal flood hazard in the Sangre Grande area is classified as **medium**, indicating a greater than 20% probability of potentially damaging coastal flood events occurring within the next ten years. While this is the case for the general region of Sangre Grande, the level of exposure is significantly lower for the Matura Water Treatment plant as it is located inland and not in close proximity to the coastal zone.
- Urban Flooding:** Urban flood hazard is classified as **high**, indicating that potentially damaging and life-threatening urban flood events are expected to occur at least once within the next decade. Project planning and design should account for the potential for surface water accumulation, drainage system exceedance, and localized flooding. Although future rainfall projections remain uncertain, climate change may increase urban flood risk, and projects should incorporate measures that enhance long-term flood resilience.

- **River Flooding:** River flood hazard is also classified as **high**, indicating that potentially damaging and life-threatening river flooding is expected to occur at least once within the next ten years. Flood risk management measures should be integrated into project design, particularly where development may be influenced by nearby watercourses or floodplains. Given the uncertainty surrounding future rainfall patterns, the magnitude and frequency of river flooding may increase under changing climatic conditions, warranting the adoption of robust and adaptive flood mitigation measures.

TORNADOES

Tornadoes are rare but increasing in Trinidad. Tornadoes are “historically uncommon” in T&T, but in recent years *“the country has recorded at least one tornadic event annually”* (Trinidad and Tobago Weather Center, 2025). These are typically short-lived, weak landspouts or waterspouts, but can damage infrastructure (e.g. roofs, power lines). Given their low frequency, the project’s overall exposure to tornado risk is low.

EARTHQUAKES AND LANDSLIDES

Trinidad lies at the complex boundary of the Caribbean and South American plates, making it the second most seismically active region in the eastern Caribbean (UWI Seismic Research Centre, 2025). There are active faults (e.g. Central Range Fault, El Pilar Fault). Historically, the 1766 quake ($M \approx 7.9$) devastated northern Trinidad, and an 1888 $M 7.5$ event caused damage across the island (UWI Seismic Research Centre, 2025). Even in the modern era, a 1968 $M 7.0$ tremor caused damage in Port-of-Spain (UWI Seismic Research Centre, 2025).

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

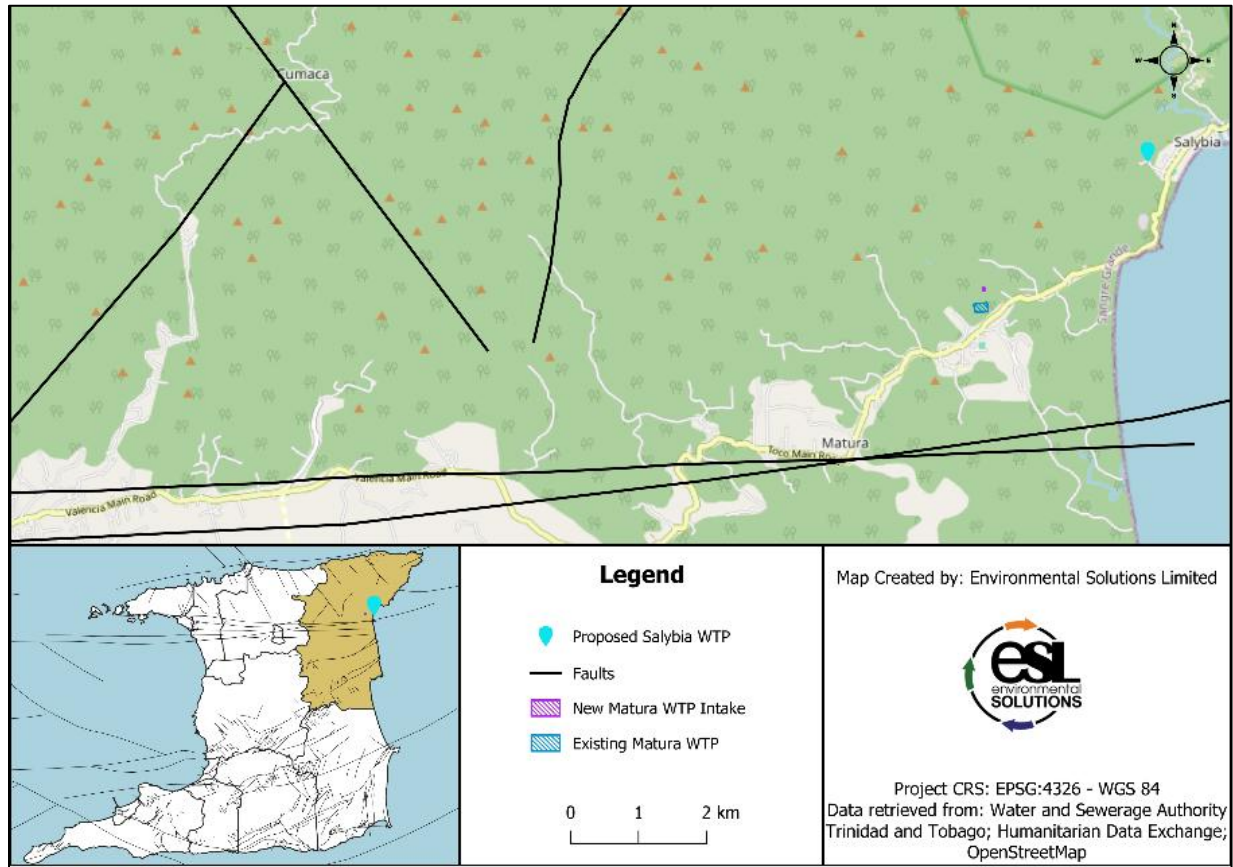


Figure 4-15 Fault Map of Project Area

The WTP site itself is inland but in a seismically active zone. Strong shaking could damage the plant's structures (sedimentation basins, clarifiers, tanks), pipelines and road access. Based on the map in Figure 4-15, there are no fault lines in the direct project area; however, there is a vast network of fault lines in the wider service area, as close as 2 KM south of the proposed Matura intake. In the event of a major earthquake, given the vast network of faultlines to the immediate south of the project site, there is a high risk of impact on the plant infrastructure. As such, the plant is considered moderately exposed to the potential impact of earthquakes.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

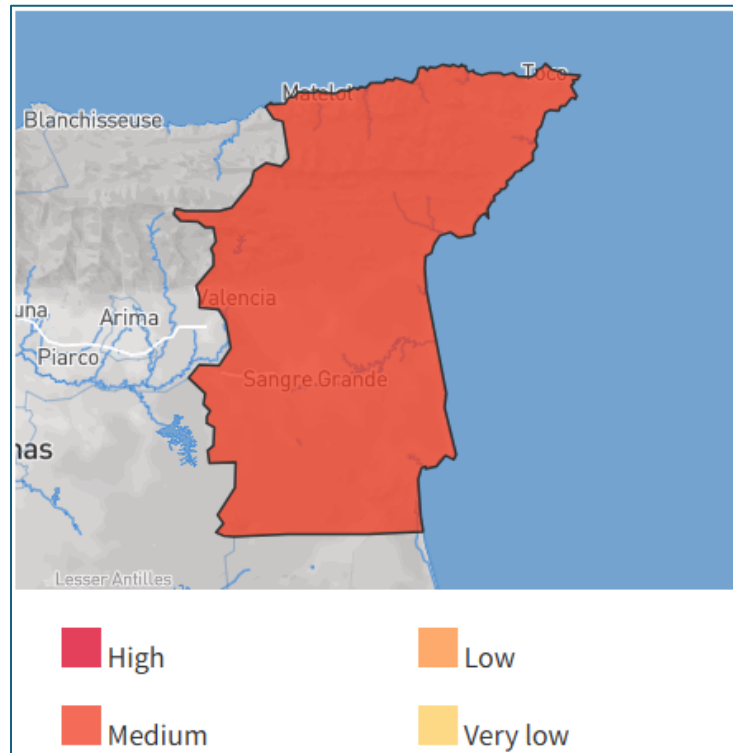


Figure 4-16 Earthquake Exposure in Sangre Grande (Source: World Bank ThinkHazard Platform)

In the Sangre Grande area, earthquake hazard is classified as **medium** according to the information that is currently available Figure 4-16. This means that there is a 10% chance of potentially damaging earthquake shaking in your project area in the next 50 years. Based on this information, the impact of earthquake should be considered in all phases of the project, in particular during design and construction. Project planning decisions, project design, and construction methods should take into account the level of earthquake hazard.

Landslide

Landslides represent a secondary hazard associated with intense rainfall and seismic activity. The Matura watershed is located within the Northern Range foothills where steep slopes, weathered soils and high rainfall contribute to slope instability. Heavy rainfall events can trigger landslides that block access roads, damage pipelines, increase sediment loads within rivers and negatively affect raw water quality.

Although no major landslides have been documented directly at the treatment plant site, slope failures have occurred elsewhere within northeast Trinidad during periods of prolonged rainfall.

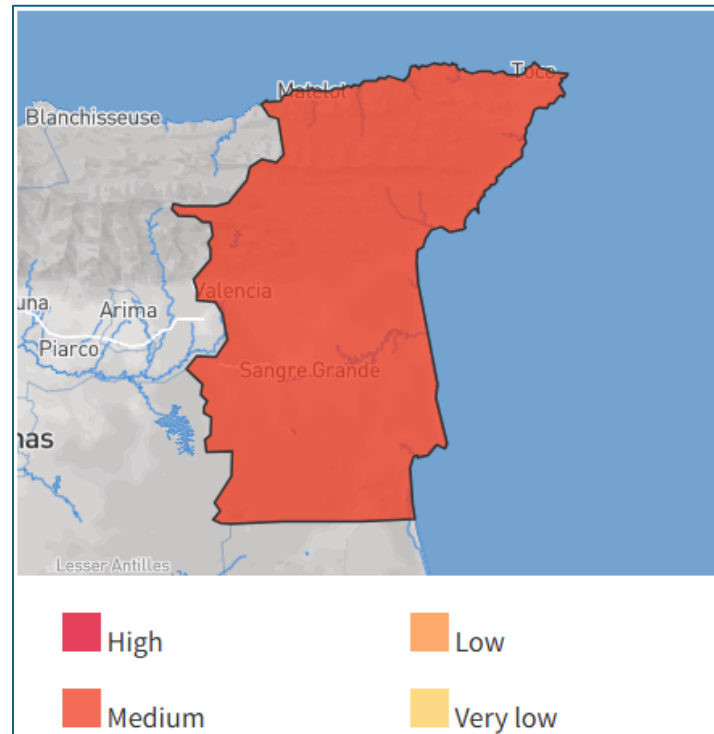


Figure 4-17 Landslide Exposure in Sangre Grande (Source: World Bank ThinkHazard Platform)

As expressed in (Figure 4-17), In Sangre Grande landslide susceptibility is classified as **medium** according to the information that is currently available. This means that this area has rainfall patterns, terrain slope, geology, soil, land cover and (potentially) earthquakes that make localized landslides an infrequent hazard phenomenon. Based on this information, planning decisions such as project siting, project design, and construction methods should take into account the potential for landslides. Further detailed information should be obtained to better understand the level of landslide susceptibility in your project area.

Climate change impact: Climate change is likely to alter slope and bedrock stability through changes in precipitation and/or temperature. It is difficult to determine future locations and timing of large rock avalanches, as these depend on local geological conditions and other non-climatic factors.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

EXPOSURE

The Matura facilities are exposed to one or more of these hazards. The WTP will serve approximately 100,000 customers both directly and indirectly. The upgraded capacity of the new plant (7 IMGD) will feed into parts of Sangre Grande, with benefits seen towards Valencia and into North Central, with the ultimate goal being a reduction in the reliance on the North Oropouche WTP. The Matura supply zone currently feeds approximately 2,000 customers and is in a low-density residential community. There are no known critical infrastructure or services in the surrounding areas of the Matura Plant. In the wider areas to be serviced by the upgraded plant, specifically in the Sangre Grande community, there are a number of micro, small, and medium-sized enterprises (MSMEs) that may be impacted by project works in the community. A summary of the Hazard exposure is provided below in Table 4-1

Table 4-1 Hazard Exposure Summary

Hazard	Exposure Level	Rationale
Tropical Cyclones	Moderate to High	Trinidad lies south of the main Atlantic hurricane belt, and direct hurricane strikes are uncommon. However, tropical storms and associated heavy rainfall events can affect the project area and are projected to increase in intensity under climate change.
Extreme Heat	Moderate	Increasing temperatures and more frequent heatwave conditions are projected throughout Trinidad and Tobago, potentially affecting water demand and operational efficiency.
Riverine Flooding	Moderate to high	In the event of prolonged heavy rainfall, there is the potential for channel overflow mainly downstream of the Matura River.
Coastal Flooding	Low	The Matura plant is inland and is at reduced risk of being impacted by coastal flooding.
Urban Flooding	High	Frequent flooding events have occurred in Sangre Grande and surrounding communities, including impacts to the Matura WTP in 2025.
Landslides	Moderate	Steep terrain within the Northern Range and upper watershed areas create susceptibility to rainfall-induced slope failures.
Earthquakes	Moderate to High	Trinidad is located along the Caribbean-South American plate boundary and is one of the most seismically active areas in the eastern Caribbean.

SENSITIVITY

Sensitivity is defined as the degree to which a system or population is affected, harmed, or compromised when exposed to a hazard or stressor. Based on the assessment of the susceptibility of the Matura facilities to natural hazards, the proposed plant is considered to have moderate sensitivity.

The Matura supply zone is a low-density population community, which significantly lowers the sensitivity in relation to the population primarily being fed by the plant. However, it should be noted that the Matura WTP serves as a primary source of drinking water for remote communities in the Matura, Orosco and Medoza roads. Residents in these communities are more sensitive given the heavy reliance on the Matura WTP.

In relation to the wider service area, these communities are currently served by the North Oropouche WTP, which reduces the level of sensitivity in the event of service disruptions to the Matura plant by natural or man-made hazards or any mechanical malfunction. Ultimately, the project area has overall medium/moderate sensitivity, with localised high sensitivity for primarily dependent communities.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

4.2.5.2 Step 2: Criticality and Vulnerability

The Matura Water Treatment Plant is considered to have moderate criticality. It will directly supply potable water to roughly 2000 customers in the Matura community and other surrounding communities. Additionally, the plant will indirectly supply potable water to communities in the east-west corridor (including Sangre Grande), which is an estimated 100,000 customers. A prolonged service disruption would have severe public health and economic impacts. Under IDB's Environmental and Social Performance Standard 4 (Community Health, Safety and Security), such critical services must be identified and protected against natural hazards. This is further in Table 4-2.

To facilitate the process of recognising the features that make a structure or system more or less critical and vulnerable, general guiding questions concerning physical characteristics, level of service provided, and magnitude of potential negative effects on third parties are provided. In addition, three subsector-specific charts that illustrate this concept for roads, water and sanitation systems, and hydroelectric dams were developed in cooperation with sector specialists. These charts reflect the most universal and technically pertinent attributes for each type of infrastructure that are the source of the sector's main concerns. The following chart (Figure 4-18) is the example developed for the water, sanitation and drainage sector (Barandiaran, Lacambra Ayuso, Suarez, & Zuloaga, 2019).

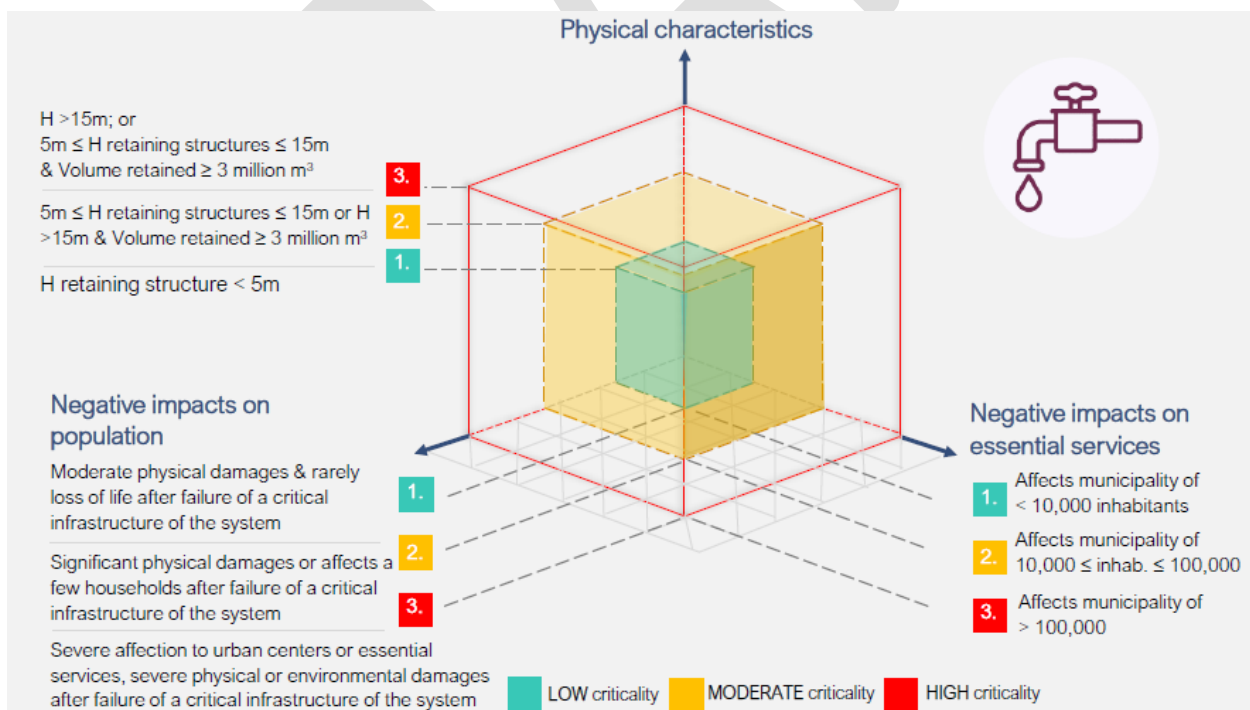


Figure 4-18 Drainage and Water Supply Systems Criticality and Vulnerability chart

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Table 4-2 Characterising Project Criticality

KEY COMPONENT	LOW	MODERATE	HIGH
DIMENSION 1: LOSS OF ESSENTIAL SERVICES			
IMPACTS ON THE SERVICE FUNCTIONALITY		Failure or impact on the current production of the Matura plant will directly impact approximately 2000 customers. With the upgraded plant, should there be any impact on service or functionality, this has the potential to indirectly impact approximately 100,000 customers.	
DIMENSION 2: IMPACT ON POPULATION			
IMPACT ON POPULATION	Based on the location and the size of the Matura plant, the potential failure, collapse, overtopping, or Malfunction of the facility, has low probability of resulting in loss of life or physical damage to property.		

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

DIMENSION 3: PHYSICAL CHARACTERISTICS			
PHYSICAL CHARACTERISTICS OF WATER TREATMENT PLANT SYSTEM		The facility will incorporate multiple treatment processes, including coagulation, filtration, sludge management, and automated monitoring and control systems. The project also includes an extensive transmission pipeline network supplying Sangre Grande, Manzanilla, Matura, and surrounding communities, with integration into the North Oropouche water supply system to supplement water availability during dry-season periods. Given the scale of the facility, the complexity of the treatment processes, the extensive transmission infrastructure, and its role in providing water to multiple communities, the project is classified as Moderate.	

Based on the assessment presented in Table 4-1, the proposed Matura Water Treatment Plant is considered to have **Moderate Criticality** and **Moderate Vulnerability**. The Moderate Criticality rating reflects the importance of the facility in providing potable water to the project area and supporting adjacent supply zones, while recognizing that a failure of the facility is unlikely to result in significant loss of life or widespread physical damage to property. Although disruptions to plant operations could affect water supply to a substantial number of customers, alternative operational measures and system redundancies may help to reduce the overall severity of impacts.

The Moderate Vulnerability rating reflects the physical characteristics of the proposed infrastructure, including multiple treatment processes, automated monitoring and control systems, and an extensive transmission network. These components may be susceptible to disruption or damage from natural hazards; however, the facility does not possess the scale, complexity, or hazard potential associated with infrastructure that would warrant a high vulnerability classification. Overall, the project is considered to have a moderate level of exposure to operational and structural impacts arising from natural hazard events.

Some of the key vulnerabilities identified include:

- **Water source vulnerability to climate change:** As a surface-water plant, the WTP depends on river flow. During drought or extreme heat, reduced rainfall means lower intake volumes and possible shortages. While it is noted that the designs are based on the current dry season max yields, climate change has the potential to decrease dry season max yields and also extend the dry season beyond the scope of what is currently considered in the design. Additionally, intense storms can sharply increase turbidity or carry debris, challenging treatment units (e.g. filters).
- **Structural vulnerability:** Civil works must withstand floodwaters and seismic shaking. Low-lying areas at Matura/Salybia are prone to flooding; foundations, access ramps, and electrical equipment must be protected (e.g. elevated or waterproofed). Under extreme earthquake loading, tanks or clarifier units might need special anchoring or base isolation.
- **System redundancy and reliability:** Key assets like pumps and power supplies are potential single points of failure. The design addresses this with duty/standby units and on-site generators. Nevertheless, prolonged power or pump outages (e.g. if storm-damaged) could halt treatment. Ensuring emergency backup for SCADA controls and safe reservoirs is vital. Step 3: Diagnostic Narrative

The hazards present in the project area are Cyclones, Heavy rainfall and flooding, drought/Extreme heat, landslides and earthquake events. For this operation, each of the hazards have been classified tabulated below in table (Table 4-1). The criticality and vulnerability of the infrastructure component of the project is classified as Moderate, following the criteria shown in table (Table 4-2):

- (i) Dimension 1: Loss of essential services – Moderate
- (ii) Dimension 2: Impact on Population - Low
- (iii) Dimension 3: physical characteristics - Moderate

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Therefore, the criticality is rated as Moderate. Dimensions 1 and 3 are not expected to increase the current conditions of natural hazards or of vulnerability to surrounding communities or the environment for the reasons listed below.

- The project consists primarily of the replacement and upgrading of existing water treatment infrastructure and does not introduce activities that would increase the frequency or intensity of natural hazards such as flooding, landslides, earthquakes, tropical cyclones, or droughts.
- The proposed Water Treatment Plant will increase potable water production capacity from 0.5 IMGD to an initial 7 IMGD, with expansion to 12 IMGD, thereby improving water supply reliability and reducing service interruptions.
- The project will provide a supplementary water source to the North Oropouche Water Treatment Plant, enhancing system redundancy and reducing vulnerability to dry-season reductions in water availability.
- Modern treatment processes, automated controls, SCADA systems, and water quality monitoring infrastructure will improve operational resilience and reduce the likelihood of service disruptions during hazard events.
- The transmission pipeline network will improve the distribution of potable water to approximately 185,962 residents, increasing the adaptive capacity of communities to climate-related stresses, including drought and prolonged dry periods.
- The project supports improved public health outcomes and community resilience through the provision of a reliable and safe potable water supply that meets WHO drinking water quality standards.
- Temporary construction-phase risks, including erosion, sediment transport, localized drainage disruption, and slope instability associated with excavation works, are expected to be short-term and can be effectively managed through standard construction and environmental management measures.

Considering the hazards levels identified, the criticality and vulnerability estimated for the infrastructure's interventions and the level of risk exacerbation, a Moderate Risk classification has been determined.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

The hazards, vulnerabilities and risk levels have been considered as expressed in table (Table 4-1). The following design considerations aimed at managing the risks were identified:

Tropical Cyclones

- Design structures to withstand hurricane-force winds in accordance with applicable building codes and standards.
- Secure roofs, cladding, equipment, and ancillary structures against uplift and wind damage.
- Provide backup power systems to maintain operations during storm-related power outages.
- Design drainage systems to accommodate extreme rainfall events associated with tropical storms.

Extreme Heat

- Select equipment and materials suitable for operation under elevated temperatures.
- Incorporate passive ventilation and cooling measures for electrical and control rooms.
- Design operational systems to accommodate increased water demand during prolonged hot and dry periods.
- Protect SCADA, monitoring, and electrical equipment from overheating.

Riverine Flooding

- Establish minimum platform and equipment elevations above anticipated flood levels.
- Protect intake structures and critical infrastructure from flood damage, erosion, and debris impacts.
- Incorporate riverbank stabilization measures where required.
- Design drainage infrastructure to safely convey stormwater away from critical facilities.

Urban Flooding

- Design site drainage systems to accommodate high-intensity rainfall events and projected climate change impacts.
- Provide adequate stormwater conveyance and discharge infrastructure to prevent ponding and inundation of operational areas.
- Elevate critical electrical, mechanical, and control equipment above anticipated flood levels.
- Ensure access roads and critical operational areas remain functional during flood events where feasible.

Landslides

- Conduct detailed geotechnical investigations for all structures, pipelines, and access roads.
- Avoid construction on unstable slopes where practicable.
- Incorporate slope stabilization measures, retaining structures, erosion control systems, and surface drainage controls where necessary.
- Monitor slope conditions during construction and operation, particularly following prolonged rainfall events.

Earthquakes

- Design all structures, tanks, pipelines, and appurtenances in accordance with applicable seismic design standards.
- Incorporate flexible pipeline connections and seismic restraints where required.
- Ensure critical mechanical and electrical equipment is adequately anchored to withstand seismic forces.
- Develop emergency response and operational recovery procedures to facilitate rapid restoration of services following seismic events.

General Resilience Measures

- Integrate SCADA and real-time monitoring systems to improve operational awareness and emergency response capabilities.
- Incorporate redundancy in critical treatment, pumping, and control systems to minimize service disruptions.
- Provide standby power generation to maintain critical operations during hazard events and grid outages.
- Implement preventive maintenance, asset management, and emergency response procedures to enhance infrastructure resilience and recovery capacity.

The narrative concluded that for this Moderate risk operation there is no need to continue to a complete qualitative risk assessment for the operation, Step 4 of the Disaster and Climate Change Risk Assessment Methodology (DCCRAM), as there are no significant gaps, appropriate measures have been identified and documented in a DRMP and it is possible to attain a tolerable risk level from these.

4.3 Biological Environment Baseline

The proposed project comprises several components; however, the construction of the new water treatment plant (WTP), intake structure, and associated pipeline infrastructure is anticipated to result in the most notable disturbance to the biological environment, albeit to varying degrees. The proposed locations of these components are illustrated in Figure 2-1 and Figure 2-2. They extend over a mixture of environments including natural forest, riverine, riparian, built-up residential, commercial and industrial zones that fall within critical, natural and modified habitat classifications.

The new WTP is proposed to be constructed within a ~0.5 acre footprint of the existing Matura Water Treatment Plant property. This site is currently characterised by managed turf grass, landscaped areas, and asphalt-paved roads and walkways (Figure 4-19). As the proposed development will largely occur within a **modified habitat** of an already disturbed and operational facility, it is anticipated that with suitable mitigation measures, direct impacts on natural vegetation and biodiversity will be minimal.



Figure 4-19: Proposed site for the New Matura WTP (left). Existing Matura WTP property (right).

In contrast, the proposed intake structure will be situated within a **natural habitat** along the Matura River and will require the installation of an estimated 330 m new raw water transmission pipeline connecting the intake to the new Matura treatment facility (the exact route and length of this alignment have not been provided at the time of report preparation). Although the final alignment of this pipeline has not yet been confirmed, an indicative route is shown by the green line in Figure 2-1. Given the densely forested nature of the intervening area, it is anticipated that construction of both the intake and the connecting pipeline will necessitate the clearing of trees and understory vegetation within the Matura Forest, regardless of the alignment ultimately selected. Based on previous work conducted by WASA, it is estimated that the width of the right-of-way for the installation of the pipeline may be between 6-10 m, resulting in approximately 3,300 m² of forest vegetation cleared during construction. It is also likely that most of this area would remain cleared to allow for a pathway between the intake and the new Matura WTP. Hence,

replanting would not occur resulting in permanent loss to the vegetation cleared. Sections 4.3.1 and 4.3.2 below details the type of flora and fauna found in the Matura Forest.

The intake will also provide water to the North Oropouche WTP, requiring an additional estimated 11km transmission pipeline (the exact route and length in some sections of this alignment have not been provided at the time of report preparation). The proposed pipeline alignment is expected to follow, for the most part, the existing T&TEC high-tension line easement which terminates at the North Oropouche Substation (represented by the green line in Figure 2-2). The precise route between the intake and the point where it joins the utility corridor remains undefined. Nevertheless, this section traverses several internationally recognized key biodiversity areas (namely the Eastern Extension Matura, Matura Swamp Reserve, and the Matura Reserve Western Extension) and may be classified as **critical habitats** characteristic of a heavily forested portion of the Matura Forest along Trinidad's Northern Range (Figure 4-24). Sections 4.3.1 and 4.3.2 below details the type of flora and fauna found in the Matura Forest and section 4.3.4 characterises the ecological value and importance of each of these key biodiversity areas. Nevertheless, vegetation clearing will be unavoidable to facilitate pipeline installation. The intended width of the rights of way that will be used for this project was not determined at the time of this report, however, based on previous work conducted by WASA, it is estimated that the width of the right-of-way for the installation of the pipeline may be between 6-10 m resulting in approximately 110,000 m² of vegetation cleared during construction of which 90% will occur within the areas designated as critical habitats. However, it must be noted that specifically along the existing utility easement, vegetation is primarily composed of secondary regrowth that has developed following initial clearing for the electric lines and subsequent maintenance activities undertaken by T&TEC technicians (Figure 4-20). Therefore, this route may be considered as a **modified critical habitat** and although the corridor is already disturbed, sections of this vegetation will require debushing or complete removal to accommodate trenching and pipeline construction activities, and continue to be maintained for access during the operation phase.

Several route deviations have also been identified to avoid physical constraints along the utility corridor. These include diversions around an active quarry (yellow pins) and areas prone to flooding (blue pin), as shown in Figure 4-24. Beyond the North Oropouche Substation, the remaining sections of the pipeline are expected to follow existing road corridors and therefore are anticipated to require only limited vegetation clearance. Although the exact locations are not known, it is expected that temporary construction access routes, staging areas, and future maintenance access points will be required at various locations along the pipeline corridor. The establishment of these ancillary works could result in additional localised vegetation loss, depending on their final location and design requirements.



Figure 4-20: Examples of disturbed vegetation found along the T&TEC utility corridor that passes through internationally recognised key biodiversity areas

The sections that follow characterise the flora and fauna associated with the Matura Ecologically Sensitive Area (ESA) and the Matura River, both of which fall within the project's area of influence and may be affected by construction and operational activities. Although the scope and design of the proposed Salybia component have not yet been fully defined, all currently anticipated works have the potential to disturb habitats and ecological communities associated with the Salybia River and adjacent portions of the Matura ESA. Consequently, these areas have been included in the biological baseline assessment to support a comprehensive evaluation of potential project impacts and the development of appropriate mitigation measures.

4.3.1 Terrestrial Ecosystems

The proposed Matura–Salybia water supply works lie at the eastern end of Trinidad's Northern Range (Figure 4-21), a steep, topographically complex series of ridges and spurs that descend from inland highlands to the north-eastern coast. The project footprint spans two freshwater catchments (Matura and Salybia within the North Oropouche hydrometric area), that originate in the forested highlands and flow through mixed rural landscapes before reaching the coast; the broader catchments and upland forests are largely contained within the Matura National Park Environmentally Sensitive Area, a large protected block of mostly evergreen-seasonal and mixed forest that was formally designated as an environmentally sensitive area in 2004. The park covers approximately 9,000 hectares and includes the headwaters and riparian corridors of multiple rivers, including the Salybia and Matura systems, that are primary sources for the proposed intakes.

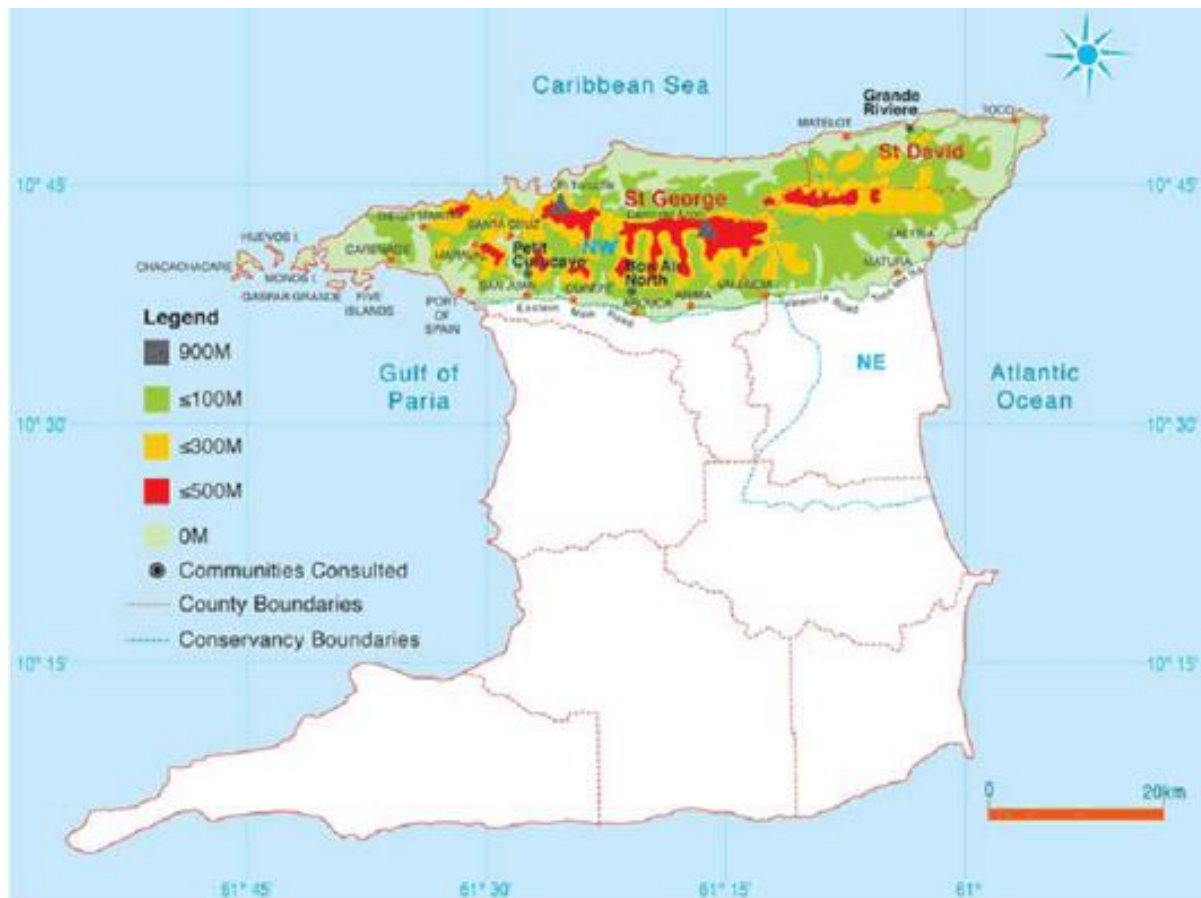


Figure 4-21: Landscape across the northern range of Trinidad, including the Salybia and Matura communities. Source: Kenny, J., P. Comeau, and L. Katwaru. 1997. A Survey of Biological Diversity, Trinidad and Tobago. UNDP, Port of Spain, Trinidad and Tobago

The dominant vegetation type in the Matura area is moist tropical rainforest, classified by Beard (1946) as two principal associations: the Carapa-Mora faciation of lowland moist tropical forest, and the Brysonima-Licania faciation of premontane sub-tropical forest at higher elevations. The Matura National Park harbours the largest remaining tract of old-growth Mora forest in Trinidad, estimated to be over 30,000 years old and covering an area of remarkable ecological antiquity (van den Eynden et al., 2007). The forest structure is multi-layered, with an emergent canopy exceeding 40 metres, a closed middle storey, and a diverse understorey of ferns, palms, and herbaceous species.

Five distinct plant community clusters have been identified within the Matura ESA through recent survey work, with the high-ridge areas considered the highest priority for conservation (van den Eynden et al., 2007). In total, over 200 tree species and 8 endemic plant species have been documented within the broader Matura forest landscape. Of the endemic species, three have been assessed as endangered: *Clusia aripoensis*, *Clusia tocuchensis*, and *Macrolobium trinitense* (van den Eynden et al., 2007). The orchid *Oncidium citrinum* occurs in the ESA, whose entire Genus is declared as Vulnerable (UWI, 2006).

Beyond the ESA, the proposed pipeline corridor traverses secondary and degraded forest, cultivation, and grassland as it approaches Sangre Grande and Manzanilla. Evergreen seasonal forest characterises much of the mid-elevation zone around Matura, with characteristic species including Bitterwood (*Simarouba amara*), Guatecare/Mutti (*Eschweilera subglandulosa*), and Bois Mulatre (*Pentaclethra macroloba*) (Beard, 1946).

Table 4-3 presents the key flora species that have been recorded within the study area, based on past ecological surveys, published species lists, and the vegetation characterisations of Beard (1946) and van den Eynden et al. (2007). Species of conservation importance are highlighted.

Table 4-3: Key Flora Species of the Matura/Salybia Study Area

Common Name	Scientific Name	Family	Habitat	Status / Notes
Mora	<i>Mora excelsa</i>	Fabaceae	Lowland moist forest	Dominant canopy species; 30,000-yr old stands
Crabwood	<i>Carapa guianensis</i>	Meliaceae	Moist forest	Timber species; used in local economy
Bitterwood/ Paradise Tree	<i>Simarouba amara</i>	Simaroubaceae	Seasonal evergreen forest	Characteristic Matura species
Guatecare/ Mutti	<i>Eschweilera subglandulosa</i>	Lecythidaceae	Evergreen forest	Characteristic Matura species
Bois Mulatre	<i>Pentaclethra macroloba</i>	Fabaceae	Lowland moist forest	Riparian and moist forest
Purpleheart	<i>Peltogyne porphyrocardia</i>	Fabaceae	Moist forest	CITES Appendix II; valued timber
Kapok	<i>Ceiba pentandra</i>	Malvaceae	Rainforest	Important wildlife tree
Hog plum	<i>Spondias mombin</i>	Anacardiaceae	Forest margins	Fruiting tree; wildlife food source
Clusia (endemic)	<i>Clusia aripoensis</i>	Clusiaceae	High-ridge forest	ENDEMIC; ENDANGERED
Clusia (endemic)	<i>Clusia tocuchensis</i>	Clusiaceae	High-ridge forest	ENDEMIC; ENDANGERED
Macrolobium (endemic)	<i>Macrolobium trinitense</i>	Fabaceae	Moist forest	ENDEMIC; ENDANGERED
Balisier (Heliconia)	<i>Heliconia bihai</i>	Heliconiaceae	Forest understorey	Hummingbird nectar plant
Bromeliad	<i>Bromeliaceae spp.</i>	Bromeliaceae	Epiphytic, canopy	Critical habitat for endemic frog
Yellow Oncidium	<i>Oncidium citrinum</i>	Orchidaceae	Rainforest	Rare, native orchid species
Tree fern	<i>Cyathea spp.</i>	Cyatheaceae	Moist forest understorey	Indicator of old-growth forest
Red mangrove	<i>Rhizophora mangle</i>	Rhizophoraceae	Estuarine / coastal	Coastal and river mouth habitat

Common Name	Scientific Name	Family	Habitat	Status / Notes
White mangrove	<i>Laguncularia racemosa</i>	Combretaceae	Estuarine / coastal	Coastal fringe
Black mangrove	<i>Avicennia germinans</i>	Acanthaceae	Estuarine / coastal	Coastal and river mouth habitat
Button mangrove	<i>Conocarpus erectus</i>	Combretaceae	Coastal fringe	Littoral woodland transition

The Matura forest supports a diverse mammal assemblage representative of the Neotropical moist forest. Key species documented within the study area include the native Ocelot (*Leopardus pardalis*), the island's largest terrestrial carnivore; the native Red Howler Monkey (*Alouatta seniculus*); the Trinidad White-Fronted Capuchin (*Cebus albifrons*); the native Southern Tamandua/Anteater (*Tamandua tetradactyla*); the Lowland Paca/Lappe (*Cuniculus paca*); and the Red-Rumped Agouti (*Dasyprocta leporina*), an important seed disperser for the Mora forest ecosystem (Nelson, 2004; Protected Areas TT, 2017). The critically endangered Blue-and-Yellow Macaw (*Ara ararauna*) has been recorded as a rare visitor.

The study area lies within one of the most bird-rich regions of the Caribbean. Trinidad as a whole supports over 400 bird species, more than any other Caribbean island (Discover T&T, 2020). Key species documented in the Matura National Park and broader study area are listed in Table 4-4 below.

Table 4-4: Key Bird Species of the Matura/Salybia Study Area

Common Name	Scientific Name	IUCN Status	Notes
Trinidad Piping Guan (Pawi)	<i>Pipile pipile</i>	Critically Endangered	Endemic to Trinidad; ESS; <330 mature individuals; occurs in Matura National Park
Blue-and-yellow Macaw	<i>Ara ararauna</i>	Least Concern	Rare in study area; significant sighting value
Trinidad Motmot	<i>Momotus bahamensis</i>	Least Concern	Endemic to Trinidad and Tobago
Oilbird	<i>Steatornis caripensis</i>	Least Concern	Cave-nesting; uses Northern Range caves near study area
Scarlet Ibis	<i>Eudocimus ruber</i>	Least Concern	National bird; coastal wetland forager
Red Howler Monkey (vocally dominant)	—	—	Not a bird; listed in error — see mammals
Purple Honeycreeper	<i>Cyanerpes caeruleus</i>	Least Concern	Canopy species; forest interior
Tufted Coquette	<i>Lophornis ornatus</i>	Least Concern	Hummingbird; Trinidad endemic
Brown Pelican	<i>Pelecanus occidentalis</i>	Least Concern	Coastal forager around Matura/Salybia coast

Common Name	Scientific Name	IUCN Status	Notes
Magnificent Frigatebird	<i>Fregata magnificens</i>	Least Concern	Coastal and offshore species
Black Vulture	<i>Coragyps atratus</i>	Least Concern	Common scavenger; forest edge
Violaceous Trogon	<i>Trogon violaceus</i>	Least Concern	Forest interior; indicator of old-growth forest health
White-necked Jacobin	<i>Florisuga mellivora</i>	Least Concern	Forest hummingbird; canopy forager
Channel-billed Toucan	<i>Ramphastos vitellinus</i>	Vulnerable	Frugivore; sensitive to forest fragmentation

Trinidad supports approximately 93 reptile species. The study area is notable for its herpetofauna, including the Mapiire Balsain/Fer-de-lance (*Bothrops asper*), native Green Iguana (*Iguana iguana*), and numerous Skinks and Gecko species.

Four species of marine turtle nest on Matura Beach (which is downstream of the project area:

- Leatherback Turtle (*Dermochelys coriacea*) — the primary species; Matura Beach is one of the largest nesting sites in the Caribbean, with 15,000–16,000 visitors annually for turtle watching (UWI, 2012). The beach is a Prohibited Area requiring permits during the March–September nesting season.
- Green Sea Turtle (*Chelonia mydas*) — nests at Matura and surrounding beaches.
- Hawksbill Turtle (*Eretmochelys imbricata*) — present in coastal waters and beaches.
- Loggerhead Turtle (*Caretta caretta*) and Olive Ridley Turtle (*Lepidochelys olivacea*) — rare sightings on land and at sea (Turtle Village Trust, 2019).

All marine turtle species are listed on CITES Appendix I and are protected under the SPAW Protocol, to which Trinidad and Tobago is a signatory.

Trinidad supports approximately 30 amphibian species (Discover T&T, 2020). The study area's moist forest is particularly suited to tree frogs and terrestrial species. The Golden Tree Frog (*Phytotriades auratus*) is endemic to Trinidad's Northern Range and is dependent on the tank bromeliads of the moist forest canopy for breeding; it is classified as Vulnerable on the IUCN Red List. Additional species include the Cane Toad (*Rhinella marina*), several species of Leptodactylus ground frogs, and glassfrog species.

4.3.2 Aquatic Ecosystems

Of particular significance is the Neotropical River Otter (*Lontra longicaudis*), classified as Near Threatened by the IUCN (IUCN, 2015). It is a key indicator of good river water quality and healthy fish populations; its presence in the Matura River is contingent on maintaining the ecological integrity of the system (Devenish and Sayer, 2007). Trinidad hosts the only insular population of this species in the Caribbean, making it of special biogeographical and conservation importance. The species is closely associated with the Matura and Salybia Rivers and is highly sensitive to

disturbance of riparian habitats and water quality deterioration (Devenish and Sayer, 2007). Rare sightings of the West Indian Manatee (*Trichechus manatus*) have been recorded in the coastal waters adjacent to the study area; the species is designated an Environmentally Sensitive Species under the EMA (2001) rules.

The Matura River supports a diverse assemblage of freshwater fishes representative of Trinidad's Neotropical ichthyofauna. Kenny (1995) and Winemiller et al. (2008) documented numerous species across Trinidad's river systems; species recorded from or expected in the Matura River system include:

Common Name	Scientific Name	Family	Notes
Cascadura	<i>Hoplosternum littorale</i>	Callichthyidae	Widespread; air-breathing; important food fish
Guabine	<i>Hoplias malabaricus</i>	Erythrinidae	Top predator; freshwater
Leporinus	<i>Leporinus friderici</i>	Anostomidae	Recorded from Matura River (Kenny, 1995); slow-moving waters
Killifish	<i>Rivulus hartii</i>	Rivulidae	Common in upper tributaries; habitat generalist
Anableps	<i>Anableps anableps</i>	Anablepidae	Four-eyed fish; estuarine margins
Crayfish	<i>Macrobrachium spp.</i>	Palaemonidae	Freshwater shrimp; ecologically important invertebrate
Guppy	<i>Poecilia reticulata</i>	Poeciliidae	Ubiquitous; tolerant of varied conditions
Lobster (freshwater)	<i>Macrobrachium carcinus</i>	Palaemonidae	Large freshwater shrimp; food species

The upper Matura River near the location of the proposed intake is expected to support a diverse macroinvertebrate community including Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), which are bioindicators of good water quality requiring high dissolved oxygen levels. The presence of these sensitive orders confirms the high ecological status of the upper river. Downstream sections may transition to more tolerant assemblages of Chironomidae and Oligochaeta in response to naturally higher organic inputs from the forested catchment.

4.3.3 Coastal and Marine Ecosystems

The Salybia Bay area on the north-east coast of Trinidad supports a fringing coral reef (Newsday, 2020). A comprehensive biodiversity survey identified 178 unique species at Salybia Reef, including key reef-building species such as *Siderastrea radians* and *Porites porites* (Boodhan et al., 2011).

The reef provides coastal protection, fish nursery habitat, and significant ecological value. The Salybia River discharges into Salybia Bay; elevated turbidity and nutrient inputs associated with any upstream development could threaten coral reef health downstream. The coastal zone also supports seasonal foraging by marine turtles (Green Turtle and Hawksbill particularly) associated with the seagrass and invertebrate communities of the reef flat.

Table 4-5: Species of Conservation Importance in the Study Area

Species	Scientific Name	IUCN / National Status	Designation	Key Habitat
Trinidad Piping Guan (Pawi)	<i>Pipile pipile</i>	Critically Endangered	CITES App. I; ESS (EMA)	Old-growth moist forest (Matura NP)
Leatherback Turtle	<i>Dermochelys coriacea</i>	Vulnerable (globally)	CITES App. I; SPAW; ESS	Matura Beach nesting; coastal waters
Green Sea Turtle	<i>Chelonia mydas</i>	Endangered	CITES App. I; SPAW	Matura Beach; coastal seagrass
Hawksbill Turtle	<i>Eretmochelys imbricata</i>	Critically Endangered	CITES App. I; SPAW	Coastal reef; occasional nester
Neotropical River Otter	<i>Lontra longicaudis</i>	Near Threatened	National concern; ESS candidate	Matura and Salybia Rivers
West Indian Manatee	<i>Trichechus manatus</i>	Vulnerable	ESS (EMA); CITES App. I	Coastal/estuarine waters
Ocelot	<i>Leopardus pardalis</i>	Least Concern	Conservation Wildlife Act	Forest interior (Matura NP)
Golden Tree Frog	<i>Phytotriades auratus</i>	Vulnerable	Endemic to Northern Range	Bromeliad epiphytes; moist forest
—	<i>Clusia aripoensis</i>	Endangered	ENDEMIC to Trinidad	High-ridge forest, Matura NP
—	<i>Clusia tocuchensis</i>	Endangered	ENDEMIC to Trinidad	High-ridge forest, Matura NP
—	<i>Macrolobium trinitense</i>	Endangered	ENDEMIC to Trinidad	Moist forest, Matura NP
Channel-billed Toucan	<i>Ramphastos vitellinus</i>	Vulnerable	Sensitive to fragmentation	Forest interior

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

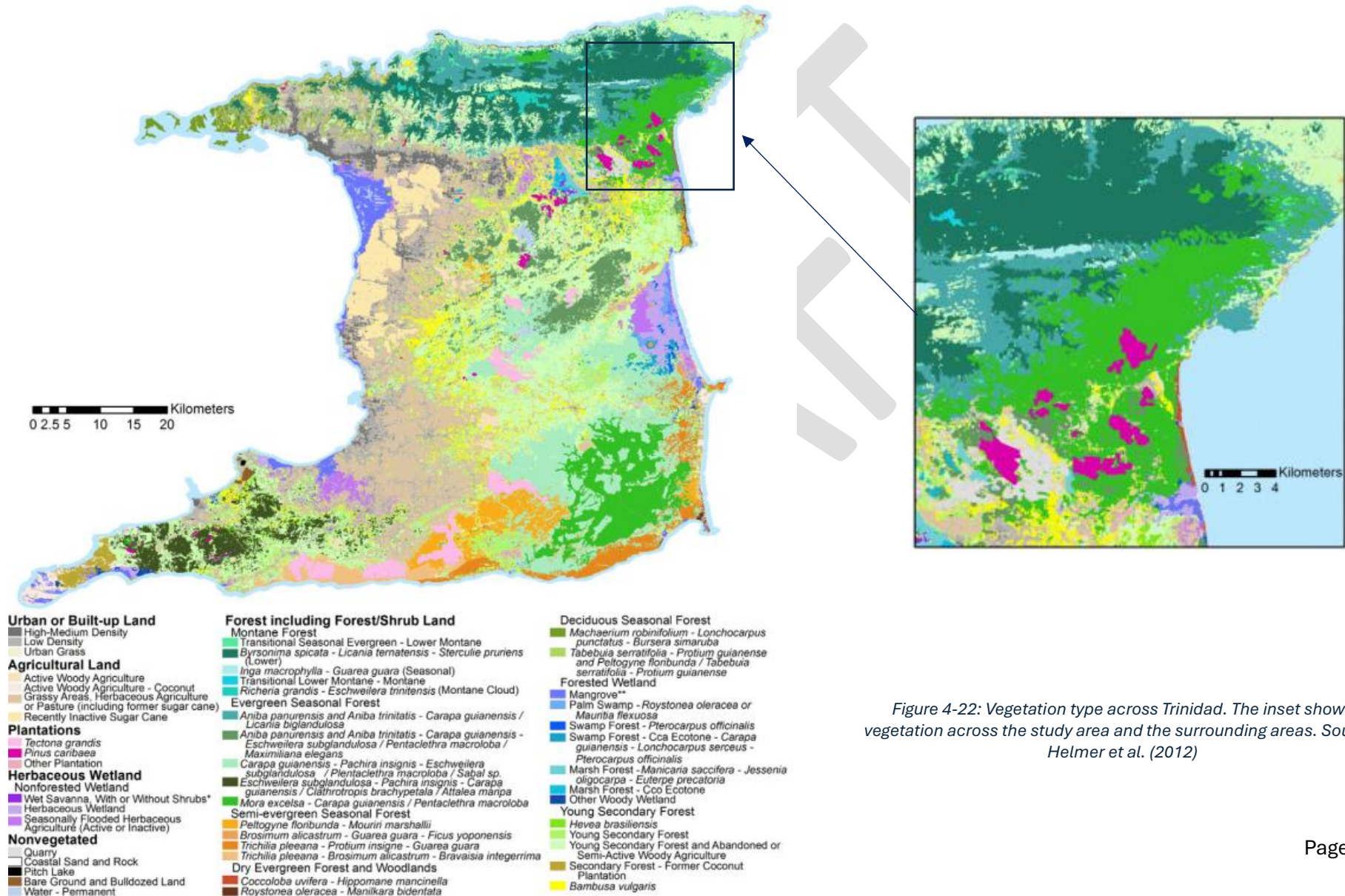


Figure 4-22: Vegetation type across Trinidad. The inset shows vegetation across the study area and the surrounding areas. Source: Helmer et al. (2012)

4.3.4 Protected and Key Biodiversity Areas

The Matura Forest Reserve, located in the Matura watershed, is a designation which was historically intended for timber production, specifically pine. The Forestry Division manages the forest reserve since it is predominantly state-owned land. This watershed is located adjacent to the Matura National Park Environmentally Sensitive Area, which was declared in 2004 and contains the largest acreage of intact Mora primary forest in Trinidad and Tobago (UWI, 2006). Presently, sections of the Matura Forest Reserve which fall in the upper watershed have been allocated for watershed conservation; as such, pine harvesting has ceased in these areas.

A major percentage of the land use in the Matura watershed is primary undisturbed forest. The ESA has not experienced intensive logging. Approximately 300ha were estimated to be disturbed to the southern (Salybia) end. About 10% of the area is inhabited or farmed (Van den Eynden 2006). As previously mentioned, a significant feature of the Matura watershed is the presence of a nesting ground for marine sea turtles. This nesting ground is located along the Matura Beach adjacent to the outfall of the Matura River. Conservation efforts have been geared towards the protection of this nesting ground through the designation of the Matura Beach as a prohibited area under the Forests Act.



Figure 4-23: Location of the Matura National Park Environmentally Sensitive Area in the northeastern region of Trinidad. Project area is located where at the point labelled Matura. Source: UWI, St. Augustine

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Although the project area lies south of the Matura National Park ESA, the proposed pipeline route from the new Matura intake to the North Oropouche WTP traverses several key biodiversity areas that all form part of the broader Northern Range ecosystem, namely the Eastern Extension Matura, Matura Swamp Reserve, and the Matura Reserve Western Extension (Figure 4-24). It also lies just over 1km north of the Melajo Reserve and the Manzanilla Extension.

EASTERN EXTENSION MATURA FOREST RESERVE

The Eastern Extension Matura Forest Reserve forms part of the larger Matura Forest Reserve complex located on the southeastern slopes of the Northern Range and lies in close proximity to the communities of Matura and Salybia. The reserve serves as an important ecological corridor linking the forested uplands of the Northern Range with the coastal ecosystems of Trinidad's Atlantic coast. The reserve is characterised by tropical evergreen seasonal forest, riparian habitats, and steep watershed catchments that contribute to the hydrological integrity of the Matura and Salybia river systems.

From a biodiversity perspective, the reserve has been recognised as being of global importance for several threatened species. The area provides habitat for the Critically Endangered Trinidad Piping-Guan (Pawi) (*Pipile pipile*), Trinidad's national bird and one of the most threatened birds in the Caribbean. Global irreplaceability assessments have identified the reserve as supporting a significant proportion of the remaining habitat for this species. The reserve is also important for the Yellow-throated Frog (*Mannophryne trinitatis*), a Trinidad endemic amphibian listed as Vulnerable by the IUCN.

The Eastern Extension also contributes significantly to watershed protection, erosion control, and climate regulation functions. Its forest cover stabilises steep slopes and regulates runoff within the Matura watershed, thereby supporting downstream water quality and aquatic ecosystem health. Given its proximity to the proposed intake and pipeline alignments, the reserve represents one of the most sensitive biodiversity receptors within the project's area of influence and requires careful consideration during project planning and implementation.

MATURA SWAMP FOREST RESERVE

The Matura Swamp Forest Reserve is located within the lowland coastal zone of northeastern Trinidad and forms part of a broader mosaic of freshwater wetlands, swamp forests, riparian habitats, and coastal ecosystems associated with the Matura watershed. The reserve functions as a critical transitional ecosystem between upland forests and the Atlantic coastline and plays an important role in flood attenuation, groundwater recharge, sediment retention, and carbon sequestration.

Ecologically, the reserve supports a diversity of wetland-dependent flora and fauna, including numerous species of birds, amphibians, reptiles, freshwater fish, and invertebrates. The swamp forest provides important feeding, breeding, and refuge habitat for resident and migratory bird species and contributes to the ecological connectivity between inland forest reserves and

coastal habitats. The reserve also supports hydrological processes that sustain downstream coastal ecosystems, including the internationally recognised leatherback turtle nesting beaches at Matura.

The conservation importance of the Matura Swamp Reserve is further enhanced by its role in maintaining water quality within the Matura watershed. The wetland vegetation acts as a natural filter, trapping sediments and pollutants before they reach downstream rivers and coastal waters. Consequently, any activities that alter hydrology, increase sediment loads, or degrade wetland habitats have the potential to affect both freshwater and marine biodiversity. Within the context of the proposed project, the reserve is considered a sensitive ecological receptor due to its close functional relationship with the river systems from which raw water will be abstracted.

MATURA RESERVE WESTERN EXTENSION

The Matura Reserve Western Extension occupies the western portion of the Matura Forest Reserve system and forms part of the broader Northern Range biodiversity corridor. Together with the Eastern Extension and the Matura National Park, this reserve protects substantial tracts of tropical forest that remain relatively intact compared to many other areas of Trinidad. Approximately half of the upper catchments of the Matura and Oropouche Rivers fall within the Matura Forest Reserve and its extensions.

The reserve contains a mixture of mature evergreen seasonal forest, secondary forest, riparian corridors, and steep upland terrain. These habitats support a diverse assemblage of mammals, reptiles, amphibians, and birds characteristic of the Northern Range. Species known or expected to occur include red howler monkeys (*Alouatta macconnelli*), white-fronted capuchins (*Cebus albifrons*), ocelots (*Leopardus pardalis*), agoutis, armadillos, and numerous bat species. The area also supports important populations of forest-dependent birds, including the Trinidad Piping-Guan and several migratory species.

The reserve provides critical ecosystem services including watershed protection, carbon storage, soil stabilisation, and habitat connectivity. It is particularly important for maintaining ecological linkages between the protected forests of the Northern Range and lower elevation habitats toward the eastern coast. Because habitat fragmentation is one of the primary threats to biodiversity in Trinidad, the reserve serves an essential role in maintaining landscape-scale ecological integrity.

MELAJO FOREST RESERVE

The Melajo Forest Reserve is a protected forest area situated within northeastern Trinidad and forms part of a network of reserves established to protect critical watershed and biodiversity resources. The reserve consists predominantly of tropical moist forest and serves as an important ecological corridor connecting upland forests with lowland and coastal ecosystems.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

The reserve supports exceptionally diverse flora and fauna reflecting Trinidad's unique biogeographic connection to mainland South America. Mammalian species recorded or expected within the reserve include red howler monkeys, white-fronted capuchins, silky anteaters, armadillos, pacas, agoutis, and small felids such as the ocelot. The reserve also supports a highly diverse avifauna, including toucans, trogons, manakins, hummingbirds, and forest raptors. Amphibian diversity is particularly notable, with several endemic Northern Range species occurring within suitable habitats.

Vegetation within the reserve is characterised by multi-layered tropical evergreen forest dominated by native species such as crappo (*Carapa guianensis*), cedar (*Cedrela odorata*), balata (*Manilkara bidentata*), and numerous palms and epiphytes. The forest structure provides a high degree of habitat complexity and supports important ecological processes such as nutrient cycling, pollination, and seed dispersal. The reserve also contributes significantly to watershed protection through the regulation of streamflow and prevention of soil erosion.

Although the Melajo Reserve is located outside the direct project footprint, it forms part of the wider ecological landscape of northeastern Trinidad and contributes to regional biodiversity connectivity. As such, it is relevant to cumulative impact considerations under IDB ESPS 6.

MANZANILLA EXTENSION FOREST RESERVE

The Manzanilla Extension Forest Reserve forms part of the broader Manzanilla–Nariva coastal ecosystem along Trinidad's eastern seaboard. The reserve comprises a diverse assemblage of coastal forest, freshwater swamp forest, mangrove systems, and beach habitats associated with the Atlantic coastal plain. It functions as an important ecological transition zone linking inland forests to coastal and marine ecosystems.

The reserve is closely associated with the internationally important Nariva Swamp ecosystem, one of the largest freshwater wetlands in the Caribbean and a designated Ramsar Site. The area supports a wide variety of wildlife, including wetland birds, migratory species, freshwater fish, reptiles, and mammals. Historically, the wider Manzanilla-Nariva ecosystem has provided habitat for species such as the West Indian manatee (*Trichechus manatus*), red howler monkey, and numerous waterbird species. The adjacent coastal zone also supports nesting activity by leatherback turtles and other marine turtle species.

From an ecosystem services perspective, the reserve plays an important role in shoreline stabilisation, groundwater recharge, flood attenuation, carbon storage, and maintenance of coastal fisheries productivity. Its extensive wetland systems function as natural filters that improve water quality and support downstream marine habitats. Although geographically separated from the immediate project area, the Manzanilla Extension forms part of the broader eastern Trinidad conservation landscape and is relevant in the context of regional ecological connectivity and cumulative environmental assessment.

SIGNIFICANCE TO THE PROPOSED PROJECT

Collectively, the Eastern Extension Matura Forest Reserve, Matura Swamp Reserve, Matura Reserve Western Extension, Melajo Forest Reserve, and Manzanilla Extension Forest Reserve form part of a larger network of protected areas, forest reserves, and biodiversity corridors that underpin ecological integrity within northeastern Trinidad. These areas provide habitat for threatened and endemic species, protect critical watersheds, support hydrological regulation, and maintain connectivity between upland, wetland, and coastal ecosystems. Their presence within the project's direct and indirect areas of influence elevates the biodiversity sensitivity of the project area and necessitates the application of the mitigation hierarchy, biodiversity monitoring, and habitat protection measures required under IDB ESPS 6. The proximity of the proposed water abstraction and transmission infrastructure to these ecologically significant areas highlights the importance of avoiding habitat loss, minimising disturbance to wildlife, and maintaining environmental flows. If critical habitats are identified within the project areas, a critical habitat assessment and a Biodiversity Action Plan should be prepared in accordance to ESPS 6.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

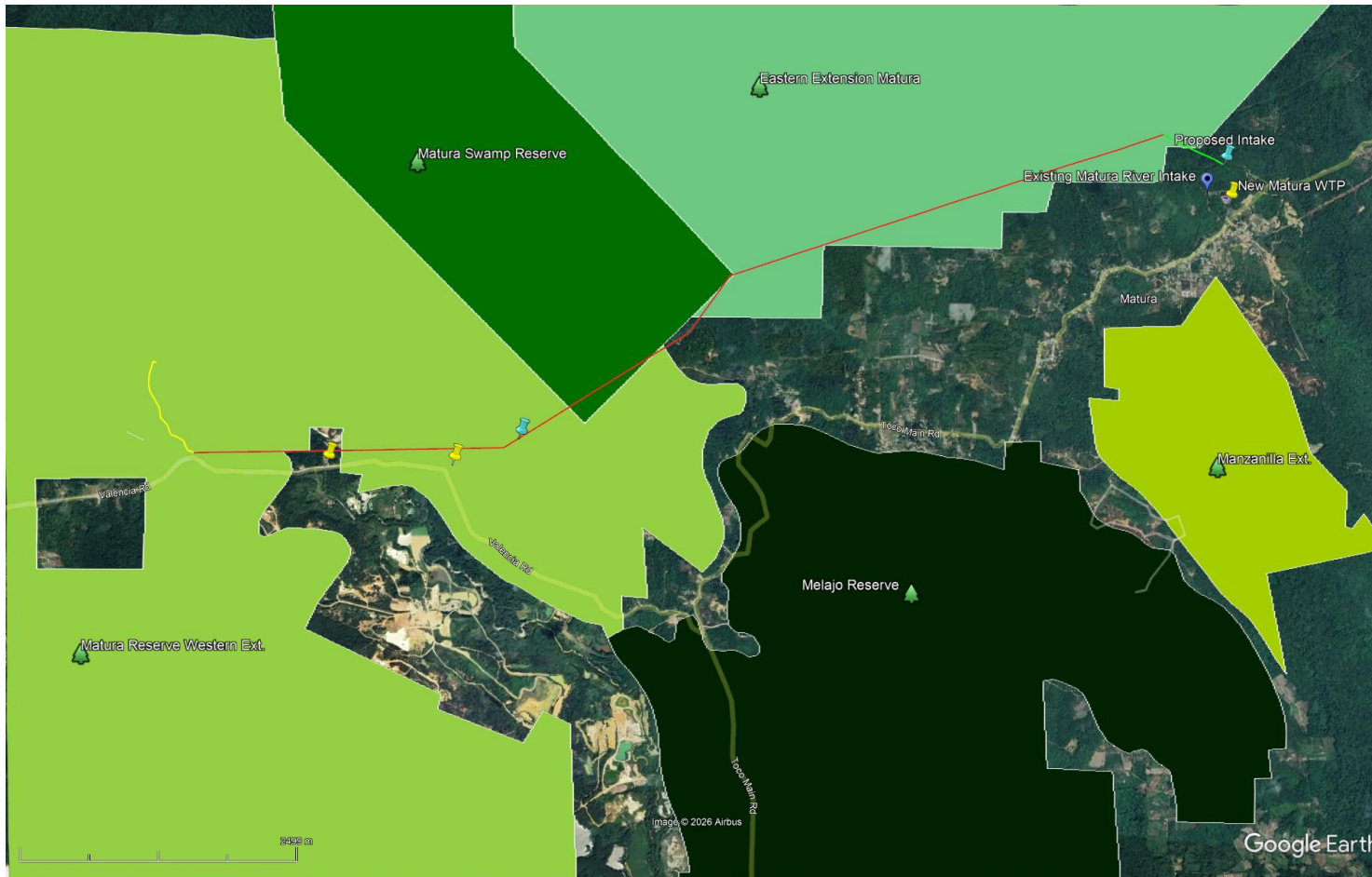


Figure 4-24: Location of the proposed project relative to the surrounding environment, including key biodiversity areas. Yellow and white points represent areas where the pipeline will be laid along the roadway. (Source: UNEP-WCMC (2026). Protected Area Profile for Manzanilla Ext. from the World Database on Protected Areas, June 2026. Available at: www.protectedplanet.net)

4.3.5 ESPS 6 Biodiversity Screening Analysis

Under ESPS 6, habitats have been classified as a mixture of modified habitat, natural habitat, and critical habitat within the study area. The proposed WTP site is located within an area that has been previously disturbed due to existing infrastructure development. The site consists primarily of modified vegetation, maintained grassed areas, and previously altered land surfaces. As such, the WTP footprint would generally be classified as Modified Habitat under ESPS 6. In contrast, the proposed intake structure and pipeline alignments to the Matura WTP traverse areas characterised by intact forest cover, riparian vegetation, freshwater habitats, and watershed ecosystems. These areas exhibit relatively low levels of anthropogenic disturbance and continue to support native ecological communities and natural ecological processes. Accordingly, these portions of the project area would be classified as Natural Habitat under ESPS 6.

While a Critical Habitat Assessment is being prepared, several biodiversity features identified during the baseline review suggest that the project area supports habitat for the Trinidad Piping-Guan (Pawi) (*Pipile pipile*), a species classified as Critically Endangered by the International Union for Conservation of Nature (IUCN) and endemic to Trinidad. The presence of suitable habitat for this species within the Matura Forest Reserve and surrounding key biodiversity areas is particularly significant, as ESPS 6 recognises habitat supporting globally threatened species as a potential Critical Habitat trigger. The baseline also identifies several endemic and range-restricted species associated with the Northern Range ecosystem, including the Golden Tree Frog (*Phytotriades auratus*), Yellow-throated Frog (*Mannophryne trinitatis*), and several endemic plant species. These species are considered biodiversity features of conservation importance.

The route between the intake and the North Oropouche WTP intersects and lies adjacent to several recognised biodiversity conservation areas, including the Eastern Extension Matura KBA, Matura Swamp Reserve, and Matura Reserve Western Extension, while also forming part of the broader Northern Range ecological corridor. Under ESPS 6, KBAs are widely recognised as Critical Habitat because they contain biodiversity values of global significance. However, this proposed route, although mainly within internationally recognised key biodiversity areas, is proposed to run primarily along already heavily disturbed corridors and road networks, therefore this localised habitat along the project footprint can be considered as a Modified Critical Habitat. The anticipated clearing of vegetation along sections of the pipeline corridor, together with potential impacts associated with water abstraction and operational maintenance activities, will therefore require application of the mitigation hierarchy. Particularly for the species that are being preserved under these conservation designations.

ECOSYSTEM SERVICES

The baseline information demonstrates that the project area provides numerous ecosystem services that are important to both biodiversity conservation and local communities. These ecosystem services include watershed protection, water supply regulation, erosion control, flood attenuation, carbon sequestration, nutrient cycling, habitat provision, and water quality maintenance. The forests of the Matura watershed play a particularly important role in regulating streamflow and maintaining the quality and quantity of freshwater resources that support both

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

ecological functions and human water use. The river systems associated with the project also provide important supporting services for freshwater biodiversity and contribute to downstream coastal ecosystems.

The project's reliance on water abstraction from the Matura River creates a direct linkage between project operations and ecosystem service provision. A Report from the WRA Hydrological Brief June 2025 indicated that the Matura River has the potential to support an increase at the intake in both the dry and wet seasons (i.e., dry season 7.1 IMGD and wet season approximately 20 IMGD). These flows present the most conservative water availability in both the dry and wet seasons. Nevertheless, ESPS 6 requires consideration of both biodiversity impacts and impacts on priority ecosystem services, particularly where these services support local communities or vulnerable populations.

SPECIES OF CONSERVATION CONCERN

The biological baseline identifies numerous species of conservation significance within the project area and surrounding landscapes. These include globally threatened species, endemic species, and species protected under national legislation and international conservation agreements. The presence of these species elevates the biodiversity sensitivity of the project area and reinforces the need for targeted species assessments, habitat protection measures, and long-term biodiversity monitoring. The occurrence of multiple threatened and endemic species suggests that the project area contributes significantly to regional biodiversity conservation objectives and may contain irreplaceable biodiversity features requiring special management consideration.

KEY BIODIVERSITY INFORMATION GAPS

Although the biological baseline provides a comprehensive overview of biodiversity conditions and the expected flora and fauna to be found within the project area and surrounding environments based on secondary data from historical assessments, several important data gaps remain for full alignment with ESPS 6. During the assessment, it will be determined whether project features like construction access roads, staging areas and operational maintenance routes will require clearing of forested lands beyond the already disturbed zones. At the time of this report's preparation, this information was not available. Additional information is also needed regarding site-specific flora and fauna communities along the proposed pipeline corridors, freshwater ecological conditions within the Matura River, fish populations, aquatic macroinvertebrates, amphibians, bats, and other sensitive taxa. Quantitative habitat mapping and environmental flow assessments will be necessary to better understand the ecological implications of water abstraction and habitat alteration, as well as specific needs for fish trap inclusions on intake infrastructure.

BIODIVERSITY RISK ASSESSMENT

The biodiversity risk associated with the project varies among project components. The WTP site presents a relatively low biodiversity risk due to its location within an already modified environment. However, the intake structure, raw water pipelines, and transmission pipeline

corridors present higher biodiversity risks because of their interaction with natural habitats and key biodiversity areas.

Operational risks associated with water abstraction may also be significant, particularly with respect to potential impacts on environmental flows, aquatic habitats, freshwater species, and ecosystem services. While these impacts may be manageable through appropriate design and operational controls, they warrant careful assessment and long-term monitoring.

ESPS 6 REQUIREMENTS AND RECOMMENDATIONS

Based on the preliminary findings of this assessment, the project will likely be required to undertake a number of additional biodiversity studies and management actions to demonstrate compliance with ESPS 6. These include a Critical Habitat Assessment, and a Biodiversity Action Plan to complement the Biodiversity Management Plan in Section 6.11 below.

The project should also establish a long-term biodiversity monitoring programme, implement habitat restoration and revegetation measures (where feasible), and incorporate invasive species management into construction and operational activities. The project will also need to demonstrate adherence to the ESPS 6 requirements for development in Critical Habitat (regardless of most of the project works occurring in disturbed zones), including implementation of the mitigation hierarchy, avoidance of measurable adverse impacts on critical biodiversity values, and achievement of no net loss or, where applicable, net gain outcomes for qualifying biodiversity features.

4.4 Socioeconomic Environment Baseline

4.4.1 Social Area of Influence

The definition of the social area of influence (SAol) for the proposed 7 IMGD Water Treatment Plant (WTP), with modular expansion to 12 IMGD, at Matura is guided by the project scope and geographic footprint described by the project's Conceptual Design Framework and project brief prepared by WASA (WASA, 2025; WASA, 2026). Further to the area of influence description in Section 4.1.1, this section details the area of influence within the context of the socioeconomic baseline. Given the nature of the project and the extent of the zone of supply (See Figure 2-3), this analysis his analysis considers a wider area of influence and taking in consideration community boundaries and municipality boundaries.

The SAol represents the social component of the Aol defined for the ESA. It captures the social receptors that may experience direct or indirect effects from the construction and operation of the proposed Matura WTP, the secondary component at Salybia, intake works, access roads, laydown areas, and ancillary facilities.

Table 4-6: Social Area of Influence Definition and Associated Receptors

Area	Proposed Definition	Main Receptors
------	---------------------	----------------

S-DAoI	WTP site, intake area, access roads, laydown areas, and any directly affected properties or users within Matura and Salybia Village.	Residents, road users, land users, nearby businesses, community facilities, construction workforce, vulnerable groups.
S-IAoI	Wider Sangre Grande municipality expected to benefit from or be indirectly affected by the project.	Beneficiary communities, public institutions, service providers, businesses, municipal authorities, water users.

The Social Direct Area of Influence (S-DAoI) is defined by the physical footprint of construction and operation activities associated with the proposed intervention, together with the nearby receptors that may be directly affected by those activities. The existing WTP at Matura will be decommissioned and replaced with a purpose-built, full-process WTP, while a complementary treatment and supply component will be constructed at Salybia. The S-DAoI therefore includes the existing and proposed WTP site, intake area, pipeline corridor, construction access routes, laydown areas, and any properties, livelihoods, public roads, businesses, institutions, land users, road users, community facilities, or vulnerable groups that may be directly affected by construction disturbance, access restrictions, noise, dust, traffic, land access requirements, or employment opportunities. In community terms, the S-DAoI covers the CSO-defined communities of Matura and Salybia Village, both of which are small rural settlements located along the Toco Main Road on the north-eastern coast of Trinidad, within the Matura Ward in the Sangre Grande region.

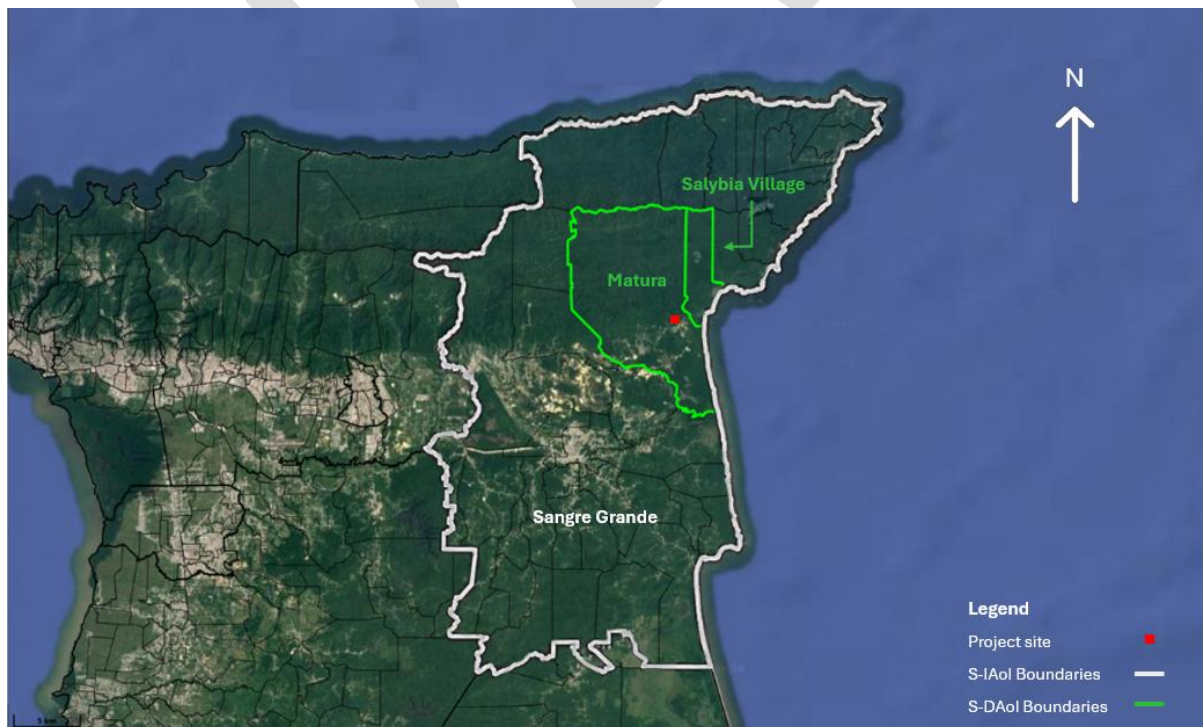


Figure 4-25 Social Indirect and Direct Areas of Influence Boundaries
Map data ©2026 Google.

The Social Indirect Area of Influence (S-IAoI) comprises the wider social receptors that may experience indirect, secondary, or system-level effects from improved water-supply reliability, construction-related economic activity, institutional coordination, and operation of the upgraded water-supply system. The Matura WTP is located in the municipality of Sangre Grande and falls within WASA's Northeast Operational Region, which includes water-supply infrastructure within the administrative regions of Sangre Grande, Arima, Tunapuna, and parts of Couva/Tabaquite/Talparo. However, the social effects of the proposed intervention are expected to be concentrated primarily within Sangre Grande, given that the project is intended to improve operational resilience and service continuity for communities in Matura, Sangre Grande, Manzanilla, and the surrounding areas. Sangre Grande is also the main hub for administrative, commercial, transport, educational, and health services for the S-DAoI communities and other north-eastern settlements. Although water-sector planning, development, and regulatory oversight are primarily undertaken by national institutions, project implementation will also require coordination with municipal authorities in relation to local roads, drainage, solid waste management, disaster preparedness, public communication, and community-level grievance management. Accordingly, the S-IAoI is defined as the municipality of Sangre Grande.

4.4.2 Demographic and Social Structure

Section 4.4.2 summarises the demographic and social characteristics of the population residing within the defined social area of influence, drawing on data from the Central Statistical Office (Beaie & St Bernard, 2009; Central Statistical Office of Trinidad and Tobago, 2012a) and relevant secondary sources. The focus is on describing the population size, composition, and household dynamics of the communities of Matura and Salybia Village (S-DAoI) and, more broadly, the Sangre Grande municipality (S-IAoI), which provides the wider social context for the project.

4.4.2.1 Population and Housing Characteristics

At the municipal level, the Sangre Grande Regional Corporation recorded a total population of 75,766 (75,605 non-institutional population) in 2011, representing 5.7 percent of Trinidad and Tobago's national total. The municipality's population growth has either matched or exceeded the national growth rates observed between 1980 and 2011, recording the third highest intercensal (2000 to 2011) population growth per annum (1.3%) among the country's regions, after the Borough of Chaguanas (2.0%) and the St. George Parish (2.3%) in Tobago. Based on assumptions about fertility levels in communities with youthful or ageing populations, the population of Sangre Grande is expected to increase steadily from 2011 through 2041 (Ecoengineering Consultants Limited, 2019). The most significant increases are predicted in the town of Sangre Grande and its surrounding communities, spurred by development and the expansion of squatter settlements.

Sangre Grande also saw a marked increase, approximately 37 percent, in the number of households recorded, more than twice the growth rate observed nationally between 2000 and 2011 (16.2%). The municipality reported 22,706 households in 2011, corresponding to an average household size of 3.3 persons. Close to half of the region's households (47.7%) were medium in size, containing 3 to 5 members.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Despite its above-average population growth, Sangre Grande is the second-least densely populated administrative region in Trinidad and Tobago, with 82 persons per square kilometre (sq km), approximately one-third of the national figure of 259 persons per sq km. The municipality is largely rural in character, with 41 communities located along the major arterial network and at its main intersections. The Region can be divided into seven sub-regions: the Town of Sangre Grande, Greater Sangre Grande, the Matura-to-Matelot (M2M) communities, the conurbation of Valencia, Greater Tamana, Manzanilla, and Fishing Pond/North Manzanilla.

The S-DAoI communities of Matura and Salybia Village had a combined population of 2,018 in 2011, representing less than 3 percent of the municipal population (2.7%). Matura accounted for approximately 90 percent (87.8%) of the 2011 S-IAoI population. In line with their rural character, Matura and Salybia Village had densities of 15.2 and 13.3 persons per sq km, respectively, in 2011. The S-DAoI population is projected to grow steadily from 2011 to 2041, with estimates reaching 2,254 in Matura and 273 in Salybia by 2026, and increasing to 2,393 and 276, respectively, by 2041.

The S-DAoI population was distributed across 617 households, with an average household size of 3.3 persons in 2011. More households contained fewer than three persons, at 45.1 percent of households, in the S-DAoI than across the municipality. Close to 30 percent (27.4%) of S-DAoI households comprised one individual. Notably, Salybia Village recorded an average of 3.6 persons per household.

4.4.2.2 Age and Gender Composition

The municipal population aged between 2000 and 2011. The S-IAoI median age increased from 26.2 to 30.5 years, while the population over 45 years old increased from 19.7 to 29.6 per cent from 2000 to 2011 and the proportion of persons over 65 years old increased by 1.9 points to stand at 7.7 percent in 2011. Despite the ageing population, the 2011 age distribution in the municipality of Sangre Grande indicates a relatively youthful demographic, with individuals under 35 representing more than half of the population (56.9%). Further, children under 15 comprised 23.0 percent of the municipal population in 2011. The gender composition is near balanced in the S-IAoI – approximately 49 percent female (48.6%) and 51 percent male (51.4%).

The S-DAoI communities featured a larger proportion of dependents (children and older adults) than the municipal population. Children made up 27.1 percent of the S-DAoI in 2011, while persons over 65 represented 8.3 percent. Notably, approximately 60 percent (61.0%) of the population of Matura and Salybia Village was under 35 years old. Compared to the municipality, the S-DAoI had a higher proportion of males. Collectively, the population of Matura and Salybia Village was 52.4 percent male and 47.6 percent female, equivalent to approximately 5 more men (4.8) than women per 100 people or 110 males per 100 females.

4.4.2.3 Vulnerable Groups

In the context of the proposed project, vulnerability is defined as the degree to which individuals or groups may experience adverse effects from project activities or have limited capacity to benefit from associated opportunities. Within the social area of influence, key vulnerable groups

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

include older adults, female-headed and single-parent households, youth not in education or employment, persons with disabilities, and low-income or informally employed households. Each group faces specific exposure and sensitivity to project-related change, shaped by their social and economic conditions.

Older residents in the S-DAoI may face difficulties adapting to temporary disruptions or accessing project-related benefits due to limited mobility and reliance on local social support networks. Construction activities, such as increased traffic, noise, or temporary access restrictions, could constrain their ability to reach health facilities or obtain daily necessities. Additionally, older persons are more susceptible to health impacts from interruptions in water supply or fluctuations in water quality during system integration. Their limited capacity to engage directly in project employment or consultation processes further increases their vulnerability to exclusion.

Female-headed and single-parent households are vulnerable primarily because of their economic and caregiving responsibilities. In the S-DAoI, many women head households as single parents or caregivers for both children and older relatives. These households are often more economically insecure, as women in rural areas are overrepresented in informal employment and lower-wage service occupations. Limited access to transportation and formal childcare restricts their ability to seek stable or better-paying work. During construction activities, female-headed households may be particularly vulnerable to temporary disruptions in water supply and in local access routes, which affect household routines and caregiving responsibilities.

The construction phase may offer short-term employment, yet unskilled or semi-skilled youth in Matura and Salybia may face barriers to participation if recruitment and training processes are not locally accessible or equitable. Without proactive inclusion measures, existing underemployment among youth could persist, limiting their potential to benefit from the project's economic opportunities. Idle or excluded youth may also be more exposed to social risks such as conflict, unsafe work practices, or risky behaviours associated with transient construction workforces. Their vulnerability lies in their marginal position between opportunity and exclusion in the project's labour market.

Proportionally, 5.9 percent of Trinidad and Tobago's national population of PWDs resided in the municipality of Sangre Grande in 2011, amounting to 3,072 individuals or 4.1 percent of the local population. Within the S-DAoI, 67 persons with disabilities were identified. Although most PWDs were between 15 and 64 years old (64.4%), disabilities were most prevalent among seniors, 30.2 percent of whom were over 65 years old. Impairments that limited mobility (43.1%) and vision (35.1%) were most common.

For this group, vulnerability arises from limited physical accessibility to construction zones, community infrastructure, and emergency information. Works along narrow or uneven corridors could temporarily restrict safe passage for persons with mobility challenges. Furthermore, water service disruptions can have disproportionate effects on PWDs who require reliable water for personal care or medical needs. Without accessible communication and consultation mechanisms, PWDs may also be excluded from project-related engagement and grievance processes.

Households reliant on irregular or informal income, such as small-scale agriculture, vending, craftwork, or seasonal tourism, are vulnerable to both temporary and systemic project impacts. Construction-related disruptions can constrain access to local markets or transport, while increases in the cost of living (e.g., water storage, materials, or transport) may place pressure on already limited household budgets. Conversely, these same households are among those most likely to benefit from improved water reliability in the long term. Their vulnerability, therefore, stems not only from exposure to short-term risk but also from limited capacity to take advantage of opportunities without targeted inclusion measures.

4.4.3 Socio-Cultural Context

The socio-cultural context of the project area reflects the plural character of Trinidad and Tobago's population and the intermixing of ethnic and religious traditions within the Sangre Grande municipality and its constituent rural communities. This section draws on data from the 2011 Population and Housing Census (Central Statistical Office of Trinidad and Tobago, 2012a) and crime statistics reported by the Trinidad and Tobago Police Service (Crime and Problem Analysis Branch of the Trinidad and Tobago Police Service, 2023).

4.4.3.1 Ethnic Composition

Trinidad and Tobago is recognised as a plural society composed of multiple ethnic groups, and the Sangre Grande municipality exemplifies this diversity. In 2011, the municipal population comprised individuals from 10 ethnic groups, with the largest proportions being East Indian (31.0%) and African (30.0%), together accounting for 61.0 percent of the total. Persons of Mixed-Other ethnicity represented 23.0 percent, while those identifying as Mixed-African/East Indian accounted for 12.9 percent. Collectively, the proportion of residents of mixed ancestry (35.9%) was notably higher in Sangre Grande than the national and Trinidad averages, indicating a long history of inter-ethnic interaction and integration in the region.

Within the S-DAoI, the population shows similar heterogeneity but with local differences in proportional representation between the two communities. In 2011, persons of African (35.1%) and Mixed-Other ancestry (31.9%) constituted the majority in the S-DAoI. Matura's population was 32.2 percent African, 14.9 percent East Indian, 16.7 percent Mixed-African/East Indian, and 34.8 percent Mixed-Other. Salybia Village, by contrast, was more heavily African in composition, with 58.7 percent African, 21.2 percent East Indian, 10.1 percent Mixed-African/East Indian, and 9.5 percent Mixed-Other.

4.4.3.2 Religious Composition

Religious affiliation across the project's social area of influence mirrors Trinidad and Tobago's broader multi-faith profile, with Christianity, Hinduism, and Islam as the dominant faiths. However, Christianity is somewhat more prevalent in the north-eastern region than nationally. In 2011, 72.3 percent of Sangre Grande's population identified with Christian denominations, compared to approximately 65 percent nationally. Among these, Roman Catholics accounted for 27.6 percent of residents, while Protestant denominations collectively represented 42.8 percent, led by Pentecostal churches (19.8%). Other significant groups included Hindus (16.6%) and

Muslims (4.1%), with smaller proportions following other belief systems or reporting no religious affiliation.

Within the S-DAoI communities, religious adherence reflects both shared Christian traditions and localised differences in denominational strength. In Matura and Salybia Village, Roman Catholicism was the most commonly reported religious affiliation (38.4%), followed by Pentecostalism (20.1%), Seventh Day Adventism (13.3%), and the Spiritual Shouter Baptist faith (11.9%); 3.5 percent of residents reported no religious affiliation.

In Matura, the religious profile closely paralleled the S-DAoI average, with Roman Catholics comprising 39.5 percent, Pentecostals 18.8 percent, Seventh Day Adventists 14.9 percent, and Spiritual Shouter Baptists 12.7 percent, while only 2.1 percent indicated no religion. Salybia Village, however, displayed a distinct pattern: Roman Catholicism (29.6%) and Pentecostalism (30.2%) were nearly equally represented, while Seventh Day Adventists (0.5%) and Spiritual Shouter Baptists (5.3%) accounted for smaller shares, and a notably higher 14.3 percent of residents identified with no formal religion.

4.4.3.3 Safety and Security

The Sangre Grande municipality, and by extension the project communities of Matura and Salybia Village, fall under the jurisdiction of the Eastern Division of the Trinidad and Tobago Police Service (TTPS). Over the nine-year period from July 2013 to July 2022, the Eastern Division accounted for only 6.2 percent of all major or serious offences reported nationally. This figure underscores the generally moderate security environment of the wider region compared with urban centres in the Port of Spain, Northern and Central Divisions.

Between 2013 and 2021, the Division recorded an average of approximately 700 offences per year, with total reported crimes peaking between 2016 and 2018 (822–856 offences) before declining and stabilising in subsequent years. The decline coincided with increased enforcement and the COVID-19 restrictions that limited public movement.

Property and violent crimes have historically represented the majority of offences within the Division. Among these, robberies accounted for 45 percent or more of all violent incidents during the review period. Since 2017, the Division has also observed a marked increase in the possession of firearms and ammunition, mirroring national trends in weapon-related offences.

Sex-related offences, while of lower frequency, have fluctuated over time, peaking in 2014 with 129 reported cases and declining to a minimum of 24 in 2019, before stabilising to an average of about 40 cases per year. Property crimes are dominated by burglaries and break-ins, followed by general larceny.

4.4.4 Socio-Economic Conditions

The socio-economic conditions of the project's social area of influence reflect a rural but moderately diversified economy anchored in public services, agriculture, and small-scale enterprise, supported by a gradually improving educational base. While the municipality of Sangre Grande (S-IAoI) has benefited from incremental improvements in educational attainment

and institutional access, the S-DAol communities of Matura and Salybia Village continue to face constraints in transport connectivity, service coverage, and employment opportunities that influence social vulnerability and adaptive capacity. The section draws on data primarily from the 2011 Population and Housing Census (Central Statistical Office of Trinidad and Tobago, 2012a), the Sangre Grande Local Area Economic Profile (Kiari Consultants Limited, 2016), and the Sangre Grande Final Draft Municipal Development Plan (Kairi Consultants Limited, 2010).

4.4.4.1 Educational Landscape

Education levels within the Sangre Grande municipality demonstrate moderate achievement overall, reflecting the region's rural character and limited access to tertiary institutions. Of the roughly 70,000 residents who reported having attended an educational institution in 2011, more than 95 percent had achieved some level of educational attainment. The most common highest levels reached were primary (39.4%) and secondary (43.8%) education, confirming that the majority of residents complete compulsory schooling, but fewer progress beyond it.

More than half of the municipal population (55.9%) possessed at least a secondary education, while 10.8 percent had completed tertiary studies. Patterns of attainment were broadly similar across genders, though females were more likely to progress to higher levels, with 13.3 percent of women compared to 8.1 percent of men holding tertiary qualifications. This pattern aligns with national trends showing greater female participation and persistence in education, especially at the post-secondary and university levels.

Despite generally widespread access to schooling, educational qualification levels remain low in the municipality. While close to 70,000 persons in Sangre Grande have completed some level of formal education, only 35.7 percent earned academic qualifications. Approximately 64.3 percent of the region's population that completed schooling, approximately ten percentage points higher than the national average (55.1%), did not obtain any formal certification. Among those with qualifications, 3.5 percent attained only a school-leaving certificate and 20.4 percent held GCE 'O'-Level or CXC General/School Certificate passes, suggesting that much of the local labour force possesses foundational rather than advanced credentials.

Within the S-DAol, educational attainment is slightly lower than the municipal average, consistent with their rural isolation and limited local schooling options. In the S-DAol as a whole, 51.6 percent of residents had secondary education, and only 6.0 percent attained tertiary education. In Matura, secondary attainment mirrored the S-DAol average (51.6%) while tertiary completion stood at 5.9 percent. In Salybia Village, 51.0 percent reached secondary level and 7.0 percent attained tertiary education.

Qualification outcomes are particularly modest in the S-DAol: 74.9 percent of residents reported no educational qualifications, 16.9 percent held GCE 'O'/CXC General/School Certificates, and fewer than 4 percent attained higher-level credentials. Matura and Salybia follow similar patterns, though Salybia shows the highest share of residents without qualifications (83.0%) and the lowest proportion with CXC or equivalent passes (11.9%).

These indicators suggest that while basic literacy and participation in schooling are widespread, formal certification and access to higher education remain limited, reflecting the distance to secondary and tertiary institutions and the time and cost burdens of travel. The absence of a secondary school within the S-DAoI, combined with infrequent public transport to Sangre Grande, constrains youth educational mobility and contributes to early entry into informal or low-wage employment.

4.4.4.2 Local Economy and Livelihoods

The Sangre Grande municipality – the country’s largest administrative land mass – hosts a diverse, predominantly domestic-facing economy with select export-competitive niches. Principal drivers include agriculture, fisheries, quarrying, ecotourism/community-based tourism, commerce and distribution (including MSMEs), and public services. The S-DAoI communities of Matura and Salybia participate most directly in agriculture, coastal fisheries, and community-based tourism, with livelihoods often combining seasonal/self-employment and commuting to the town of Sangre Grande for services and trade.

Commerce and Distribution: The town of Sangre Grande is the commercial and administrative hub, hosting the main produce market, retail and personal services, transport, construction/maintenance services, and the regional cluster of financial services. Commercial activity radiates to Valencia (a growing conurbation linked to housing expansion and corridor traffic), with additional nodes at Cumuto and Guaico. Despite spatial dispersion, most community members travel to Sangre Grande for goods/services because networks converge there.

Public Services: Regional anchors include the District Hospital, Municipal Corporation, PTSC depot, area offices of national ministries (e.g., Community Development, Social Services/Family Services), and post-secondary options (e.g., COSTAATT) alongside several Government secondary schools. These institutions generate stable employment and service-linked demand for retail, food, and transport.

Ecotourism: The north-eastern coastal arc – Matelot to Manzanilla, including Salybia and Matura – features beaches, turtle nesting sites, waterfalls (Rio Seco), caves (Cumana, Tamana), and scenic corridors (Manzanilla/Mayaro). Approximately 40 percent of the land is under statutory protection, with active NGO/CBO stewardship (e.g., Nature Seekers; Fishing Pond Turtle Conservation; Balandra Environmental & Nature Tour Group; legacy M2M network). This supports tour guiding, small accommodation, and nature-based services – central to S-DAoI household diversification.

Agriculture: A mix of tree crops and short-term crops (cocoa, coffee, coconuts, citrus, plantain/banana, mangoes, vegetables, root crops), plus livestock (notably poultry in Valencia and Cumuto/Tamana) and beekeeping. These activities sustain small farmers and micro-distributors, with S-DAoI residents often engaged in mixed subsistence-commercial farming and roadside vending.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

Fisheries: The coastal villages of Matelot, Sans Souci, Toco, Balandra, Cumana, Salybia, and Manzanilla support approximately 200 artisanal fishers (~30 vessels) (Ecoengineering Consultants Limited, 2019). The sector faces declining stocks (over-exploitation; offshore energy seismic/drilling) and cold-chain gaps (limited chilling at landing sites), forcing immediate sale to middlemen and limiting value-addition/exports. Road access constraints further suppress margins and youth entry, particularly relevant to Salybia in the S-DAoI.

Quarrying: Major deposits (“Melajo/Guanapo” gravel from Wallerfield through to Valencia and Matura; blue/yellow limestone in the Northern Range; silica sand at Matura) position Sangre Grande as a material source for national construction. The state-owned NQCL (Turure) and large private operators dominate extraction and haulage (often not resident nor integrated locally). Output is difficult to quantify (licensed/unlicensed/illegal quarries), and environmental issues persist (open-pit methods, weak rehabilitation).

BUSINESS PROFILE

There has been some fluctuation in the number of business establishments in Sangre Grande over the past two decades. Business counts, collected via the annual CSO survey of establishments and compiled from the CSO Business Register, indicate a major increase in the number of businesses in the region between 2000 and 2001, from 485 to 799 (+64.7%) (Central Statistics Office Trinidad and Tobago, 2021). The growth in the number of establishments was less dramatic from 2005 to 2007, stabilising around 900 and peaking in 2008 with 940 business places recorded. However, since then, there has been a gradual decline in the number of businesses in the municipality. In 2018, 827 registered business establishments were operating in Sangre Grande, accounting for 3.2 per cent of all registered businesses in Trinidad and Tobago at the time (Central Statistics Office Trinidad and Tobago, 2018). Most of these are located in, or in proximity to, the town of Sangre Grande (Kiari Consultants Limited, 2016).

The Wholesale and Retail Trade industry dominated the local business environment in Sangre Grande, accounting for roughly half of all businesses (48.2%)(Central Statistics Office Trinidad and Tobago, 2018). Wholesale and Retail Trade businesses are concentrated in the town of Sangre Grande and the surrounding urban areas. Other notable industries included accommodation and food service activities (24.4%) and construction (11.2%).

Most registered businesses in the region were micro, small, and medium-sized enterprises (MSMEs), employing less than 50 persons (74.8%). Given that micro-businesses tended to be engaged in Wholesale and Retail Trade and the Accommodation and Food Service Activities industries nationally, and the dominance of these industries locally, it follows that 60.6 per cent of businesses in Sangre Grande employed fewer than five persons. The Central Bank of Trinidad and Tobago 2007/2008 study of small and medium-sized enterprises (SMEs) in Trinidad and Tobago reported that most businesses in Sangre Grande were classified as micro-sized, operating mainly in the distribution, construction, finance, insurance, and real estate business services industries (Central Bank of Trinidad and Tobago, 2008). The largest number of establishments operated within the distribution industry. A 2015 MSME survey conducted as part of the Municipality of Sangre Grande Local Area Economic Profile report stated that the primary

business activities for MSMEs in the municipality were retail and distribution (60.8%), services other than distribution (12.5%), and food and beverage (16.7%) (Kiari Consultants Limited, 2016).

MSMEs contribute to local economic development through the growth and diversification of the local entrepreneurial base, the provision of goods and services, and the concomitant employment, income generation, and poverty reduction (Kiari Consultants Limited, 2016). Roughly 80 per cent of MSMEs in the region produce goods and services for their local communities, with only a modest proportion operating on a national scale (12.5%).³⁸ Though deeply embedded in local economies, MSMEs are important contributors to the broader economy and promote social inclusion for a fairly large segment of the population. Like most businesses in the region, MSMEs were typically registered under sole proprietorship (55.0%). However, MSMEs were more likely to operate under joint partnership (20.8% of MSMEs as opposed to 3.5% of all businesses) and less likely to be registered as a limited liability company (4.2% of MSMEs as opposed to 23.9% of all businesses).

Businesses in Trinidad and Tobago have been adversely affected by the COVID-19 pandemic. Many businesses were required to close their operations for April, May and June 2020. Effects continued to be felt, as a limited reopening in July 2020 was followed by another lockdown from August to October 2020. Even as public health restrictions eased, most businesses remained constrained in their ability to return to normal operations. The combination of lockdown requirements and the consequent demand shifts has crippled many businesses. The challenges posed by the pandemic were especially acute for SMEs, which account for a disproportionate share of the vulnerable jobs. SMEs generally provide most private sector jobs and accounted for most of the vulnerable jobs during the pandemic. Vulnerable jobs were concentrated in a handful of industries, namely hospitality, food services, retailing and entertainment.

4.4.4.3 Labour Market Conditions

The labour market within the Sangre Grande municipality is characterised by a relatively balanced mix of public, private, and self-employment, supported by a strong tradition of informal and own-account work. In 2011, approximately one-third of all workers (33.2%) were employed in the public sector, primarily within central and local government (22.7%) (Central Statistical Office of Trinidad and Tobago, 2012a). The public sector remains one of the largest and most stable sources of employment in the region, offering formalised working conditions and benefits. Private sector employment was comparable, accounting for 35.2 percent of the workforce, and reflects the municipality's culture of entrepreneurship and small business development. About one in four workers were self-employed or own-account workers, including small vendors, tradespeople, and service providers, with limited access to formal labour protections.

Occupationally, Sangre Grande's workforce is concentrated in low- to mid-skill categories. Elementary occupations such as construction workers, drivers, and labourers comprise 30.3 percent of employed persons, followed by plant and machine operators (17.9%), service and sales workers (15.8%), and craft and related trades (10.9%). Professional, managerial, and technical jobs account for smaller shares, largely concentrated in the town of Sangre Grande and

Valencia, where most commercial and administrative activity occurs. These two urban centres collectively host about 45 percent of the municipality's workforce.

Labour force participation in the municipality was 57.5 percent in 2011, meaning that just under half of the working-age population was economically active. Unemployment in Sangre Grande (6.8%) was higher than the national average, with women disproportionately affected. Although women made up only 38.8 percent of the labour force, they accounted for 49.3 percent of the unemployed, translating to an unemployment rate of 8.7 percent compared to 5.6 percent for men. Women also made up the majority of those outside the labour force, representing 62.8 percent of the economically inactive population, often due to household duties or limited access to transport and childcare.

Educational attainment strongly influences economic activity in the region. Individuals with lower education levels are more likely to remain outside the workforce, and most unemployed persons have completed only secondary or post-secondary education. The unemployment rate among those with intermediate-level qualifications (7.8%) exceeds that of persons with low (6.2%) or high (4.9%) educational attainment. Employment opportunities for this group are often constrained to clerical, retail, or low-skill service roles.

In the project communities of Matura and Salybia, livelihoods mirror this pattern but rely more heavily on natural-resource use and seasonal work. Only about half of adults (51%) in the Matura-to-Matelot subregion hold permanent jobs. Many residents commute to Sangre Grande or other towns for work as teachers, security officers, drivers, nurses, and government employees. Locally, livelihoods are sustained through small-scale farming, fishing, tour guiding, craftwork, and ecotourism-related activities such as guesthouse operations and turtle conservation. Natural resources are used for both income and recreation, including gardening, fishing, hunting, and crabbing. While these activities supplement household earnings, they are highly seasonal and provide limited income stability.

Unemployment in the S-DAoI remains relatively low, estimated at 4.8 percent in Matura and 0 percent in Salybia in 2011, though these figures likely mask underemployment and income instability due to the prevalence of informal and part-time work. Overall, the local labour force is dominated by semi-skilled and unskilled workers, with limited access to technical training or formal certification.

4.4.4.4 Incidence of Poverty

Poverty in Trinidad and Tobago is unevenly distributed, with the most disadvantaged regions concentrated along the eastern and southern corridors of the island. According to the Ministry of Social Development and Family Services, poverty is defined as the condition in which a person or household lacks sufficient financial resources to meet basic needs such as food, shelter, water, utilities, and healthcare. The 2007 Survey of Living Conditions identified the municipality of Sangre Grande as one of the poorest regions in the country, despite its relatively small share of the national population (Kairi Consultants Limited, 2007).

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

In 2005, Sangre Grande accounted for 9.6 percent of the national population living below the poverty line, though the municipality represented less than 6 percent of the country's total population. The region recorded the highest poverty rate nationally at 39.1 percent, more than two times the national average of 16.2 percent. Additionally, approximately one in five persons living in extreme poverty (19%) in Trinidad and Tobago resided in Sangre Grande, underscoring the region's persistent socioeconomic disadvantage.

Data from the 2011 Population and Housing Census further revealed widespread material deprivation. Over one in five households (21.7%) in the municipality had one or more unmet basic needs, ranking Sangre Grande second only to Princes Town. The region also had the highest share of households (1.1%) with three or more unmet basic needs. Notably, 9.8 percent of families lacked adequate housing, while others were deprived of access to sanitation (6.1%), electricity (3.3%), or water supply (2.5%). These deprivations reflect both infrastructure deficits and income-related barriers to securing essential services.

The labour market profile of poor households compounds these challenges. Heads of poor households were more likely to be unemployed than their non-poor counterparts, and female-headed poor households faced particularly acute vulnerability, with unemployment rates approximately twice the national average. The region also had the fifth-highest concentration of working poor nationally, accounting for 9.1 percent of the country's total in 2005. These individuals were typically employed in elementary and low-wage occupations such as construction labour, sales and service work, and craft trades. Young men under 30 years of age with low educational attainment were disproportionately represented among the working poor, reflecting limited access to skills training and stable employment opportunities.

When broader measures of well-being are considered, Sangre Grande remains among the most deprived municipalities in Trinidad and Tobago. The Multidimensional Poverty Index (MPI), which assesses deprivations across health, education, and living standards, recorded the highest incidence in Sangre Grande among all 15 municipalities (Central Statistical Office of Trinidad and Tobago, 2012b). Based on data from the 2006 Multi-Indicator Cluster Survey (MICS III), the region's MPI was 0.026, with an average intensity of poverty of 29.1 percent, meaning that those classified as poor experience nearly one-third of all possible deprivations simultaneously. Approximately 8.8 percent of residents, compared to 6.2 percent nationally, were identified as multidimensionally poor, exceeding the international threshold of 20 percent deprivation intensity.

Overall, poverty in Sangre Grande, and by extension the S-DAol communities of Matura and Salybia Village, is both monetary and multidimensional. It reflects a combination of low-income employment, educational and skills limitations, gender inequities, and gaps in access to housing, utilities, and public infrastructure. These conditions underscore the importance of integrating local employment, training, and social inclusion measures within the project's implementation to ensure that the economic benefits of improved water service reliability are equitably distributed among vulnerable households.

4.4.5 Cultural Heritage and Archaeological Resources

Trinidad and Tobago's cultural heritage reflects the tangible and intangible legacies of its people, encompassing the physical monuments, landscapes, and artefacts that embody the nation's history, as well as the traditions, beliefs, and practices passed down through generations. Tangible cultural heritage includes any monument, site, fossil, or area of natural, historical, scientific, or archaeological significance that serves as a visible reminder of the country's past. In recognition of the importance of preservation, the National Trust of Trinidad and Tobago (NTTT) has established a formal National Heritage Asset Inventory, which identifies, evaluates, and legally protects sites of cultural and historical importance. Once a site is officially listed, it is afforded legal protection against unauthorised alteration, damage, or defacement to ensure that its value can be transmitted to future generations.

Within the municipality of Sangre Grande (S-IAol), 22 sites have been recorded in the National Heritage Asset Inventory as possessing cultural or natural heritage significance. Of these, only one site, the Old Sangre Grande Post Office located at the corner of River Road and the Eastern Main Road in Sangre Grande Proper, is legally recognised and listed by the National Trust. The remaining sites, though unlisted, are considered of heritage interest and contribute to the municipality's historical identity.

The regional heritage profile includes 18 cultural sites comprising historic buildings and structures such as lighthouses, watchtowers, residences, guest houses, places of worship, post offices, railway remnants, and historic districts. These are concentrated within or near the urban centre of Greater Sangre Grande, reflecting the town's development as a nineteenth-century commercial hub and gateway to the north-eastern corridor. In contrast, natural heritage sites, including rainforest, cave and cavern, and bay and beach ecosystems, are dispersed across the municipality, particularly along the coastal belt and within forested areas that also fall under environmental protection. Eight such terrestrial and marine ecosystems have been identified as at-risk sites of natural beauty or repose and are included in the Heritage Asset Inventory.

Although there are no formally listed heritage sites within the S-DAol communities of Matura and Salybia Village, the area is rich in natural and cultural landscapes that form part of the region's wider heritage value. These include the Matura National Park and adjacent forest reserves, which not only support biodiversity but also hold cultural significance for local communities engaged in eco-tourism, conservation, and traditional coastal use. The Salybia and Matura beaches, well known for leatherback turtle nesting, are emblematic of community-based heritage stewardship through organisations such as Nature Seekers, which have transformed environmental conservation into an element of cultural identity and pride.

4.4.6 Natural and Built Resources and Use

4.4.6.1 Land Ownership and Tenure

Land tenure in Trinidad and Tobago is governed by a legal framework that establishes ownership rights and the associated rights of access, possession, occupation, use, control, and transfer. Under the State Lands Act (Chap. 57:01), the Commissioner of State Lands is the landlord of all state lands and is responsible for their management, allocation, and distribution. State lands

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

may also be vested in specific government agencies under the statutes that created them, allowing these authorities to lease or manage lands for defined purposes.

STATE AND PUBLIC LAND

A significant proportion of land within the Sangre Grande municipality, and particularly within the S-DAol encompassing Matura and Salybia Village, is publicly owned. These public lands consist largely of forested and protected areas, agricultural and housing lands, and mineral mining zones, which together form an important foundation for the region's environmental and economic activities. According to the situational report prepared for the current Sangre Grande Municipal Development Plan, approximately 2,896 plots covering 3,195.9 hectares have been leased by the Ministry of Agriculture, Land and Fisheries (MALF) throughout the municipality, including within communities such as Vega de Oropouche, Ture, and Sangre Grande town (Kairi Consultants Limited, 2010). However, the actual use of these leased plots relative to their intended agricultural or other purposes remains uncertain.

Forested lands dominate much of the municipal landscape, with extensive areas under statutory protection. The Valencia Wildlife Sanctuary and Forest Reserve together cover about 2,785 hectares, while additional reserves in Matura fall under the jurisdiction of the Forestry Division, which manages timber and wildlife resources through licensing and permitting mechanisms under the Forests Act (Chap. 66:01) and Conservation of Wildlife Act (Chap. 67:01). The Quare River Valley, located between the Hollis Dam and its intake, is further protected under the Water and Sewerage Authority Act (Chap. 54:40) to prevent pollution of surface and groundwater resources.

Forested and coastal state lands are critical not only for environmental protection but also for recreation and eco-tourism. The region's beaches and rivers, such as Salybia Beach, Matura Beach, and the Rio Seco and Cumaca (Ture Water Steps) waterfalls, are popular for leisure and nature-based tourism, while also serving as fish landing sites for local fishers. These natural areas represent both environmental assets and sources of community livelihood, requiring careful management to balance conservation and economic use.

Public land use within the municipality also includes areas designated for agriculture, quarrying, and residential development. Although agriculture remains a traditional occupation in the region, a significant portion of farmland has been converted to residential use in recent years, reflecting population growth and urban expansion. The 2004 Agricultural Census recorded 2,460 holdings across 9,552.7 hectares, with 78 percent under crop production, 9 percent devoted to livestock, and 13 percent to mixed farming (Ministry of Planning & Development, 2004). The majority of farms are smallholdings of less than five hectares, operated under individual or household ownership, often on state-leased or family lands.

Quarrying occupies an appreciable portion of state lands, particularly in Valencia, Ture, Vega de Oropouche, and Matura, where deposits of sand, gravel, limestone, and silica are extracted for national construction and industrial use. Of the 39 registered quarries in the municipality, 21 operate on state lands, though the number of active and illegal operations is believed to be higher.

These activities, while economically significant, have contributed to deforestation, road degradation, and siltation of waterways, especially in Valencia and Matura.

Despite formal leasing systems, informal occupation of state lands is widespread and growing. In 2011, 26.6 percent of dwellings were located on state land, and roughly one in four (25.6%) privately owned dwellings in the local study area were within informal settlements. Under the State Land (Regularisation of Tenure) Act, 1998 (Chap. 57:05), 14 squatter areas were originally identified in Sangre Grande for regularisation; however, by 2016, the Land Settlement Agency (LSA) had recorded 38 informal settlements accommodating over 4,500 households and 6,701 structures, 69 percent of which were residential. Many of these communities have emerged along the Sangre Grande–Valencia corridor and around future development zones such as the Cumuto–Manzanilla Highway and the proposed Toco Port, where speculative occupation (“land grabbing”) has reportedly increased.

PRIVATE LAND

Private landownership dominates residential and agricultural zones across the municipality, though the degree of legal documentation varies widely. Approximately 70 percent of S-IAoI homeowners occupy dwellings on private land, with 47.9 percent holding freehold or family land tenure. In Matura, 41.9 percent of households reported family land ownership compared to 55.6 percent in Salybia. While most informal settlements occur on state land, squatting also exists on private land, though its extent is not well documented.

In the agricultural sector, 34.8 percent of landholders nationally fully own their holdings, representing 63.1 percent of agricultural parcels. A further 15 percent of land is held under family, rent-free, or squatting arrangements, typically arising from informal inheritance practices. Only 46 percent of privately owned agricultural lands are supported by adequate legal documentation, resulting in varying levels of tenure insecurity.

Cultural and historical norms also shape perceptions of land rights. Many occupants of state or family lands regard long-term occupation and active use as legitimate claims of ownership, even in the absence of formal titles. This perception has been reinforced by the State Land (Regularisation of Tenure) Act, which enables eligible occupants to obtain legal tenure through state-issued leases.

4.4.6.2 Access to Infrastructure

Access to infrastructure across the project’s social area of influence reflects the dispersed rural settlement pattern of north-eastern Trinidad and the uneven distribution of services outside the main urban centre of Sangre Grande. While Sangre Grande functions as the primary administrative, commercial, transport, education, and health-service hub for the S-IAoI, the S-DAoI communities of Matura and Salybia Village experience more localised constraints in service coverage, transport connectivity, water reliability, sanitation arrangements, and access to higher-order facilities. This section examines key infrastructure and service conditions, drawing primarily on the 2011 Population and Housing Census (Central Statistical Office of Trinidad and Tobago, 2012a). Given the age of the census data, the figures should be treated as a historical

baseline of household-reported access and verified, where possible, against current administrative data, WASA service information, field observations, and stakeholder consultation findings.

EDUCATION

Trinidad and Tobago's education system is structured into five levels – early childhood care and education (ECCE), primary, secondary, vocational/technical, and tertiary – and is administered by the Ministry of Education, with free tuition from pre-primary to tertiary levels. The northeastern education district, which includes the project area, oversees the delivery of public education services across the municipality.

There are 41 primary schools in the Sangre Grande municipality (Ecoengineering Consultants Limited, 2019). Schools are widely distributed, and most settlements host at least one primary institution, while smaller communities rely on neighbouring villages. Approximately 80.8 percent of primary school students travel less than 4 kilometres to attend school, indicating generally good local accessibility. Within the S-DAoI, both Matura and Salybia have access to nearby government or government-assisted primary schools, with students attending either local facilities or schools in adjacent communities such as Balandra, Toco, and Valencia.

Secondary education is more centralised, with 10 of the municipality's 13 secondary schools located within the affected area and eight concentrated in the town of Sangre Grande. Although accessibility is relatively high, with 44.6 percent of students travelling less than 6 kilometres to school, students of the S-DAoI may travel beyond Sangre Grande for schooling due to limited capacity or options.

Post-secondary and tertiary education opportunities are limited locally. The YTEPP Centre in Valencia provides vocational and technical training, while three tertiary institutions, including COSTAATT, are located in Sangre Grande town. Many students pursue higher education outside the municipality, attending campuses of the University of the West Indies (UWI) or the University of Trinidad and Tobago (UTT). Overall, the proximity of primary schools supports early education access in the S-DAoI, but the lack of secondary and tertiary institutions within or near Matura and Salybia poses challenges to the continuity of youth education.

HEALTH

Healthcare services in the municipality are anchored by the Sangre Grande Hospital, a 99-bed secondary care facility serving the wider eastern region (Ecoengineering Consultants Limited, 2019). A new Sangre Grande Hospital, under construction adjacent to the existing facility, will expand secondary and specialist healthcare capacity. The municipality also contains 11 health and outreach centres, including one enhanced health centre (Ojoe Road, Sangre Grande), one main health centre (Toco), and six outreach centres at Valencia, Matura, Cumana, Sans Souci, Grande Riviere, and Matelot.

The Matura Outreach Centre provides primary health services and basic emergency care from 8:00 a.m. to 4:00 p.m., while more complex cases are referred to Sangre Grande or Toco. Women

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

requiring maternity services must travel to the Sangre Grande Hospital. Free ambulance services are available through the Toco and Matelot health centres and the Trinidad and Tobago Fire Service (TTFS) based in Sangre Grande. Despite the presence of outreach facilities, residents of remote communities such as Salybia face travel time and transport constraints, particularly outside clinic hours.

COMMUNITY AND RECREATIONAL

Community facilities play a central role in social interaction, training, and local governance. The municipality has 25 community centres, 14 of which are located within the affected area, including centres in Valencia, Sangre Grande, Vega de Oropouche, Matura, Rampanalgas, Cumana, Toco, Sans Souci, Monte Video, Grande Riviere, and Matelot. Centres vary in functionality and condition; some, such as the Grande Riviere Community Centre, require repairs. These spaces are used for community meetings, adult education, and disaster response coordination.

Recreation and sports amenities are well distributed, with 45 recreational facilities across the municipality, including 23 multi-purpose grounds equipped with basketball courts, pavilions, and, in some cases, turf wickets. The affected area contains at least 24 recreational sites, including facilities in Sangre Grande, Valencia, and the M2M coastal corridor. In addition to formal recreation grounds, the region's beaches, rivers, and waterfalls, such as Matura Beach, Salybia Beach, Rio Seco Waterfall, and Turure Water Steps, serve as natural recreational and tourism spaces.

WATER AND SANITATION

Access to water and sanitation services across the S-IAoI varies considerably by community, reflecting the region's dispersed rural settlement pattern and uneven infrastructure coverage. While most households in the wider Sangre Grande municipality reported access to pipe-borne water, rural communities such as Matura and Salybia Village continued to experience inconsistent supply and, in some cases, reliance on alternative water sources.

In 2011, 46.2 percent of households in the S-DAoI communities reported access to pipe-borne water, substantially lower than the municipal average of 85.0 percent. Public pipe-borne supply was the main source of water for households in the S-DAoI, accounting for 44.4 percent of households overall, with 35.1 percent reporting pipe-borne water directly to the dwelling. However, access differed sharply between the two communities. In Salybia Village, 80.3 percent of households reported pipe-borne water to the dwelling, compared with 29.4 percent in Matura. In Matura, 28.1 percent of households reported using private catchments, while 11.5 percent relied on truck-borne water and 6.5 percent on springs, rivers, wells, or ponds.

Among households that relied on public mains, most reported receiving water more than once per week. However, frequency of supply varied across communities. All Salybia Village households connected to the public mains reported receiving water three or more times per week, and approximately half (50.8%) reported daily supply. In Matura, by contrast, approximately one-quarter of households connected to the public mains (26.0%) reported daily

supply, while the largest share (32.0%) received water once or twice weekly. Notably, 17.7 percent of Matura households connected to the public mains reported that their frequency of supply was “not at all,” indicating either inactive connections, prolonged service interruptions, or other supply constraints requiring verification.

The Matura/Salybia service area represents a wider beneficiary population than the immediate S-DAoI communities alone. Based on WASA’s population forecasting, the estimated population served by the Matura/Salybia system was 1,657 persons in 2011 and is projected to increase to approximately 3,361 persons by 2025 and 3,387 persons by 2042. The projections suggest that, after the initial increase from the 2011 baseline, the served population is expected to remain relatively stable over the long term, with limited growth between 2025 and 2042. At the household and building level, the forecast indicates a more direct service-expansion effect: the number of buildings associated with the Matura/Salybia service area is projected to increase from 279 in 2011 to 577, with WASA anticipating approximately 298 new connections as a result of the project. Although the service area is comparatively small, additional connections are likely to increase local demand for reliable potable water services and improve access for households and buildings brought into the network.

Sanitation coverage in the wider municipality is generally high, with most households using on-site sanitation systems. In Sangre Grande, 67.9 percent of households reported using water closets (WCs) linked to septic tanks, which are the predominant sanitation arrangement in rural communities. Within the S-DAoI, 48.7 percent of households used WCs connected to septic tanks. Service levels varied by locality. In Matura, 48.7 percent of households used a WC connected to a septic tank, while 50.0 percent relied on pit latrines. In Salybia Village, 13.3 percent of households were connected to a sewer system, 48.3 percent used WCs linked to septic tanks, and 38.3 percent used pit latrines.

These figures indicate that sanitation arrangements in the S-DAoI remain largely dependent on on-site systems, with a substantial proportion of households still using pit latrines. Where pit latrines or septic tanks are poorly sited, constructed, or maintained, they may pose risks to groundwater and surface water quality, particularly in areas with high water tables, flooding susceptibility, or close proximity to drainage channels and watercourses. This reinforces the importance of considering household water access, sanitation conditions, and water-quality risks in assessing community vulnerability and the potential benefits of improved water-supply reliability.

ELECTRICITY

More than 90 percent of households utilised electricity as a power supply and light source for their homes in the municipality (96.1%) and within the S-DAoI (97.3%).

INFORMATION AND COMMUNICATION TECHNOLOGY

Information and communication technology (ICT) access and use in Sangre Grande reflect both national improvements in digital connectivity and persistent rural disparities in digital inclusion. The National Digital Inclusion Survey 2021 measured ICT access, use, skills, and digital inclusion

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

at national, municipal, and community levels (Kairi Consultants Limited, 2022). The survey recorded an ICT Development Index (IDI) score of 7.54 for Sangre Grande, below the national score of 7.86, placing the municipality among the lower-ranked administrative areas for ICT development. Sangre Grande also recorded a Digital Inclusion Index (DII) score (3.99) below the national average (4.24), indicating that gaps remain not only in access to ICT infrastructure, but also in effective use, digital participation, trust, and digital literacy.

At the S-DAoI level, however, Matura and Salybia Village performed moderately relative to other communities nationally. Both communities recorded an IDI value of 7.90 and a DII value of 4.41, ranking 227th and 188th, respectively, out of 609 communities. These scores suggest that the project communities are not among the most digitally excluded communities in Trinidad and Tobago but still form part of a rural municipality where access, service quality, affordability, and digital skills may vary by household, age, income, disability status, and location.

Nationally, the 2021 survey found that fixed Internet access was relatively widespread, with 74% of households reporting a working fixed broadband Internet subscription; however, access was slightly lower in rural areas (71%) than in urban areas (75%). Rural households were also more likely than urban households to rely on terrestrial fixed wireless Internet services, reflecting the importance of wireless technologies in dispersed settlement areas. The main reasons reported nationally for households not having Internet access were lack of need, cost of service, and access to the Internet elsewhere. These findings are relevant to Sangre Grande because rural households may rely more heavily on shared, mobile, or wireless forms of connectivity, and because affordability and perceived need may affect the extent to which residents can access project information, digital public services, online grievance channels, and emergency communications.

Mobile phone ownership and Internet use are important indicators of household and individual capacity to receive project communications and participate in digital engagement. Nationally, 84% of the population reported owning a mobile phone, while 79% of persons five years and older reported using the Internet. However, ICT use varied significantly by age, disability status, education, and labour force status. Internet use was highest among younger and working-age groups, but declined among older persons, while persons with disabilities reported substantially lower levels of Internet use and mobile phone ownership than persons without disabilities. These patterns indicate that although digital communication can support stakeholder engagement in the S-IAoI, it should not be the only channel used. Project information should continue to be shared through in-person meetings, printed notices, community leaders, village councils, local institutions, telephone contact, and other accessible formats.

Overall, ICT conditions in Sangre Grande indicate a moderate but uneven level of digital inclusion. For the proposed project, this has implications for stakeholder engagement, grievance management, community notification, emergency communication, and access to information. Digital channels such as WhatsApp, email, online notices, and virtual meetings may be useful, especially for younger residents, workers, and institutional stakeholders. However, these should be complemented by non-digital and community-based communication methods to ensure that

older persons, persons with disabilities, low-income households, and residents with limited Internet access are not excluded.

TRANSPORTATION

The municipality's transport network radiates from the town of Sangre Grande, where the Eastern Main Road (EMR) and Toco Main Road serve as the principal corridors connecting eastern and north-eastern Trinidad. Access to the S-DAol communities is primarily via Toco Main Road, which links Matura and Salybia to Sangre Grande. Public transportation is available through Private Hire (PH) taxis, maxi-taxis, and the Public Transport Service Corporation (PTSC), though frequency declines significantly during evening hours and on weekends. Road conditions deteriorate in certain rural segments, particularly near Matura and Salybia, where narrow lanes, erosion, and limited lighting pose challenges for vehicular and pedestrian safety.

4.4.7 Institutional Stakeholder Landscape

4.4.7.1 Local and National Government Institutions

At the national level, several ministries and statutory bodies have direct or indirect jurisdiction over land, water, environmental, and social management functions relevant to the project:

- Ministry of Public Utilities (MPU) – The parent ministry of the Water and Sewerage Authority (WASA), the MPU has oversight of national water policy, infrastructure development, and regulatory standards for potable water production and wastewater management.
- Water and Sewerage Authority (WASA) – The implementing agency for the project, responsible for the management, operation, and maintenance of the national water supply system. WASA will oversee the construction, commissioning, and long-term operation of the new water treatment plant and pipeline network.
- Ministry of Agriculture, Land and Fisheries (MALF) – Manages state agricultural lands and leases, including parcels in Turure, Vega de Oropouche, and Sangre Grande, and provides agricultural extension services and land regularisation support to farmers within the project's wider area of influence.
- Ministry of Planning and Development (MPD) – Through the Town and Country Planning Division (TCPD), the MPD guides spatial development, land use zoning, and project approval processes, while its Environmental Policy and Planning Division coordinates environmental management policy in alignment with Vision 2030 and the National Spatial Development Strategy.
- Environmental Management Authority (EMA) – The statutory body responsible for environmental regulation and compliance under the Environmental Management Act (Chap. 35:05). The EMA administers the Certificate of Environmental Clearance (CEC) process, enforces pollution control standards, and monitors environmental performance throughout the project lifecycle.
- Forestry Division – Administers the Forests Act (Chap. 66:01) and the Conservation of Wildlife Act (Chap. 67:01), and manages forest reserves and protected areas in Matura

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

and Valencia, ensuring that ecological integrity and biodiversity are maintained within proximity to the project area.

- Land Settlement Agency (LSA) – Operates under the State Land (Regularisation of Tenure) Act, 1998 (Chap. 57:05) to manage and regularise informal settlements on state lands. The LSA's oversight is particularly relevant given the concentration of squatters along the Valencia–Sangre Grande corridor and near existing water catchments.
- Ministry of Works and Transport (MOWT) – Responsible for the maintenance and upgrading of the road infrastructure network, including the Toco Main Road, which will serve as a key access route for construction and operations traffic associated with the project.
- Ministry of Rural Development and Local Government (MRDLG) – Provides policy oversight and coordination for regional corporations and local governance systems across Trinidad.

At the municipal level, the Sangre Grande Regional Corporation (SGRC) serves as the local government authority for the area. It manages local roads, drainage, solid waste collection, minor infrastructure works, and community disaster preparedness through its Disaster Management Unit (DMU). The SGRC also coordinates local land use planning, building approvals, and maintenance of public spaces within the municipality. The DMU oversees the network of 47 emergency shelters across Sangre Grande, including those designated in or near the affected area.

4.4.7.2 Civil Society Organisations

Civil society and community-based organisations play a significant role in environmental stewardship, community development, and local service delivery within the project's area of influence. Prominent groups include:

- Nature Seekers – Based in Matura, this award-winning community-based organisation leads leatherback turtle conservation, eco-tourism management, and environmental education. It represents a cornerstone of local environmental governance and eco-enterprise in the S-DAoI.
- Matura Women's Group – Engages in environmental conservation, entrepreneurship, and community education initiatives, with a focus on women's empowerment and sustainable livelihoods.
- Fishing Pond Turtle Conservation Group and Balandra Environmental and Nature Tour Group – Operate in coastal conservation and eco-tourism, supporting sustainable resource use across the north-eastern coast.
- Community Development Committees (CDCs) and Village Councils – The Matura Village Council and Salybia Village Council function as primary community liaison bodies, facilitating engagement with residents and coordinating with government agencies during development initiatives.

- Faith-based organisations – Churches and religious institutions play informal but influential roles in community cohesion, public awareness, and mobilisation for social or environmental causes.

These organisations are essential partners for stakeholder engagement, project communication, and capacity-building activities. Their long-standing relationships with residents and conservation track records make them valuable intermediaries for disseminating project information and monitoring community-level impacts.

4.4.7.3 Community Participation and Consultation Mechanisms

Community participation within the Sangre Grande municipality typically occurs through structured and informal channels. Formal participation is facilitated through public consultations, village council meetings, and regional corporation outreach programmes, while informal engagement often occurs through civil society initiatives, religious gatherings, and community-led projects.

5 Environmental and Social Impacts and Risks

5.1 Assessment of Impacts and Risks

The main goal of the Assessment is to identify the environmental and social impacts and risks associated with the Project's activities in the area of influence and around the sites of interest, focusing on both positive and negative impacts and risks as well as bio-physical, chemical, social, economic and cultural components of the environment including, but not limited to:

- Effects on wildlife, terrestrial and aquatic biodiversity;
- Effects on existing or proposed protected areas or other sites of conservation or special management interest;
- Effects on the hydrological system (watershed)
- Effects on surrounding communities (residential and commercial activities); and
- Effects on livelihoods.

Table 5-1: Defining the nature of the potential impacts

Term	Definition
Positive Impact (Benefit)	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative Impact	An impact that is considered to represent an adverse change from the baseline or introduces a new undesirable factor.
Direct Impact	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g. between occupation of a site and serviced communities).
Indirect Impact	Impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g. in-migration for employment placing a demand on resources).
Cumulative Impact	Impacts that act together with other impacts (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as the Project.

Table 5-2: Impact Rating Table

Criteria Used for Impact Rating	
Extent	• On-site – Limited to within the site boundaries • Local – impacts that affect an area in a radius of 2km around the sites; • Regional – impacts that affect regionally important resources or are experienced at traditional authority or district scale; • National – impacts that affect nationally important resources or affect an area that is nationally important/ or have macro-economic consequences; • Transboundary/International – impacts that extend beyond country borders or affect internationally important resources.

Criteria Used for Impact Rating

Duration	• Temporary – impacts are predicted to be of short duration and intermittent/occasional; • Short-term – impacts that are predicted to last only for the duration of the construction period; • Long-term – impacts that will continue for the life of the Project, but ceases when the Project stops operating; • Permanent – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.
Likelihood	• Unlikely – The impact is unlikely to occur. • Likely – The impact is likely to occur under most conditions. • Definite – The impact will occur.
Magnitude	• Magnitude can be considered in terms of the sensitivity of the receptor: ○ Negligible – the impact is not detectable; ○ Low – the impact affects the environment in such a way that natural functions and processes are not affected; ○ Moderate – where the affected environment is altered but natural functions and processes continue, albeit in a modified way; ○ High – where natural functions or processes are altered to the extent that it will temporarily or permanently cease.

Table 5-3: Impact Significance or Severity Criteria

Significance Criteria

Negligible Significance	An impact of negligible significance is where a resource or receptor will not be affected in any way by a particular activity, or the predicted effect is deemed to be imperceptible or indistinguishable from natural background levels.
Low Significance	An impact of low significance is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value.
Moderate Significance	An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that “moderate” impacts have to be reduced to “minor” impacts, but that moderate impacts are being managed effectively and efficiently.
High Significance	An impact of high significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. A goal of the ESIA process is to get to a position where the Project does not have any major residual negative impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a development. It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors, such as employment, in coming to a decision on the Project.

5.1.1 The Construction Phase

While construction activities are often associated with temporary environmental disturbances, the Matura and Salybia Water Treatment Plant (WTP) and Transmission Pipeline development also presents a range of positive socioeconomic and institutional benefits for local communities and the wider region. These benefits will arise primarily through employment generation, local economic stimulation, capacity building, and infrastructure enhancement, all of which contribute to broader national goals for sustainable water resource management and rural development.

One of the most significant positive impacts during the *construction phase* will be the creation of direct and indirect employment opportunities. The project is expected to require a diverse range of skilled and unskilled labour, including engineers, equipment operators, masons, carpenters, welders, drivers, electricians, and general labourers.

Beyond direct employment, numerous indirect economic benefits are anticipated. These include increased demand for local goods and services such as small business support (e.g., hardware stores, food vendors, and equipment rental). The multiplier effect of this spending can potentially stimulate the local economy and contribute to community resilience.

The project will provide a valuable platform for skills transfer and professional development among the local workforce. Through on-the-job training and technical supervision, workers can gain exposure to modern construction practices, occupational health and safety standards, and environmental management procedures aligned with international best practices.

Specialized areas such as water treatment system assembly, pipeline installation, quality control, and site management will enhance the technical capacity of participating workers, improving their employability beyond the project's duration.

Local subcontractors engaged in civil works, materials supply, and transport can also benefit from institutional strengthening through compliance with contractual, safety, and environmental requirements, positioning them for future participation in national infrastructure projects. Construction activities will necessitate improvements to access roads and site infrastructure, which will also serve community needs. Temporary upgrades to existing rural roads for the transport of materials and equipment may result in improved surface conditions and drainage, facilitating safer and more reliable access for local residents.

In some instances, temporary access routes, culverts, and small bridges constructed for the project may continue to provide long-term utility, especially in areas where connectivity is currently constrained during heavy rainfall. The implementation of a large-scale infrastructure project under IDB financing will strengthen the institutional capacity of the Water and Sewerage Authority (WASA) and other regulatory partners through improved environmental and social management systems (ESMS), monitoring frameworks, and reporting practices.

The project's adherence to IDB safeguard policies will reinforce the integration of environmental and social considerations into national infrastructure planning, while also promoting inter-

agency collaboration among WASA, EMA, the Forestry Division, and the Ministry of Works and Transport (MOWT).

These strengthened institutional linkages have the potential to improve long-term governance in environmental monitoring, occupational health and safety, and water resource management across Trinidad and Tobago. The cumulative positive effects of employment, local spending, and skill development can have a multiplier effect within the surrounding communities.

Overall, this project is expected to deliver substantial short-term socioeconomic and institutional benefits. While physical works will inevitably cause temporary environmental disturbances (as detailed in the table below), these impacts are balanced by meaningful local employment, capacity building, economic stimulation, and strengthened environmental governance.

Table 5-4: Impacts, Proposed Mitigation Measures, Management Plans and Responsible Party for the Construction Phase of the project

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
PHYSICAL									
Soil erosion and water pollution of Matura and Salybia Rivers (WTP and Pipeline)	Onsite	High	Site clearing and earthworks resulting in soil disturbance, erosion, and sedimentation into Matura and Salybia Rivers.	Negative	Moderate to High (localised but significant near water courses).	Short-term	- Limit clearing to the designated footprint. - Maintain ≥20–30 m riparian buffer. - Install silt fences, sediment basins, and check dams. - Schedule works for the dry season as best as possible.	Soil Erosion and Drainage Management Plan	WASA, Contractor
Landslide and sedimentation of Salybia River (Pipeline and Salybia intake)	Localized	Moderate	Excavation and grading of slopes to support the Salybia intake resulting in slope instability and increased runoff leading to sediment discharge downstream Salybia River.	Negative	Moderate	Short-term	- Conduct a geotechnical assessment prior to works. - Stabilize exposed slopes with vegetation or bioengineering. - Install temporary drainage diversion.	Soil Erosion and Drainage Management Plan	WASA, Contractor
Blocked roadside drainage (Pipeline)	Localized	High	Pipeline installation (trenching) resulting in localised erosion, sedimentation, and disruption of roadside drainage.	Negative	Moderate	Short-term	- Use trench boxes or shoring. - Avoid trenching during heavy rain. - Backfill and compact promptly. - Reinstate disturbed areas.	Soil Erosion and Drainage Management Plan	WASA, Contractor

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
Air and water pollution (WTP)	On Site	High	Stockpiling and material storage resulting in dust generation, sediment runoff, and contamination from fuel or chemical spills.	Negative	Moderate	Short-term	- Locate stockpiles >50 m from rivers. - Cover fine materials. - Store fuel/chemicals in bunded, impervious areas. - Implement spill response protocols.	Soil Erosion and Drainage Management Plan	WASA, Contractor
Air and noise pollution (WTP and Pipeline)	Localized	High	Operation of construction vehicles and machinery resulting in dust, exhaust emissions, and noise affecting nearby residents and workers.	Negative	Low to Moderate	Short-term	- Maintain equipment regularly. - Wet exposed road surfaces. - Use mufflers and limit night work. - Enforce speed limits with signs.	Soil Erosion and Drainage Management Plan	WASA, Contractor
Land-based pollution and pest proliferation (WTP and Pipeline)	On Site	High	Solid waste generation (construction debris, packaging) resulting in unsightly accumulation, pest attraction, and pollution can occur if improperly disposed.	Negative	Moderate	Short-term	- Segregate, reuse, or recycle where feasible. - Transport to EMA-approved disposal sites. - Maintain waste logs.	Waste Management Plan	WASA, Contractor
Soil and water pollution and health and safety and fire		Moderate	Hazardous waste and chemical use (fuels, lubricants, chlorine, caustic	Negative	Moderate to High	Medium- to long-term if spills occur.	- Bund and label chemical storage. - Maintain MSDS on-site.	Waste Management Plan	WASA, Contractor

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
risks to workers and visitors	On Site		soda) on site during WTP construction can result in soil and water contamination, worker exposure risk, fire hazard.				- Train staff in spill response and HAZMAT handling. - Use secondary containment.	Hazardous materials handling management plan	
Noise and vibration nuisance from (WTP and Pipeline)	Localized	High (localized)	WTP and Pipeline works resulting in noise and vibration nuisance to residents and wildlife; stress to fauna.	Negative	Low to Moderate (treeline buffer may reduce extent of impact)	Short-term	- Restrict noisy activities to daylight hours. - Maintain equipment. - Notify nearby communities before noisy works.	Noise and Vibration Management Plan	WASA, Contractor
Increased surface runoff and drainage alteration localized flood risk	Localized	Moderate	Potential flooding, erosion, and alteration of local hydrology.	Negative	Moderate	Medium-term	- Maintain pre-development drainage patterns. - Construct site drains and retention basins. - Ensure outlets are energy dissipated.	Soil Erosion and Drainage Management Plan	WASA, Contractor
Land and water pollution as well as health and safety risks from decommissioning of old 0.5 IMGD plant	On Site	Moderate	Generation of solid and hazardous waste; risk of chemical release, and worker and community health and safety risks from improper protocol in decommissioning of old WTP	Negative	Moderate	Short-term	- Drain and neutralize residual chemicals. - Dismantle units safely. - Dispose of materials per EMA requirements.	Waste Management Plan	WASA, Contractor

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
Air, noise and traffic nuisance from the transportation of materials and equipment (WTP and Pipeline)	Localized	High	Dust, noise, traffic congestion, road wear, accident risk.	Negative	Low to Moderate	Short-term	- Use approved haul routes. - Cover loads. - Schedule deliveries off-peak. - Install traffic signage.	- Air Quality and Dust Control Plan - Noise and Vibration Management Plan - Traffic and Road Safety Management Plan	WASA, Contractor
ECOLOGICAL									
Loss of vegetation and habitats due to land clearing for plant site and access roads	On Site	High	Localised loss of riparian and natural forest habitat vegetation; habitat fragmentation; soil erosion.	Negative	Low to Moderate (in already disturbed areas; locally significant near rivers and KBAs).	Short- to Medium-term (during construction).	- Restrict clearing to defined footprints. - Maintain ≥20–50 m riparian buffer. - Replant with native species post-construction (where feasible). - Avoid clearing during breeding/nesting seasons.	Biodiversity Management Plan	WASA, Contractor
Long-term land use change	-	Low	Permanent conversion of forested lands for utility usage.	Negative	Low	Long-term	- Limit footprint. - Landscape non-operational areas with native vegetation.	Biodiversity Management plan	WASA, Contractor
Fragmentation of forest patches within KBAs and near	Localized	Moderate	Disruption of natural and critical habitat connectivity	Negative	Moderate	Long-term	- Minimize permanent infrastructure footprint.	Biodiversity management plan	WASA, Contractor

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
Matura National Park ESA boundary			for terrestrial species.				- Maintain vegetated corridors. - Reforest disturbed peripheries with native trees.		
Destruction/removal of riparian vegetation due to intake construction along the river	Localized	High	Disturbance of riparian vegetation; increased sedimentation affecting aquatic species.	Negative	Moderate (due to proximity to watercourses).	Short-term (construction phase).	- Implement erosion and sediment controls (silt fences, traps). - Avoid direct in-stream work. - Conduct works during dry season. - Reinstall riparian vegetation.	Soil erosion and drainage management plan	WASA, Contractor
Disruption of wildlife movement due to pipeline trenching along project routes	Localized	Moderate	Possible disruption of wildlife movement; entrapment of small fauna in open trenches.	Negative	Moderate	Short-term	- Use existing rights-of-way where possible. - Cover open trenches while not actively working. - Progressive reinstatement of vegetation.	Soil erosion and drainage management plan	WASA, Contractor
Disturbance from noise, vibration and lighting on fauna during construction	Localized	High (localised)	Disturbance to wildlife (especially birds, amphibians, and nocturnal mammals). Displacement of birds, reptiles, amphibians and small mammals;	Negative	Moderate	Short-term	- Limit noisy activities to daytime hours. - Use low-intensity, downward-facing lights, as needed. - Prohibit night works near forest edges.	Noise and vibration management plan	WASA, Contractor

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
			loss of nesting or breeding sites.						
Sediment runoff into Matura and Salybia Rivers	At intake and Downstream of project area	High	Elevated turbidity and suspended solids reducing aquatic habitat quality; fish and macroinvertebrate stress.	Negative	Moderate to High (depending on how keenly mitigation measures are adhered)	Short- to Medium-term	- Use silt curtains and sediment traps. - Schedule works for low-flow period. - Implement continuous turbidity monitoring. - Maintain vegetated buffers.	Soil erosion and drainage management plan Water quality management plan	WASA, Contractor
Construction and vegetation removal along the river may cause downstream sedimentation that potential affect coastal ecosystems (e.g. Matura Beach)	Downstream	Moderate	Increased sediment transport may cause increased turbidity from sediment plumes and the river mouth.	Negative	Low to Moderate	Medium- to Long-term	- Implement erosion control upstream. - Regular turbidity monitoring. - Collaborate with local environmental groups for coastal monitoring. - Include emergency spill protocol.	Soil erosion and drainage management plan Water quality management plan	WASA, Contractor
Construction of intake structures along the river may cause loss or alteration of aquatic habitat	Regional	Low	Minor modification of microhabitats; potential fish entrainment.	Negative	Low to Moderate	Long-term	- Design intake with screens (<5 mm mesh). - Position outside main channel. - Maintain environmental flow. - Routine inspection and debris removal.	Biodiversity management plan	WASA, Contractor
Wildlife mortality from vehicle		Moderate	Injury or death of small animals	Negative	Low to Moderate	Short-term	- Cover open trenches daily.	Biodiversity management plan	WASA, Contractor

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
movement and associated project works during construction	Localized		trapped in trenches or hit by vehicles.				- Install escape ramps. - Implement speed limits and wildlife awareness signage.		
SOCIAL									
Road access disruption due to trenching and pipeline installation along Toco Main Road	Localized	High	Temporary closure or restricted access; inconvenience to residents, businesses, schools, and emergency services.	Negative	Moderate-High	Short to medium term	- Implement Traffic Management and Road Safety Plan. - Phased trenching. - Temporary crossings. - Clear signage. - Flag personnel. - Advance community notifications	Traffic Management and Road Safety Plan Stakeholder Engagement Plan	Contractor, WASA, Ministry of Works and Transport of Trinidad and Tobago
Road degradation due to movement of heavy equipment (WTP and Pipeline)	Localized	Medium-High	Accelerated wear of the only access road; safety risks to users	Negative	Moderate	Medium term	- Enforce axle load limits. schedule deliveries strategically. - Use road protection in vulnerable areas. - Ensure road reinstatement.	CESMP Traffic Management and Road Safety Plan	Contractor, WASA, MOWT
Delayed or inadequate road reinstatement after works (Pipeline)	Localized	High	Persistent community dissatisfaction; reduced mobility; political fallout	Negative	High	Medium to long term	- Incorporate road reinstatement requirements in contract - Incremental repair as sections are completed. - Joint supervision with MOWT and Municipal	Road Reinstatement Plan (within CESMP)	WASA, Contractor, MOWT, Municipal Corporation

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
							Corporation regarding road instatement. - Communicate publicly		
Land acquisition and livelihood disturbance (Pipeline)	Localised	High	Potential loss of access to land, disruption of existing land uses or impacts on livelihoods if land users, occupants or informal users are identified during detailed design and due diligence investigations	Negative	High	Long-term	- Confirm land ownership and land requirements prior to construction; undertake land due diligence investigations; identify and consult any affected land users; avoid or minimise impacts where feasible; provide compensation and livelihood restoration assistance where required	Land Acquisition and Livelihood Restoration Plan (LALRP)	WASA
Noise, dust, and vibration from construction activities (WTP and Pipeline)	Localized	Medium	Temporary reduction in quality of life; health impacts on sensitive population groups	Negative	Low-Moderate	Short term	- Dust suppression. - Barriers near sensitive receptors (e.g. schools, health and outreach centres, etc.). - Restricted working hours	CESMP Air quality and dust control management plan	Contractor
Community safety risks (open trenches,	Localized	High	Accidents involving residents, children, pedestrians	Negative	Moderate	Short term	- Secure work sites. - Barriers. - Signage.	HSE Plan; Stakeholder Engagement Plan	Contractor, WASA

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
equipment movement) (Pipeline)							- Lighting at night. - Community sensitisation		
Interruption of water service during tie-ins (Pipeline)	Regional	Medium	Temporary service interruption affecting households and businesses	Negative	Low–Moderate	Short term	- Advance notification. - Provide temporary (truckborne) water supply or schedule works at low-demand periods	Operational Contingency Plan	WASA, Contractor
Limited local employment opportunities and gender imbalance (WTP and Pipeline)	Localized	Medium	Missed opportunities for local hiring; exclusion of women from employment benefits	Mixed	Low–Moderate	Short term	- Encourage local hiring by including local hiring clause in contractor’s contract. - Advertise positions early within local communities. - Work with communities to establish transparent recruitment procedures. - Integrate gender inclusion measures.	Social Management Plan; Labour Management Plan	Contractor, WASA
Institutional coordination gaps between WASA, MOWT and Municipal Corporation (WTP and Pipeline)	On Site	High	Scheduling conflicts, poor communication, community frustration	Negative	High	Medium term	- Establish clear coordination arrangement between WASA, MOWT and SGRC. - Joint scheduling of planned activities.	Stakeholder Engagement Plan	WASA, MOWT, Municipal Corporation

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	EXTENT OF IMPACT	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
Inadequate communication with affected communities (WTP and Pipeline)	Localized	High	Confusion, mistrust, unsafe behaviours, grievances	Negative	Moderate–High	Short to medium term	- Implement community communication plan. - Engage all directly and indirectly affected communities (Matura, Salybia, Sangre Grande fringe). - Use multiple communication channels to advertise - Provide mechanisms to provide feedback and address grievances.	Stakeholder Engagement Plan; Grievance Redress Plan	Contractor, WASA

5.1.2 The Operations Phase

The project is expected to yield substantial and long-term positive environmental, social, and economic outcomes for the communities of Matura, Salybia, Balandra, and the broader Sangre Grande region. Once operational, the system can provide a sustainable, high-quality, and reliable potable water supply, improving living standards, supporting local livelihoods, and strengthening institutional capacity for water resource management in Trinidad and Tobago.

The most direct and significant positive outcome of the operational phase will be the provision of a consistent, high-quality water supply to communities currently affected by intermittent service and inadequate water quality. The new Water Treatment Plant at Matura will enable the treatment and distribution of water to meet both domestic and institutional demand in the region.

Key benefits include:

- Enhanced water reliability, reducing the frequency and duration of supply interruptions.
- Improved potable water quality.
- Reduced reliance on truck-borne water or unsafe private sources, thereby lowering public health risks associated with waterborne diseases.
- Stabilised pressure and volume in the regional distribution network, improving service to downstream consumers.

The operationalization of the WTP will reinforce the institutional capacity of WASA through the application of modern operational standards, automation, and monitoring systems. This will include:

- Adoption of SCADA (Supervisory Control and Data Acquisition) systems for real-time monitoring of water quality and flow;
- Implementation of preventive maintenance programs;
- Enhancement of data-driven management and reporting aligned with IDB Environmental and Social Performance Standards (ESPS); and
- Strengthened staff competence in plant operations, water chemistry, safety, and environmental compliance.

The design and operation of the WTP and transmission system incorporate measures to enhance climate resilience and disaster preparedness. The project is expected to yield indirect but meaningful environmental benefits during operation through better management of water abstraction, reduced leakage, and improved wastewater control. By formalising raw water intake and treatment processes under EMA-regulated standards, the project will:

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)**

- Improve water resource efficiency and reduce uncontrolled abstraction from rivers and aquifers;
- Decrease pollution loading to surface and groundwater systems through regulated discharge and sediment control;
- Support habitat protection within the Matura and Salybia watersheds by reducing informal extraction and unsanitary discharges; and
- Provide baseline data for long-term environmental monitoring and watershed management under the EMA and Forestry Division.

The use of modern treatment technologies and energy-efficient pumping systems can, therefore, ultimately lead to reduced operational costs. Negative project impacts linked to the operation of the WTP are provided in the table below.

Table 5-5: Impacts, Proposed Mitigation Measures, Management Plans and Responsible Party for the Operations Phase of the Project

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
PHYSICAL								
Water pollution and health and safety risks due to improper disposal of backwash and sludge (operation phase)	Moderate	Discharge of high-turbidity effluent; potential contamination of receiving waters.	Negative	Moderate	Long-term (operational)	- Provide lined sludge drying beds. - Prevent direct discharge to rivers. - Dispose of dewatered sludge at EMA-approved site. - Monitor effluent quality.	Waste management plan Water quality management plan	WASA
Health and safety risk and due to Operation of treatment plant (chemical dosing, chlorine storage)	Moderate	Risk of accidental release, air emissions, worker exposure.	Negative	High (safety impact); Moderate (environmental).	Long-term	- Install chlorine scrubbers, alarms, and ventilation. - Maintain emergency shutoff systems. - Conduct routine inspections and training.	Worker health and safety management plan Hazardous materials handling management plan	WASA
Air emissions from standby generators	Low	Localized NOx and particulate emissions; greenhouse gas contribution.	Negative	Low	Long-term (intermittent).	- Maintain equipment; use low-sulphur fuel. - Operate only during outages or testing. - Consider renewable backup options.	Air quality management plan	WASA
Reduction in environmental flow from Water abstraction	Low to Moderate	Reduction of environmental flow, potential stress to aquatic ecosystems.	Negative	Moderate	Long-term	- Install flow meters and maintain minimum environmental flow.	Water quality management plan	WASA

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
(hydrological alteration)						Monitor river levels seasonally.- Adjust abstraction during dry season.	Biodiversity management plan	
Natural hazards (flooding, landslides, earthquakes)	Low (with mitigation)	Physical damage to infrastructure, contamination from overtopping.	Negative	High (if event occurs)	Event-based (episodic)	- Design plant above 1-in-100-year flood level.- Implement slope stabilization and seismic design criteria.- Maintain drainage regularly.	Disaster Risk Management Plan	WASA
Light pollution from night-time operations	Low	Disturbance to fauna and nearby communities.	Negative	Low	Long-term	- Use downward-directed LED fixtures.- Avoid bright white/blue lights near riparian zones.- Motion-activated lighting only.	Biodiversity management plan	WASA
ECOLOGICAL								
Improper disposal of sludge and backwash effluent into the river	Moderate	Discharge of high-turbidity effluent impacting river biota if unmanaged.	Negative	Moderate	Long-term (operational)	- Provide lined settling ponds. - Recycle clarified water where feasible. - Dispose of dried sludge at EMA-approved site. - No direct discharge to rivers.	Water quality management plan Waste management plan Biodiversity management plan	WASA
Alteration of environmental flows	Moderate	Reduced downstream flow affecting aquatic	Negative	Moderate	Long-term (operational)	- Establish environmental flow thresholds.	Water quality management plan	WASA, Contractor

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
from water abstraction		ecosystems and riparian vegetation.				- Install abstraction meters and automated controls. - Adjust intake rates during the dry season.	Biodiversity management plan	
Chemical spills into river systems (chlorine, alum, caustic soda, etc.)	Low to Moderate	Risk of accidental spills contaminating soil and aquatic ecosystems.	Negative	Moderate to High (if incident occurs).	Episodic (accidental).	- Bund chemical storage areas. - Train operators in HAZMAT response. - Maintain spill kits and emergency protocols. - Routine inspection and containment maintenance.	Worker Health and Safety Management Plan Hazardous materials handling management plan	WASA
Water abstraction impacts on river flow and river fauna	Moderate	Continuous abstraction of raw water from the Matura River may reduce downstream flows during low-flow periods, potentially affecting aquatic habitat availability, channel connectivity, water depth, and ecological processes. Reduced flows may also alter sediment transport	Negative	Moderate	Long-term	- Establish environmental flow requirements based on hydrological assessments. - Limit abstraction during drought and low-flow periods. - Install automated flow monitoring systems linked to abstraction controls. - Develop adaptive abstraction protocols based on	Water Resources Management Plan Water Quality Management Plan Biodiversity Management Plan Operational Environmental Monitoring Plan	WASA Operations Team

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
		patterns and water quality characteristics such as dissolved oxygen concentrations and temperature.				seasonal river conditions. - Regularly monitor upstream and downstream flow regimes. - Coordinate with the Water Resources Agency and EMA regarding abstraction thresholds.		
Water abstraction impacts on ecosystem-dependent species	Moderate	Reduced flow volumes may affect habitat suitability for freshwater fish, aquatic macroinvertebrates, amphibians, and riparian-dependent species. Changes in flow regimes may disrupt breeding, migration, feeding, and refuge habitats, particularly during the dry season.	Negative	Moderate	Long-term	- Maintain environmental flows sufficient to support aquatic ecosystem functions. - Conduct periodic ecological monitoring upstream and downstream of the intake. - Adjust abstraction rates if ecological thresholds are exceeded. - Protect riparian vegetation and aquatic habitats. - Implement ecological flow	Biodiversity Management Plan Water Resources Management Plan Ecological Monitoring Programme	WASA Environmental Specialist Forestry Division (oversight)

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
						assessments periodically.		
Fish entrainment at intake structures	Medium	Small fish, fish larvae, eggs, and aquatic organisms may be drawn into intake systems, resulting in mortality and potential impacts on local fish populations. Sensitive life stages are particularly vulnerable during spawning seasons.	Negative	Low to Moderate	Long-term	- Install fine-mesh intake screens designed to international best practice standards. - Maintain low intake velocities (<0.15 m/s where feasible). - Position intake structures away from known spawning and nursery areas. - Conduct routine inspection and maintenance of screening systems. - Monitor fish entrainment rates periodically.	Biodiversity Management Plan Operational Monitoring Plan	WASA Operations Team/Plant Manager
Fish impingement at intake structures	Low	Larger fish and aquatic organisms may become trapped against intake screens, resulting in injury, stress, or mortality. This could affect species diversity in the	Negative	Low	Long-term	- Utilize wedge-wire or passive fish-friendly intake screens. - Maintain low approach velocities. - Conduct routine inspections to remove trapped organisms safely.	Biodiversity Management Plan	WASA Operations Team

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
		immediate vicinity of the intake structure.				- Install bypass systems where feasible. - Monitor impingement incidents and adjust intake operations if necessary.		
Alteration of aquatic habitat conditions downstream of the intake	Low to moderate	Changes in flow, water depth, and velocity may influence habitat availability for aquatic organisms, particularly during dry seasons. Reduced flow may also affect riparian vegetation dependent on natural hydrological conditions.	Negative	Low to Moderate	Long-term	- Maintain environmental flow releases. - Monitor aquatic habitat conditions annually. - Establish ecological trigger thresholds requiring operational review. - Restore riparian vegetation where degradation occurs.	Biodiversity Management Plan Water Resources Management Plan	WASA Environmental Manager
Potential impacts on downstream coastal ecosystems	Low	Significant reductions in freshwater inputs could potentially alter downstream estuarine and coastal ecological processes, including nutrient transport	Negative	Low	Long-term	- Maintain environmental flow requirements. - Monitor downstream salinity and ecological indicators where appropriate. - Periodically review abstraction rates	Biodiversity Management Plan Water Resources Management Plan Environmental Monitoring Programme	WASA Environmental Manager

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
		and salinity regimes affecting nearshore habitats and marine biodiversity. Under normal operating conditions, impacts are expected to be limited due to the relatively small proportion of river flow abstracted.				during drought conditions. - Implement adaptive management if adverse trends are detected.		
SOCIAL								
Improved access to potable water and service reliability	Definite	Improved water supply and scheduling (Matura-Salybia-Balandra/ Rampanalgas) and less diversion from the North Oropouche distribution system). Enhanced household health, hygiene, and quality of life; improved business operations.	Positive	High	Long term	- Ensure operational maintenance and timely service response. - Ongoing public communication	Operations and Maintenance (O&M) Plan Stakeholder Engagement Plan	WASA
Increased climate resilience and water security	Definite	Greater reliability during droughts and extreme weather events.	Positive	High	Long term	- Regular maintenance of climate-adaptive infrastructure.	O&M Plan Climate Resilience Strategy	WASA

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
						- Update emergency response protocols		
Service interruptions due to operational maintenance or system failure	Likely	Temporary loss of water service to households, businesses, schools, and health facilities.	Negative	Moderate	Short term (episodic)	- Provide advance notice for scheduled maintenance. - Establish rapid response protocol. - Ensure redundancy systems	O&M Plan Contingency and Emergency Response Plan	WASA
Inadequate communication on service disruptions	Likely	Frustration, mistrust, and increased grievances from communities.	Negative	Moderate	Short term	- Implement real-time notification system (e.g., WhatsApp, radio, community boards). - Maintain active grievance redress channel.	Stakeholder Engagement Plan Grievance Redress Plan	WASA
Water quality deterioration (e.g., due to inadequate treatment or distribution issues)	Unlikely-Likely (depending on O&M)	Health and safety risks, loss of confidence in utility	Negative	Moderate-High	Medium term	- Continuous water quality monitoring. - Transparent reporting. - Prompt corrective actions.	Water Quality Management Plan O&M Plan	WASA
Unequal access or inconsistent service between communities	Low-Medium	Perception of inequity; community dissatisfaction	Negative	Low-Moderate	Medium to long term	- Maintain equitable supply schedules. - Monitor distribution system performance. - Engage community.	O&M Plan Stakeholder Engagement Plan	WASA

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
Increased utility bills or tariffs (perceived or actual)	Likely	Economic burden on vulnerable households; resistance to changes	Negative	Low-Moderate	Medium to long term	- Advance communication and justification of tariff changes. - Ensure targeted social support or subsidies.	Stakeholder Engagement Plan Customer Relations Protocol	Regulated Industries Commission, WASA
Pressure on road infrastructure from continued operational traffic (e.g., maintenance vehicles)	Low–Medium	Minor road wear, traffic inconvenience	Negative	Low	Long term	Periodic maintenance. Coordinate with Ministry of Works and Municipal Corporation	Road Maintenance Plan	WASA, MOWT, Municipal Corporation
Potential impacts on downstream recreational facility	Lkely	Significant reductions in freshwater inputs could potentially alter downstream recreational site. Under normal operating conditions, impacts are expected to be limited due to the relatively small proportion of river flow abstracted.	Negative	Moderate	Long-term	- Maintain environmental flow requirements. - Stakeholder engagement and management of the recreational facility downstreamt - Periodically review abstraction rates during drought conditions. - Implement adaptive management if adverse trends are detected.	Water Resources Management Plan Environmental Monitoring Programme Stakeholder Engagement Plan	WASA Environmental Manager

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM
PHASE 2 (TT-L1071)
 DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION
 OF A NEW 12 IMGD WATER TREATMENT PLANT AT MATURA, INCLUSIVE OF
 TRANSMISSION PIPELINES (WITH SALYBIA COMPONENT)

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
Strengthened institutional capacity and service efficiency	Likely	Improved operational response, better customer service	Positive	Moderate-High	Long term	Maintain operator training; regular review of operational procedures	Capacity Development Plan O&M Plan	WASA
Community expectations for further service expansion	Likely	Pressure on WASA to extend service beyond project scope	Mixed	Moderate	Long term	Clear communication of service boundaries and future plans. Manage expectations through community engagement.	Stakeholder Engagement Plan	WASA
Improved access to potable water and enhanced reliability	High	Improved health, quality of life, business operations	Positive	High	Long term	Sustain community communication; timely commissioning	O&M Plan	WASA
Increased climate resilience and operational sustainability	High	Strengthened system reliability	Positive	High	Long term	Integrate climate adaptation features	ESMS Implementation Plan	WASA

6 Environmental and Social Management Plan (ESMP)

6.1 Introduction to the ESMP

The Environmental and Social Management Plan (ESMP) outlined in this chapter presents the key guidelines necessary to direct the environmental and social management and occupational health and safety of the Project. This chapter outlines in detail:

- the various environmental and social plans or programs that will comply with the environmental, social and health and safety requirements that are necessary to carry out the activities of the project works, complying with the policies and regulations of both the IDB and the national government,
- institutional obligations and responsibilities for the elaboration and implementation of the required measures,
- a description of the environmental and social monitoring plan in the construction and operation stages of the project, identifying the expected results, the parameters to be measured, the places of measurement, the methods and tools to be used and the periods/frequency in which the measurements will be made, along with the responsible institutions,
- an implementation schedule of each of the proposed measures and defined responsibilities.

6.2 Objectives of the ESMP

The ESMP provides the framework for managing, monitoring, and mitigating all environmental and social risks and impacts associated with the design, construction, operation, and decommissioning of the proposed Matura and Salybia Water Treatment Plant and Transmission Pipeline Project. The ESMP serves as the practical implementation tool of the mitigation measures identified through the Environmental and Social Assessment (ESA) process and ensures full compliance with both national regulatory requirements and the Inter-American Development Bank's Environmental and Social Policy Framework (ESPF).

The primary objectives of the ESMP are to:

1. Translate the ESIA findings into actionable management measures by detailing specific mitigation, monitoring, and enhancement activities for each potential environmental or social risk identified.
2. Ensure compliance with relevant legislation and standards, including the Environmental Management Act (2000), the Certificate of Environmental Clearance (CEC) Rules (2001), and

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

all applicable regulations of the Environmental Management Authority (EMA), as well as the IDB Environmental and Social Performance Standards.

3. Provide an operational framework for environmental and social risk management throughout all phases of the project, ensuring that mitigation commitments are systematically implemented and monitored.
4. Establish clear roles, responsibilities, and accountability mechanisms among the Water and Sewerage Authority (WASA), contractors, supervising engineers, and regulatory agencies, so that all environmental and social aspects are managed consistently and effectively.
5. Facilitate adaptive management and continuous improvement, allowing project managers and decision-makers to revise and strengthen management measures based on ongoing monitoring results, lessons learned, and stakeholder feedback.
6. Promote transparency and stakeholder engagement through proactive communication, disclosure of monitoring outcomes, and inclusion of affected communities and local authorities in the project's environmental and social oversight framework.
7. Ensure the protection of sensitive environmental receptors, particularly the Matura and Salybia Rivers, the adjacent Matura Environmental Sensitive Area (ESA), and downstream habitats, by maintaining ecological integrity and minimizing adverse effects on biodiversity.
8. Maximize social benefits and community well-being, including employment generation, skill development, gender equality, and improvement of public health and water security across the Matura–Salybia region.

6.3 Roles and Responsibilities

6.3.1 Construction Phase

Prior to the start of the works, WASA will conduct the due diligence with the Environmental Management Authority to obtain certificate of environmental clearance (CEC) for the works.

During the Construction Phase, the Contractor Company will be responsible for preparing and implementing the Construction Environmental and Social Management Plan (C-ESMP) of the project, as well as obtaining the environmental and occupational health and safety qualifications and insurances required according to the national and local regulatory framework.

The Contractor will also need to obtain others applicable permits, which could include tree cutting permits for protected trees according to the Protected Trees Act, easements, excavation permits, construction permits, public road occupancy permits, waste disposal permits, permits for works near or in monuments, etc.

Before the start of the works, the Contractor must submit to the EMA, for its approval, a Construction Environmental and Social Management Program (C-ESMP).

The C-ESMP of the project will contain, as a minimum, the programs described in the following Sections of this ESMP.

Once the C-ESMP is approved, the Contractor Company will be responsible for its compliance, using the necessary means to implement the Programs that are formulated within its framework. The Contractor Company must have an environmental and social representative and a person responsible for hygiene and safety, who will be responsible for conducting the implementation of the C-ESMP. Likewise, the contractor must comply with and make the operators and subcontractors comply with all the provisions contained in said Plan, national and local environmental legislation, appropriate construction codes and best practices and the IDB Environmental and Social Policy Framework, during all stages of the execution of the works.

The Contractor Company will prepare monthly reports to the EMA, detailing the actions and results of the C-ESMP implementation.

The inspection, control, and monitoring activities of the C-ESMPc will be conducted by WASA. WASA may conduct inspection visits, prepare reports for internal use for the Project, and determine and impose corrective measures based on the stipulations of the bidding documents.

The environmental authority may also conduct control audits of the work.

At the finalization of the works, the Contractor must submit a Final Environmental and Social Report, which includes the information corresponding to the implementation of C-ESMP, including records of implementation of plans and programs, and a report on compliance with all environmental and social indicators considered at various stages of the project cycle.

6.3.2 Operation and Maintenance

During the operational stage, WASA will be responsible for the operation and maintenance of the infrastructure built under the Program, in accordance with its current environmental policies and environmental and social management systems, including the ESMP for the operational and maintenance stage of each work.

6.3.3 Role of IDB

The IDB will oversee and supervise the implementation of the environmental and social management system for all projects under the Program. This includes the review and approval of the semi-annual environmental and social compliance reports submitted by WASA, as well as conducting environmental and social supervision missions. This is expected to last throughout project implementation.

The Table below summarizes the environmental and social management responsibilities of the entities involved in the different phases of the projects.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Table 6-1: Environmental and Social Responsibilities for Project Intervention

Project Phase	Activity	Responsibility	Monitoring	Oversight
Design	Grievance Redress Mechanism (for the duration of the Program)	WASA		IDB
	Final Project Design / Engineering Design	Independent Contractors	WASA	IDB
	Environmental and Social Assessment	Independent Consultants	WASA	IDB
	Public Consultation	WASA		IDB
	Preparation of E&S Technical Specifications for Bidding Documents	WASA		IDB
	Environmental Permits (when applicable)	WASA		MPU
Construction	ESMPc: Preparation and implementation	Contractors	WASA	IDB
	Environmental and Social compliance during construction	Contractor	WASA	IDB
	Monthly E&S Progress Report	Contractor	WASA	MPU
	Semi-annual E&S Progress Reports	WASA		IDB
	Final E&S Report	Contractor	WASA	MPU
	Final E&S Report	WASA		IDB
Operation	Operation and maintenance of the new installed infrastructure	Each WASA plant	MPU	IDB (initial period of 3 years after work completion)
Decomissioning	Decommissioning of older water treatment plants being replaced will be application to some project interventions. The Decommissioning Plan developed in the ESMP and ESMPc should be implemented.	Contractor	WASA	MPU

6.4 Scope of the ESMP

The ESMP applies to all activities, facilities, and operations associated with the Matura and Salybia Water Treatment Plant and Transmission Pipeline Project, encompassing the construction of a new 12 IMGD water treatment plant, associated raw water and treated water pipelines, intake structures, storage reservoirs, access roads, and ancillary facilities.

Measure	Description	Estimated Cost	Schedule	Responsible
Implementation of Mitigation Measures and Programs of Construction ESMP	Preparation of the ESMP at the construction level and implementation during the construction of the project; environmental and social monitoring of the works	1.5% of the total cost of the project	From beginning of their works until their finalization	Contractor
Implementation of Mitigation Measures of Operational ESMP	Incorporation of mitigation measures for the operational stage within the project activities	Incorporated in WASA operational budget	Throughout the lifecycle of the infrastructure	WSC

Its scope covers the following key thematic areas:

1. Environmental Management – addressing impacts on air quality, noise, water quality, soil, biodiversity, landscape, and waste management through targeted mitigation and monitoring programs.
2. Social Management – encompassing worker hiring practices, labour management, community engagement, health and safety, worker behaviour, gender equity, and grievance handling mechanisms, ensuring that local communities benefit from the project while minimizing social risks.
3. Health and Safety Management – ensuring safe working conditions for all employees and contractors, and safeguarding community health and safety throughout construction and operation.
4. Biodiversity Conservation – protecting sensitive terrestrial, riparian, and aquatic ecosystems, with particular attention to the Matura ESA and Salybia River, and ensuring compliance with

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

IDB ESPS 6 on biodiversity conservation and sustainable management of living natural resources.

5. Pollution Prevention and Resource Efficiency – controlling emissions, discharges, and waste generation, and promoting efficient use of energy, water, and raw materials in line with ESPS 3.
6. Stakeholder Engagement and Grievance Management – ensuring continuous consultation and information disclosure to affected communities and other stakeholders, in accordance with ESPS 10.
7. Climate Resilience and Energy Efficiency – integrating climate adaptation measures, energy-efficient technologies, and resilient design standards to strengthen the long-term sustainability of the project.
8. Monitoring, Reporting, and Adaptive Management – establishing procedures for environmental and social performance tracking, periodic audits, and submission of monitoring reports to the EMA, IDB, and other relevant authorities.

The ESMP also defines the institutional arrangements for its implementation, including the designation of a WASA team to oversee compliance, supported by contracted environmental officers, independent monitoring consultants, and regulatory oversight by the EMA.

Furthermore, the ESMP incorporates a capacity-building component to enhance the technical competence of WASA staff and contractors in implementing the prescribed management plans, ensuring that all environmental and social obligations are effectively fulfilled. The management plans are listed below and show the applicable phases under which each plan will need to be implemented.

Construction Phase

- Water Quality Monitoring/Management Plan
- Air Quality and Dust Control Plan
- Noise and Vibration Management Plan
- Soil Erosion and Drainage Management Plan
- Waste Management Plan (including hazardous materials)
- Hazardous Materials Handling Management Plan
- Biodiversity Management Plan (including aquatic and coastal habitat management; invasive species management)
- Disaster Risk Management Plan
- Emergency Management Plan
- Local Employment and Gender Inclusion Management Plan (LEGIMP)
- Worker Health and Safety Management Plan (OHS and labour management)
- Worker Behaviour and Anti-Harassment Plan
- Community Health and Safety Management Plan

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES**

- Traffic and Road Safety Management Plan
- Stakeholder Engagement Plan
- Grievance Redress Mechanisms (GRMs)
- Land Acquisition and Resettlement Framework
- Livelihood Protection
- Livelihood Restoration
- Cultural Heritage Management (Chance Find Procedures)

Operational Phase

- Water Quality Monitoring/Management Plan
- Waste Management Plan
- Hazardous Materials Handling Plan
- Worker Health and Safety Management Plan
- Stakeholder Engagement Plan
- Grievance Redress Mechanisms (GRMs)
- Disaster Risk Management Plan
- Emergency Management Plan

Decommissioning Phase

- Decommissioning Plan
- Waste Management Plan
- Hazardous Materials Handling Plan
- Worker Health and Safety Management Plan
- Disaster Risk Management Plan
- Emergency Management Plan

6.5 Water Quality Management Plan

The proposed construction and operation of the water treatment plants will involve extensive construction activities. These activities have the potential to adversely affect both source water and treated water quality.

The parameters to be monitored during land preparation and operation to ensure the protection of the aquatic environment will be stipulated by EMA National standards. Full list of standards for ambient water quality of freshwater sources is attached in (Appendix 8). Table 6-2 below is the parameters deemed to have the highest potential to contaminate water sources and deteriorate the quality of treated water.

Table 6-2 Trinidad and Tobago National Ambient Water Quality Standards – Freshwater (EMA)

Parameters (units)	Standard Range
Total Dissolved Solids (mg/L)	≤ 600
pH (pH units)	6.5-8.5
Total Alkalinity	≤ 20
Conductivity (μS)	≤2500
Chloride (mg /L)	≤ 250
Magnesium (mg Mg/L)	3.6 - 27.0
Nitrate (mg NO ₃ /L)	≤ 10
Sodium (mg /L)	≤ 200
Sulphate (mg SO ₄ ²⁻ /L)	3.0 – 10.0
Hardness (mg CaCO ₃ /L)	As Ca: 100-300; As CaCO ₃ : 200-300
Silica (mg SiO ₂ /L)	≤ 80
Turbidity (NTU)	≤ 5
Metals:	
1. Iron (μg/L)	1. ≤300
2. Manganese (mg/L)	2. ≤0.5
3. Lead (μg/L)	3. ≤10
4. Copper (μg/L)	4. ≤1000
5. Zinc (μg/L)	5. ≤5000
6. Cadmium (μg/L)	6. ≤2
7. Arsenic (μg/L)	7. ≤10
8. Mercury (μg/L)	8. ≤1

6.5.1 Monitoring Equipment, Stations, and Frequency

Monitoring should be carried out by an entity approved for regulatory sampling and testing. The recommended guidelines are as follows:

- One random monthly sampling is done each month for the first year of the project.
 - After the first 2-3 months of sampling, general trends can be deduced and mitigative measures implemented for outlying parameters.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Following the 12 months of sampling, trends will be deduced and dictate measures to be taken.
- If parameters are in line with the range of standards, testing can be reduced to being done at quarterly intervals to ensure that parameters stay in check,
- For constantly outlying parameters, testing must be continued monthly along with the mitigative measures.
 - Intermediary physical tests should also be done to fully grasp the state of the water quality in the project area.
- Once parameters are determined to be non-compliant with the regulatory stipulations or process requirements, corrective actions should be taken to bring the parameters back into compliance. Investigations into the cause(s) of the non-compliance should be done as soon as possible once results are obtained to ensure swift and adequate corrective measures are implemented.

6.5.2 Management Measures

Water Pollution Prevention

- Include environmental clauses in all contractor agreements to hold them accountable for spills and contamination.
- Store fuel, lubricants, and chemicals in bunded containment areas at least 50 m from watercourses.
- Prohibit direct discharge of wastewater or stormwater into rivers.
- Provide spill kits and train personnel in spill response procedures.
- Maintain stormwater drains and sediment control devices throughout construction.
- Conduct regular inspections during rainfall events to ensure effectiveness of erosion control measures.

6.5.3 Monitoring and Compliance

Water quality monitoring will comply with the Environmental Management (Water Pollution) Rules, 2019, and IDB Environmental and Social Performance Standard 3 (Resource Efficiency and Pollution Prevention).

As the project abstracts and treats raw water from the Matura and Salybia Rivers, special emphasis will be placed on maintaining water quality during construction (to prevent sedimentation and contamination) and operation (to ensure sustainable intake quality).

Monitoring Frequency

Monitoring will be conducted by the Contractor, supported by a qualified environmental specialist and supervised by WASA.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Pre-construction: Establish baseline parameters for turbidity, total suspended solids (TSS), pH, conductivity, and dissolved oxygen (DO).
- Construction: Weekly monitoring at river intakes and downstream points (or in accordance with frequency stipulated by the EMA).
- Operation Phase: Quarterly sampling for raw and treated water to verify ongoing water quality (or in accordance with frequency stipulated by the EMA).

6.5.4 Indicators

The following KPIs have been selected in order to evaluate the effectiveness of the water quality management program.

Table 6-3 Key Performance Indicators (KPI) for Water Quality Management

Key Performance Indicators	How Will It Be Monitored and Measured	Responsibility
Sediment traps installed and maintained	Site inspections and photographs	Contractor / EHS Officer
Work halted during heavy rainfall	Logbook entries and supervisor reports	Contractor
Turbidity and TSS levels within limits	Certified laboratory test results	Contractor / WASA
Spill containment maintained	Inspection records	EHS Officer
Riverbank vegetation restored	Field verification	Contractor/ WASA

6.5.5 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that the management and mitigation measures for water quality are clearly understood by all workers and that they are carried out and relevant monitoring reports are prepared.

WASA is responsible for monitoring the contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced.

6.6 Air Quality and Dust Control Plan

The Air Quality and Dust Control Management Plan (AQDCMP) provide a structured framework to prevent, monitor, and mitigate adverse impacts on ambient air quality resulting from construction and operational activities associated with the Matura Water Treatment Plant Project. The plan emphasizes proactive measures to minimize fugitive dust emissions, equipment exhaust, and particulate matter dispersion that could affect nearby communities and sensitive ecological receptors.

The plan seeks to:

1. Protect ambient air quality within and surrounding the Salybia and Matura areas, ensuring that emissions from construction and operation remain within acceptable limits established under the Environmental Management (Air Pollution Control) Rules, 2014 and the World Health Organization (WHO) Air Quality Guidelines (2021).
2. Prevent nuisance dust and particulate pollution from construction activities such as excavation, hauling, stockpiling, and material handling through effective site management and dust suppression techniques. These may include:
 - ✓ Routine wetting, mainly during active construction
 - ✓ Chemical Suppressants for long term or high traffic areas
 - ✓ Physical barriers including dust screens, fences or vegetative buffers
 - ✓ Coverage of loose materials
3. Control exhaust emissions from generators, vehicles, and heavy machinery through routine maintenance, use of compliant equipment, and restriction of unnecessary idling.
4. Safeguard worker health and community well-being by implementing appropriate personal protective equipment (PPE) requirements and maintaining safe air quality levels at work zones and receptor sites.
5. Establish a monitoring and reporting framework to measure particulate matter (PM₁₀, PM_{2.5}, and TSP) levels and evaluate the effectiveness of mitigation measures, allowing for adaptive management and continuous improvement in environmental performance.

6.6.1 Monitoring Equipment, Stations, and Frequency

Monitoring should be carried out by an entity approved for regulatory sampling and testing. The recommended guidelines are as follows:

1. One random monthly sampling is done each month for the first year of the project.
 - ✓ After the first 2-3 months of sampling, general trends can be deduced and mitigative measures implemented for outlying parameters.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- ✓ Following the 12 months of sampling, trends will be deduced and dictate measures to be taken.
- 2. If parameters are in line with the range of standards, testing can be reduced to being done at quarterly intervals to ensure that parameters stay in check.

6.6.2 Management Measures

In addition to the monitoring procedures, the Contractor will ensure that these measures are followed:

General measures

- Effective implementation, monitoring and enforcement of any guidelines or action provided by the Environmental Management Authority (EMA)
- Record complaints and relevant responses

Fugitive dust control measures

- Cover haulage vehicles transporting aggregate, soil and cement.
- Cover and/or wet onsite stockpiles of aggregate, soil etc., especially during windy and dry conditions
- Locate sources of dust away from sensitive receptors
- Ensure proper stock piling/storage and disposal of solid waste.
- Wet cleared land areas regularly
- Wet dust suppression methods on unsealed roads must be implemented to prevent generation of nuisance dust.
- Provide workers with the necessary PPE e.g. dust masks, and ensure that they are worn correctly
- There must be strict speed limits on dust roads to prevent dust entrainment into the atmosphere.
- Restrict the dropping of material from height during loading and unloading.
- Revegetate cleared areas immediately following construction to prevent loose soil from being blown away.

Emissions control measures

- Use low-emission machinery and maintain all equipment regularly.
- Prohibit unnecessary idling of vehicles and generators.
- Ensure all generators, compressors, and construction vehicles meet manufacturer emissions standards.
- Implement strict maintenance logs for heavy equipment.

6.6.3 Monitoring and Compliance

Ambient air quality monitoring will be conducted in accordance with the World Health Organization (WHO) Guidelines for Air Quality (2021) and the Environmental Management (Air Pollution Control) Rules, 2014 under the Environmental Management Act of Trinidad and Tobago.

Baseline data will be obtained from the nearest EMA monitoring stations and verified by project-specific baseline sampling prior to construction. Parameters will include PM_{10} , $PM_{2.5}$, and Total Suspended Particulates (TSP), which are of particular concern during site preparation, earthworks, and construction.

Table 6-4 WHO and EMA Ambient Air Quality Guidelines for $PM_{2.5}$ and PM_{10}

Parameter	Averaging Time	WHO 2021 ($\mu\text{g}/\text{m}^3$)	EMA Standards ($\mu\text{g}/\text{m}^3$)
$PM_{2.5}$	24-hour mean	15	65
$PM_{2.5}$	Annual mean	5	15
PM_{10}	24-hour mean	45	75
PM_{10}	Annual mean	15	50

6.6.4 Indicators

A The following KPIs have been selected to evaluate the effectiveness of the air quality monitoring system.

Table 6-5 Key Performance Indicators (KPI) for Air Quality and Dust Management

Key Performance Indicators	How Will It Be Monitored and Measured	Responsibility
Equipment maintenance logs updated	Review of maintenance documentation	Contractor / EHS Officer
Stakeholder notifications and complaints addressed	Review of stakeholder communications	Contractor / WASA
Air quality parameters within WHO/EMA limits	Review of lab certificates	Contractor
Frequency of dust suppression (wetting)	Site logs	Contractor
Worker PPE usage compliance	Site inspection reports	EHS Officer

6.6.5 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an Environmental Health and Safety (EHS) Manager is employed to oversee the specific requirements of this plan.

WASA is responsible for monitoring the contractor to ensure that monitoring is being undertaken and mitigation measures are being enforced.

6.7 Noise and Vibration Management Plan

The Noise and Vibration Management Plan (NVMP) establish a systematic approach to identify, monitor, and mitigate noise and vibration impacts associated with the construction and operational phases of the Matura Water Treatment Plant Project. The plan aims to ensure that project activities are conducted in a manner that protects community health, worker safety, and the integrity of nearby structures and ecosystems.

The plan seeks to:

1. Ensure compliance with the Environmental Management (Noise Pollution Control) Rules, 2001 and relevant World Health Organization (WHO) Environmental Noise Guidelines, maintaining noise and vibration levels within acceptable limits for residential and environmentally sensitive areas.
2. Minimize noise and vibration emissions from construction equipment, vehicle movement, and material handling using low-noise machinery, proper equipment maintenance, and scheduling of high-noise activities during daytime hours.
3. Prevent nuisance and health effects on nearby communities, workers, and wildlife in the Matura and Salybia region by maintaining effective buffer zones and implementing temporary barriers or enclosures where appropriate.
4. Monitor and evaluate noise and vibration levels at key receptor sites to ensure adherence to regulatory thresholds and facilitate adaptive management when exceedances are detected.
5. Promote awareness and accountability among construction personnel and contractors through training on noise mitigation procedures and community engagement to address complaints promptly and effectively.

6.7.1 Management Measures

In addition to the monitoring procedures, the Contractor will ensure the following noise reduction options are implemented where necessary:

- Provide workers with the necessary PPE (e.g., noise-cancelling headphones) and ensure that they are worn. Specialised hearing protection tailored to filter high-frequency sounds typical of electrical systems is also recommended.
- Consult with and sensitise residents in the area to the types of activities that will take place ahead of the works and assign a liaison person (recommend that a Community Liaison Officer be hired) with whom the residents can relate.
- Maintain all equipment in proper working order to avoid excessive noise generation and the simultaneous use of multiple noisy machines in proximity to each other.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- If noise complaints are received from residents, consider installing partial screening around the noisiest activities and/or mufflers on noisy equipment. In case of complaints, they should be recorded, and appropriate action should be taken via the Grievance Redress Mechanism.
- Limit the implementation of noisy work simultaneously. As well, limit noisy activities to daytime hours, adhering to local noise ordinances.
- Implement a rotating roster of personnel who are employed for noisy work – rotate workers involved in noisy activities to minimise fatigue-related errors and prolonged exposure.
- Work around key events, peak usage times, or high-traffic periods (e.g., avoid work during school hours in educational buildings or peak visiting hours in public offices and health centres). Prioritise performing the noisiest tasks during times when targeted public buildings are unoccupied, such as evenings, weekends, or holidays.
- Train workers on the importance of minimising noise during construction. This includes proper equipment use, the scheduling of noisy activities, and following best practices for equipment maintenance.

6.7.2 Monitoring and Compliance

The ambient noise standards in Trinidad and Tobago are regulated by the Noise Pollution Control Rules, 2001 (as amended) and enforced by the Environmental Management Authority (EMA). The standards vary zonally and are displayed in the table below:

Table 6-6 Noise Standards as outlined by the Noise Pollution Control Rules, 2001 (As amended)

Zone Category	Time Period	Equivalent Continuous Sound Pressure Level (dBA)	Instantaneous Unweighted Peak Sound Pressure Level (dB peak)
Industrial Zone (Zone I)	Any time	75 dBA	130 dB
Environmentally Sensitive Areas (Zone II)	Daytime	Max 60 dBA, or 3 dBA above background level	120 dB
Environmentally Sensitive Areas (Zone II)	Nighttime	Max 60 dBA, or 3 dBA above background level	115 dB
General Area (Zone III)	Daytime (8AM-8PM)	Max 80 dBA, or 5 dBA above background level	120 dB
General Area (Zone III)	Nighttime (8PM-8AM)	Max 65 dBA, or 3 dBA above background level	115 dB

6.7.3 Indicators

The following KPIs have been selected to evaluate the effectiveness of the noise monitoring system.

Table 6-7 Key Performance Indicators for Noise Management

KEY PERFORMANCE INDICATORS	HOW WILL IT BE MONITORED AND MEASURED	FREQUENCY	RESPONSIBILITY
Notice given to stakeholders in advance of scheduled works	Review and inspection of documentation	Twice per month or as stipulated by the EMA	WASA and/or Contractor;
Noise parameters within EMA standards	Results Certificate provided by EMA and the staff member responsible for EHS		Results to be presented by the EHS Officer to the WASA Technical Leads for the Project and the EMA
Log of complaints	Review and inspection of documentation		
Use of personal protective equipment gear (specialised hearing protection included)	Review and inspection of documentation		

6.7.4 Roles and Responsibilities

It is the responsibility of WASA and all contractors and subcontractors to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an Environmental Health and Safety (EHS) Officer is employed to oversee the specific requirements of this plan.

WASA is responsible for ensuring the contractor understands the importance of monitoring and will support them in undertaking this task as often as is required and for implementing the mitigation measures necessary. The site and the surrounding environment will be monitored, and negative impacts caused by the construction works will be recorded. This should be included in the contract arrangements.

The sampled noise data will be compared to the standards outlined in (Table 6-6) as well as the baseline data, and the analysis will be included in the environmental monitoring report prepared and submitted to the EMA. If there are any exceedances, this will be reported immediately to the EHS Officer to allow for the implementation of corrective measures or adjustments in management strategies based on the results and, where practicable, to the operations.

6.8 Soil Erosion and Drainage Management Plan

The Stormwater and Drainage Management Plan (SDMP) provide a structured framework for managing surface runoff, minimizing flood risk, and preventing erosion or sedimentation impacts throughout all phases of the Matura Water Treatment Plant Project. The plan outlines strategies to maintain natural drainage patterns, reduce stormwater contamination, and enhance the site's climate resilience in accordance with national standards and IDB environmental safeguard requirements.

The plan seeks to:

1. Prevent flooding and uncontrolled runoff within and downstream of the Matura and Salybia catchments by implementing engineered drainage systems, retention basins, and permeable surfaces that support effective water management during high-intensity rainfall events.
2. Protect water quality and sensitive ecosystems by preventing sediment, debris, and contaminants from entering the Matura and Salybia Rivers, which serve as critical water supply sources and support ecologically sensitive habitats.
3. Ensure compliance with the Environmental Management (Water Pollution) Rules, 2019, the Drainage Policy for Trinidad and Tobago, and best practices for stormwater design and flood mitigation recommended by the Ministry of Works and Transport, Drainage Division.
4. Incorporate climate-resilient design features that account for projected increases in rainfall intensity and sea level rise, ensuring the long-term performance of drainage infrastructure under changing climatic conditions.
5. Establish a monitoring and maintenance regime for stormwater control structures, including culverts, drains, and sediment traps, to ensure continued functionality and to allow for timely corrective action during the project's operational phase.

6.8.1 Management Measures

The Contractor will ensure that these measures are followed:

- Minimise the Project activities' disturbance area. Demarcate the boundaries within which Project activities will occur. All activities will strictly occur within the designated work zone, ensuring that the work scope is confined to this specific area.
- Restrict vehicular movements to designated roads and trails to reduce the possibility of off-road incidents with residents, golf carts or bicycles.
- Constant monitoring and inspection of sites is necessary to assess the effectiveness of sediment control mechanisms implemented.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Minimise vegetation removal to reduce disturbance to the soil (and sensitive wetland/mangrove environment) and maintain natural water infiltration rates. Maintain buffer strips of native vegetation along drainage channels to filter runoff and stabilise soil.
- Keep construction activities and equipment away from water channels and flow paths. If impossible, create temporary channels to redirect water around the zone of works while maintaining the natural flow direction.
- Limit the area of exposed soil by working on small sections at a time, allowing for immediate stabilisation post-completion.
- Avoid the excessive compaction of soil, which can reduce permeability and alter runoff patterns. Soil compaction is contributed to by construction activities that include:
 - The repeated trips of construction equipment over the soil
 - Soil excavation
 - Soil mixing
 - The use of heavy machinery on wet soil

6.8.2 Monitoring and Compliance

Daily inspections of the work site will be conducted by WASA and contractors. Sediment controls will be assessed during site inspections and following significant rainfall events (defined as more than 10mm of rainfall within 24 hours, leading to site runoff), or as stipulated by the EMA. The assessment will also encompass the removal of any accumulated sediments as needed. This is especially important, given the nature of the limestone substrate within the project area and the extensive impact this can have on nearby coastal and marine environments.

6.8.3 Indicators

The following KPIs have been selected to evaluate the effectiveness of the erosion control management systems.

Table 6-8 Key Performance Indicators for Erosion Control Management

KEY PERFORMANCE INDICATOR	HOW WILL IT BE MONITORED AND MEASURED	FREQUENCY	RESPONSIBILITY
Absence of Substantial Sediment Deposition in waterways and marine environment	Site Inspection	Daily	WASA and/or Contractor; Results to be presented to the EMA

6.8.4 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an Environmental Health and Safety (EHS) Officer is employed to oversee the specific requirements of this plan.

WASA is responsible for assigning the contractor as the responsible party for undertaking the monitoring required and for implementing the mitigation measures necessary. The site and surrounding environment will be monitored by the contractor for negative impacts caused by the construction Works.

DRAFT

6.9 Waste Management Plan (incl. Hazardous Materials)

The Waste Management Plan (WMP) provides a systematic framework for the proper handling, segregation, storage, transportation, treatment, and disposal of all waste streams generated during the construction and operation phases of the project.

The main purpose of the plan is to prevent environmental contamination and safeguard human health by ensuring that all waste is managed responsibly, in full compliance with EMA regulations and IDB environmental safeguards.

Objectives

1. Identify and categorize all waste streams likely to be generated during construction and operation (solid, liquid, hazardous, and non-hazardous).
2. Prevent and minimize waste generation through design optimization, reuse, and recycling where feasible.
3. Ensure safe handling and storage of all waste materials, preventing leaching, spills, or unauthorized dumping.
4. Establish waste segregation protocols for recyclable, reusable, and disposable materials.
5. Ensure compliance with the EMA Waste Management Rules and all applicable CEC conditions.
6. Promote resource efficiency and environmental awareness among workers and contractors.
7. Provide monitoring and reporting mechanisms to track waste generation, movement, and disposal.

Waste streams expected during project implementation include:

- Non-hazardous solid waste: Construction debris (concrete, wood, packaging, scrap metal), domestic waste, paper, plastics.
- Hazardous waste: Used oil, lubricants, fuel-contaminated materials, paint cans, chemical containers, oily rags, and spent filters.
- Liquid waste: Concrete wash water, wastewater from site sanitation facilities, process backwash water (during operation).
- Biological waste: Organic matter from cleared vegetation.

Waste Hierarchy Approach

The project shall apply the internationally accepted waste management hierarchy in order of priority:

1. Avoid / Minimize: Reduce waste generation at the source through efficient material use.
2. Reuse: Recover and reuse materials such as timber or metal parts.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

3. Recycle: Segregate recyclable materials (metal, paper, plastic) for collection by approved recycling entities.
4. Recover: Utilize organic waste for composting where feasible.
5. Dispose: Safely dispose of non-recyclable, non-recoverable waste at EMA-approved facilities.

6.9.1 Management Measures

SEGREGATION AND STORAGE

- Provide clearly labelled bins for each waste category.
- Locate waste collection areas away from drains, watercourses, and sensitive habitats.
- Store hazardous waste in impermeable, bunded, and ventilated containment areas with spill containment.
- Maintain an up-to-date Waste Register detailing quantities, categories, and disposal destinations.
- Inspect storage areas weekly for integrity and cleanliness.

TRANSPORTATION AND DISPOSAL

- Only EMA-licensed waste haulers shall be used for transporting waste offsite.
- All hazardous waste must be accompanied by a Waste Tracking Manifest, signed at each transfer stage.
- Non-hazardous solid waste shall be sent to the Forres Park Landfill or other EMA-approved disposal facility.
- Hazardous waste (e.g., used oil, chemicals) shall be disposed of through certified waste treatment or recovery companies (e.g., SWMCOL or other licensed operators).
- Maintain receipts and manifests for verification during audits.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMDG SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

6.9.2 Indicators

The following KPIs have been selected to evaluate the effectiveness of the waste management measures.

Table 6-9: Key Performance Indicators for Waste Management

INDICATOR	TARGET / PERFORMANCE STANDARD	FREQUENCY	MEANS OF VERIFICATION	RESPONSIBLE PARTY
NO CONSTRUCTION WASTE DEPOSITED IN THE ENVIRONMENT	0	Daily	Site Inspection	Contractor / WASA
VOLUME OF HAZARDOUS WASTE DISPOSED VIA LICENSED HAULER	100% compliance	Per event	EMA permits and disposal receipts	WASA Environmental Unit
NUMBER OF WASTE-RELATED INCIDENTS (SPILLS, ILLEGAL DUMPING, LEAKS)	0	Ongoing	Incident logs	Contractor / WASA

6.9.3 Roles and Responsibilities

It is the responsibility of the WASA and all contractors to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an Environmental Health and Safety (EHS) Officer is employed to oversee the specific requirements of this plan.

WASA is responsible for assigning contractors as the responsible parties for undertaking the monitoring required and for implementing the mitigation measures necessary. The Site and surrounding environment will be monitored by WASA and contractors for negative impacts caused by the construction works.

Table 6-10: Roles and Responsibilities for Waste Management

ENTITY / ROLE	KEY RESPONSIBILITIES
WASA ENVIRONMENTAL UNIT	Oversee implementation of the WMP; ensure compliance with EMA and IDB requirements; review monthly waste reports; liaise with EMA.
CONTRACTOR / HSE OFFICER	Implement waste management measures onsite; maintain segregation and storage; prepare monthly waste tracking reports; ensure worker training.
WASA ON-SITE OPERATORS (OPERATIONAL PHASE)	Manage sludge, residuals, and backwash waste during WTP operation; maintain effluent and sludge disposal records.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

EMA (REGULATORY AUTHORITY)	Review waste management documentation; issue permits and conduct site inspections; enforce compliance under Waste Management Rules.
WASTE HAULING CONTRACTORS (LICENSED)	Transport waste safely to approved facilities; maintain manifest records; ensure vehicles are labelled and spill-proof.
WORKERS AND SUBCONTRACTORS	Comply with waste segregation, labelling, and disposal procedures; immediately report any spills or improper disposal.

DRAFT

6.10 Hazardous Materials Handling Management Plan

The WASA personnel responsible for the water treatment plant is primarily responsible for the handling, storage and disposal of hazardous materials.

The IDB Guidelines for Community Health, Safety and Security (ESPS 4) outlines that hazardous materials and substances may include: explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material; corrosive substances; chemical fertilizers; soil amendments; chemicals, oils, and other hydrocarbons; paints; pesticides; herbicides; fungicides; asbestos; hospital and pharmaceutical waste; used batteries; radioactive medical waste; some types of fluorescent light bulbs and ballasts; and polychlorinated biphenyls (PCBs) in electrical equipment, among others. These all present a risk to human health, community, and the environment due to their physical, chemical, or biological characteristics. The best way to mitigate against the effects of hazardous waste is to refrain from the use of hazardous materials.

6.10.1 Monitoring Frequency

In the anticipation that the monitoring of hazardous materials handling, storage and disposal should be done weekly to ensure that all measures are being implemented and followed.

6.10.2 Management and Mitigation Measures

The Contractor will ensure that every effort is made to abide by the following mitigation measures during construction or operations in order to lessen the potential negative effects of inappropriate handling of hazardous materials:

Spill Prevention and Hazardous Waste Management

- Environmental conditions must be included in any construction contracts, thereby making contractors accountable for preventing accidental spillages
- Effective implementation, monitoring and enforcement of National Environmental Policy, and the National Pollution Rules and action by the Environmental Authority
- Conduct preventive maintenance for vehicles and machinery to ensure integrity and reliability and reduce/avoid leaks
- Conduct any on site repairs on impervious surfaces.
- Ensure proper handling, use and storage of all chemical and hazardous waste according to best practices:
 - Safety Data Sheets) ought to be kept on site. In case of an accident on site, there should be first aid supplies on hand and clear signage with the emergency numbers of nearby medical centres
 - Provide spill containment and cleanup equipment on site
 - Personnel handling chemicals and hazardous substances must be trained in the use of spill prevention measures
 - Personnel handling chemicals and hazardous substance including chlorine and heavy fuel oils must be trained in the correct use of the appropriate Personal Protective Equipment (PPE)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Utilise the proper dispensing equipment
- Storage areas must be well marked with appropriate signage.
- All hazardous substances must be stored on an impervious surface in a designated bunded area, able to contain 110 % of the total volume of materials stored at any given time.
- Fuel and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. There shall be no storage fuel on the project site. Fuel must be brought to the project site each day that Work is performed.
- Clean up any spills (including existing spills) immediately, through containment and removal of product and appropriate rehabilitation or disposal of contaminated soils
- All hazardous waste must be disposed of at a registered hazardous waste disposal facility, which is under the Trinidad and Tobago Solid Waste Management Company (SWMCOL) or stored in designated, lined and bunded areas as approved by the Environmental Management Authority
- Handling and disposal of hazardous waste is only conducted by trained personnel wearing the correct PPE
- Any spilling incidents must be reported as soon as possible
- Chlorine is a corrosive that is irritating to the eyes and to the respiratory system. Storage of chlorine away from heat and in a well ventilated area. Personnel handling chlorine should wear the appropriate PPE including hazardous resistant gloves, sleeved clothing to protect from skin irritation. Respirators would be needed if handling for long periods and in an area that is not well ventilated.

6.10.3 Key Performance Indicators

The following Key Performance Indicators (KPIs) have been selected in order to evaluate the effectiveness of the hazardous materials handling.

Table 6-11: Key Performance Indicators for Hazardous Materials Handling

KEY PERFORMANCE INDICATOR	HOW WILL IT BE MONITORED AND MEASURED	RESPONSIBILITY	FREQUENCY
No leakages or spills	Monitor possible spills Inspection of site by Contractor	Contractor; Results to be presented to the Implementing Agency	Twice per month
Incident Logs	Reporting of all incidents associated	WASA personnel	

with hazardous
materials

6.10.4 Roles and Responsibilities

It is the responsibility of the Contractor to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an Environmental Health and Safety (EHS) Manager is employed to oversee the specific requirements of this plan.

The Implementing Agency is responsible for assigning the ENGINEER as the responsible parties for undertaking the monitoring required and for implementing the mitigation measures necessary.

6.10.5 Data Analysis and Reporting

If there are any exceedances, this will be reported immediately to the EHS Manager to allow for management strategies to be changed according to the results.

6.11 Biodiversity Management Plan

The Biodiversity Management Plan provides the framework for conserving and managing the ecological integrity of the project area and surrounding environs during the design, construction, and operation of the project.

The primary objectives of the plan are to:

1. Protect terrestrial, aquatic, and riparian habitats within and adjacent to the Matura and Salybia Rivers, including areas linked to the Matura Environmental Sensitive Area (ESA).
2. Prevent or minimise direct and indirect biodiversity impacts arising from vegetation clearance, noise, lighting, sedimentation, and chemical contamination.
3. Maintain ecological connectivity by ensuring riparian buffers and wildlife corridors remain intact (where feasible) and functional.
4. Enhance environmental awareness among project staff and local communities to promote stewardship and sustainable coexistence.
5. Comply with national environmental laws and international biodiversity conservation principles, including EMA CEC conditions, the Convention on Biological Diversity (CBD), and IDB ESPS 6, particularly for conducting critical habitat assessment in identified KBAs that intersect with the project area and development of a Biodiversity Action Plan.

6.11.1 Management Measures

- Integrate biodiversity protection clauses in all construction contracts and site environmental procedures.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Review the results of pre-construction ecological surveys along proposed pipeline routes, particularly the location of sensitive habitats, fauna nesting sites, and a list of rare species within the footprint.
- Clearly demarcate no-go areas (e.g., avoidable riparian zones that are intact, pristine forest patches) prior to mobilisation.
- Limit clearing strictly to the approved project footprint and use existing access routes where possible (e.g., T&TEC utility corridor, roadways).
- Prohibit collection, hunting, or disturbance of wildlife by any project personnel.
- Schedule high-noise activities during daylight hours only and as best as possible outside sensitive breeding seasons (March–July).
- Biodiversity awareness training prior to commencing work for all workers. Training shall include identification of sensitive habitats and protected species, vegetation clearing restrictions, wildlife encounter procedures, aquatic ecosystem protection measures, prohibited activities (e.g., hunting, fishing, collection of flora and fauna), and biodiversity incident reporting requirements. Refresher training shall be conducted at least annually and prior to activities with elevated biodiversity risks.

Terrestrial Habitat Management

- Retain and mark vegetation buffers (minimum 20–50 m) along the Matura and Salybia Rivers.
- Preserve mature trees (>25cm DBH) where feasible, especially those offering nesting or shade functions.
- Identification and protection of large, mature, or protected trees.

Riparian and Aquatic Habitat Protection

- Maintain riparian vegetation continuity and stabilise banks using suitable bioengineering methods.
- Prohibit machinery access within 10 m of watercourses unless explicitly authorised and controlled.
- Conduct in-stream works during low-flow (dry) season and use silt curtains or cofferdams where necessary.
- Install sediment traps and turbidity curtains downstream of construction zones.
- Regularly monitor turbidity, dissolved oxygen, and TSS upstream and downstream of work sites.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Establishment of environmental flow requirements.
- Monitoring of abstraction volumes for the WTP.
- Screening of intake structures to prevent fish entrainment.
- Avoidance of in-stream works during sensitive breeding or migration periods.

Faunal Protection Measures

- Restrict clearing and noisy works during bird and reptile breeding seasons.
- Use downward-directed lighting and low-wattage LEDs to minimize light spill if used.
- Cover all open trenches at the end of each workday and install escape ramps for small animals.
- Ensure waste is securely stored to prevent attraction of wildlife.

Invasive Species Control

- Inspect all fill and topsoil sources for invasive species.
- Clean all construction equipment and vehicles before entering the site.
- Conduct quarterly monitoring for invasive species colonization and implement manual or mechanical removal if detected

Post-Construction Habitat Restoration

- Restore disturbed areas using native ground cover and native species.
- Conduct survival assessments at 3, 6, and 12 months post-planting.
- Replace any non-surviving plants to maintain target density.
- Engage local environmental NGOs and other groups in replanting and post-restoration monitoring.

6.11.2 Monitoring and Compliance

Biodiversity and habitat monitoring is designed to ensure that the mitigation and management measures outlined in the BHMP are effectively implemented and that they achieve their intended objectives. Monitoring provides the evidence base for adaptive management, allowing for corrective action if unforeseen impacts occur, and demonstrating regulatory compliance with the EMA's Certificate of Environmental Clearance (CEC) conditions and IDB safeguard requirements.

Monitoring is an ongoing process that evaluates:

1. The effectiveness of biodiversity conservation and habitat protection measures;

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

2. The recovery and stability of rehabilitated habitats;
3. The status and health of key flora and fauna populations; and
4. Compliance with national environmental regulations and international biodiversity protection obligations.

6.11.3 Indicators

The following KPIs have been selected to evaluate the effectiveness of the noise monitoring system.

Table 6-12: Key Performance Indicators for Biodiversity and Habitat Management

INDICATOR	TARGET / PERFORMANCE STANDARD	FREQUENCY	MEANS OF VERIFICATION	RESPONSIBLE PARTY
RIPARIAN VEGETATION COVER (%)	≥90% baseline maintained	Quarterly	Biodiversity Monitoring Report	WASA Env. Officer (via Independent Ecologist)
TURBIDITY AND TSS	≤10% above baseline	Weekly (construction)	Water Quality Report	WASA Env. Officer (via Independent Lab)
PRESENCE OF PROTECTED SPECIES	No disturbance incidents	Biannual	Biodiversity Monitoring Report	WASA Env. Officer (via Independent Ecologist)
FAUNA SIGHTINGS OR MORTALITY	0 mortality due to works	Weekly (construction)	Biodiversity Monitoring Report	Contractor / WASA
REPLANTED VEGETATION SURVIVAL (%)	≥80% survival rate	3, 6, and 12 months post-planting	Biodiversity Monitoring Report	Forestry Division/WASA
INVASIVE SPECIES PRESENCE	0 new invasive species established	Quarterly	Biodiversity Monitoring Report	WASA Env. Officer (via Independent Ecologist)
DOWNSTREAM SEDIMENTATION	No significant increase in fine sediment	Weekly	Water Quality Report	WASA Env. Officer (via Independent Lab)

6.11.4 Roles and Responsibilities

It is the responsibility of WASA and all contractors to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor hired should be supported by the WASA Environmental Officer to oversee the specific requirements of this plan.

Any contractor assigned by the WASA assumes joint responsibility of undertaking the monitoring required and implementing the mitigation measures necessary. The site and surrounding environment will be monitored by the contractor, independent ecologists, and the WASA Environmental Officer for negative impacts caused by the works.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES**

If there are any violations, this will be reported immediately to WASA's Environmental Officer to allow for management strategies to be changed according to the results.

Table 6-13: Roles and Responsibilities for Ecosystem/Biodiversity Management

ENTITY / ROLE	KEY RESPONSIBILITIES
WASA ENVIRONMENTAL OFFICER	Oversee implementation of biodiversity measures, ensure contractor compliance, and prepare quarterly monitoring reports.
CONTRACTOR / HSE OFFICER	Implement all mitigation and monitoring measures; employ an Environmental Officer to manage site biodiversity controls.
FORESTRY DIVISION (MINISTRY OF AGRICULTURE, LAND AND FISHERIES)	Provide technical guidance for flora/fauna management and approve relocation and replanting programmes.
EMA	Regulatory oversight; review compliance reports and conduct periodic inspections.
IDB	Review environmental performance as part of project supervision and safeguard compliance verification.

6.12 Disaster Risk Management Plan

The Disaster Risk Management (DRM) Plan provides a comprehensive framework for identifying, assessing, and mitigating natural and human-induced hazards that may affect the Matura Water Treatment Plant Project during construction and operation. The plan ensures that the facility, its personnel, and surrounding communities are adequately prepared to respond to and recover from extreme events, thereby supporting climate resilience, public safety, and service continuity.

The plan seeks to:

1. Safeguard critical water infrastructure by integrating disaster-resilient design features that reduce vulnerability to natural hazards such as flooding, landslides, earthquakes, and tropical storms common to the Matura–Salybia region.
2. Enhance preparedness and response capacity of WASA personnel, contractors, and local stakeholders through clear emergency protocols, communication channels, and coordination with national disaster agencies, including the Office of Disaster Preparedness and Management (ODPM).
3. Ensure compliance with the Inter-American Development Bank (IDB) Environmental and Social Performance Standard 4 (Community Health, Safety, and Security), as well as the National Disaster Risk Management Policy of Trinidad and Tobago.
4. Reduce downtime and service disruption by establishing proactive risk reduction, rapid response, and recovery mechanisms to maintain the continuous delivery of potable water during and after disaster events.
5. Promote adaptive and climate-resilient operations by incorporating lessons learned from monitoring, simulations, and periodic reviews into the ongoing management of the WTP and its supporting infrastructure.

6.12.1 Management Measures

The Contractor and WASA will jointly ensure that the following measures are implemented for effective emergency response and disaster risk reduction, with clearly identified first responders and visible emergency contact information on-site:

- Elevate key plant structures above the 1-in-100-year flood level plus additional freeboard for projected sea-level rise.
- In the absence of a unified National Building Code for Construction, design structures to withstand Category 4 hurricane wind loads, consistent with the Caribbean Uniform Building Code (CUBIC).

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Flood-proof critical infrastructure through elevated electrical panels, sealed clearwells, watertight doors, and reinforced retaining walls.
- Employ corrosion-resistant materials due to the proximity to the fluvial environment.
- Incorporate engineered foundations and controlled compaction to reduce risks of soil settlement or liquefaction during seismic activity.
- Implement graded site drainage channels, retention basins, and vegetated swales to divert and control stormwater runoff.
- Pre-wire for future renewable energy integration (e.g., solar backup for telemetry and SCADA systems).
- Maintain active liaison with regional emergency services (Fire Service, ODPM, and TTPS) to coordinate emergency response and establish a clear chain of command and communication protocols.
- Conduct regular training programs on disaster preparedness, including:
 - Basic first aid and emergency communications;
 - Fire prevention and response;
 - Evacuation and shelter procedures;
 - Handling of hazardous materials (chlorine, coagulants, etc.); and
 - Flood, earthquake, and marine environment risks.
- Maintain Standard Operating Procedures (SOPs) for:
 - Pre-storm shutdown and protective measures;
 - Backup generator operation and fuel management;
 - Post-event inspection, cleanup, and reactivation procedures.
- Conduct community engagement sessions in Salybia and Matura to raise public awareness of emergency measures and ensure coordination in the event of a disaster.
- Implement quarterly emergency simulation exercises with WASA personnel, local communities, and regional authorities to test and improve the DRM Plan.
- Adhere to hazard-specific plans, the management measures of which are outlined below:

HURRICANES AND TROPICAL STORMS

- Design plant infrastructure to withstand high winds, storm surges, and heavy rainfall. This may include using friction pylons and deep foundations that can withstand hurricane winds.
- Stay informed about hurricane forecasts and warnings.
- Store loose materials, equipment, and debris in a secure location or tie them down.
- Develop and communicate a hurricane/Tropical Storm Emergency plan for all workers.
- Ensure there are first aid supplies, communication equipment, and emergency power sources available on-site.
- Have a clear plan for the cessation of Project activities in advance of a hurricane's arrival; ensure workers are informed of the plan and evacuation routes.
- Have a plan for interim treatment and/or removal should operations be impacted for more than 24 hours.
- Develop a protocol for rapid damage assessment after a hurricane to evaluate the impact on all associated critical infrastructure related to the system.
- Establish a priority restoration plan to quickly restore plant operations and services to users.

FIRES

- There should be strict procedures for monitoring fire risks, maintaining and servicing equipment, and the handling, storage and removal of flammable materials from work sites.
- Maintain regular inspections and servicing of electrical equipment to detect early signs of overheating, leakage, or malfunction.
- In the event of a fire, there should be sufficient, available and well-maintained firefighting equipment (e.g., fire extinguishers). All workers should be trained in the use of firefighting equipment and evacuation procedures.
- If the fire escalates, the local fire brigade/service shall be called to extinguish it. The contact information for the fire department on the island should be displayed in a location where it is visible to all workers.

HEAVY RAINFALL AND FLOOD PREVENTION

- Suspend construction or outdoor maintenance during severe rainfall alerts.
- Secure all chemicals, equipment, and materials away from drains and riverbanks.
- Use bioengineering techniques (e.g., vetiver grass and native vegetation) to stabilize disturbed slopes.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Install silt fences, sediment basins, and check dams during construction to reduce sediment runoff.
- Conduct drainage performance reviews annually or after each major storm.

EARTHQUAKES

- Apply seismic-resistant design in line with CUBiC Building Code for moderate seismic zones.
- Use deep pile foundations and anchored tanks to minimize risk of differential settlement or movement.
- Conduct structural integrity assessments following any felt seismic event.
- Provide earthquake awareness sessions for staff and communities, including safe evacuation and assembly areas.

6.12.2 Monitoring and Compliance

Monitoring of the Matura WTP and associated works will be conducted daily by the Water and Sewerage Authority (WASA) to ensure full compliance with the national building codes, environmental and disaster preparedness regulations of Trinidad and Tobago, and IDB Environmental and Social Performance Standard (ESPS) 4 – Community Health, Safety, and Security. The Matura WTP has been designed as a climate-resilient facility, integrating structural and operational safeguards against tropical storms, drought, flooding, and earthquakes. Given its critical role in supplying potable water to over 160,000 customers, the risk level is classified as high.

6.12.3 Indicators

The following KPIs have been selected to evaluate the effectiveness of the emergency response measures.

Key Performance Indicators (KPIs)	Monitoring and Measurement	Frequency	Responsibility
Log of Safety and Emergency Equipment (serviced)	Review and inspection of maintenance records	Monthly	WASA and/or Contractor; Results to be presented by the EHS Officer to the WASA Technical Leads for the Project
Hazard-Specific Plans (Hurricanes, Floods, Fire, Earthquake)	Documentation review and updates	Annual	
Worker Training on Emergency and Hazard Plans	Verification of training logs	Semi-Annual	
Emergency Drills Conducted	Participation record and performance evaluation	Quarterly	
Post-Event Damage Assessments Completed	Review of inspection reports	After each major event	

6.12.4 Roles and Responsibilities

It is the responsibility of the WASA and contractors to ensure that the emergency response measures are clearly understood by all workers and that all management and mitigation measures are carried out and that monitoring reports are prepared.

6.13 Emergency Management Plan

The Emergency Management Plan establishes protocols to prepare for, respond to, and recover from emergencies affecting the Salybia and Matura water treatment plants. It aligns with international and national standards – for example, it fulfills IDB ESPS4 requirements for community safety– and follows the all-hazards approach advocated by CDEMA and the Trinidad & Tobago Disaster Management Policy. The plan outlines clear responsibilities, communication channels, preparedness measures, and procedures to ensure continuity of safe water service and protection of personnel and infrastructure during disasters.

This plan seeks to:

- **Protect Infrastructure and Operations:** Reinforce and prepare plant facilities to withstand hazards (flooding, storms, earthquakes, fire) so critical treatment capacity is maintained.
- **Ensure Personnel and Community Safety:** Establish evacuation plans, safety training, and liaison with emergency services to safeguard workers and nearby residents.
- **Maintain Continuity of Water Service:** Minimize downtime by having backup power, alternate water sources, and rapid repair protocols to quickly restore operations.
- **Enhance Preparedness and Coordination:** Conduct regular drills and training on emergency response, and coordinate with ODPM, Fire Service, Police, and local governments.
- **Comply with Standards and Policies:** Implement measures required by IDB's Environmental and Social Performance Standard 4 on health and safety and by national disaster management policies.
- **Promote Adaptive Learning:** Incorporate lessons from exercises and actual events into updated procedures to improve resilience over time.
- **Preparedness and Mitigation Measures**

6.13.1 The Incident Command System/Emergency Organization Structure and Responsibilities

The first activity in implementing the ERP is to designate responsibilities for action before, during and after an emergency incident via establishing an Incident Command System. The other general responsibilities of the committee include the following:

- To designate and clearly demarcate emergency exits.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- To update the emergency contact list at least yearly.
- To ensure that ALL members of staff are familiar with the evacuation plan by conducting regular simulation exercises.
- To ensure that all equipment and buildings are fully insured against all natural disasters.
- To arrange off-site emergency shelters and assembly points in the case of unpredictable disasters. These arrangements should be confirmed with memoranda of understanding from each establishment.
- To advise staff and suppliers of the status and operating capabilities at all stages of an emergency.
- To establish procedures for communication with all staff and suppliers.
- To ensure that the equipment and physical structure meet occupational health and safety standards.
- To procure a full complement of equipment to control emergency situations such as:
 - Protective clothing against harmful chemicals
 - Fire extinguishers
 - fully equipped decontamination unit
 - First aid kit

The Incident Command System (ICS) is the model tool used for command, control, and coordination of an emergency response and provides a means to coordinate the efforts of first responders as they work toward the common goal of stabilizing a major event and protecting life, property, and the environment. The ICS uses a simple yet well-defined command structure in order to specify roles and responsibilities for responding to emergencies. The main contact person and decision-maker is the Incident Commander. The EOC will be designated the role of Incident Commander (IC), unless the incident is of such significance that local or national officials take over the command.

Table: Roles of Key Personnel in Incident Command Structure

Role	Task
Incident Commander (IC)	The incident commander will be the EOC as appointed by the SHE Committee and responsible for management of incidents that may affect ESL (office and laboratory); coordinating all emergency response activities among the staff and between response agencies.
Project Manager	Develops and presents an action plan for sustaining operations given the disaster scenario at 4, 8, 24, and 48 hours from the time of the incident. Tracks expenditures for cost recovery and to ensure that funds can be allocated for special purchases essential to disaster response.

Safety Officer	The general safety of responders will be the responsibility of the safety officer.
Liaison Officer	Establishes contact and works with external agencies responding to the emergency.
Chief Executive Officer	Provides official information to the media and will disseminate public information.
Security Officer	Organizes and enforces scene/facility security by restricting building and grounds access and directing traffic.
All Staff and Workers	During an emergency situation all staff and workers are expected to cease operation and comply with response actions.

6.13.2 Notification and communication procedures

Appropriate and timely communication is vital to effective emergency response. An effective communication based on hierarchical notification for reporting threat warnings and other critical information to appropriate individuals at each stage of the response will be implemented at the facility.

6.13.2.1 Internal Contact List

In general, communications during an emergency response will proceed along the chain of command of the ICS. The employee who discovers an emergency situation that may affect the operation of the facility will report it to his/her supervisor immediately. The supervisor will notify the Incident Commander. If appropriate after consultation with key personnel, the IC will initiate the emergency response plan and notify the paging operator to issue an overhead or group page and instructions. Essential off-duty staff will also be notified if necessary.

In general, communications during an emergency response will proceed along the chain of command of the ICS. The employee/worker who discovers an emergency situation that may affect the operation of the facility will report it to his/her supervisor immediately. The supervisor will notify the Incident Commander. If appropriate after consultation with key personnel, the IC will initiate the emergency response plan and notify the paging operator to issue an overhead or group page and instructions. Essential off-duty staff will also be notified if necessary.

Communication channels such as: telephone (land lines and cellular lines), pagers and two-way radios whenever possible will be used to communicate vital information during an emergency. If established communication channels are unavailable, the Incident Commander will establish a runner/courier system to communicate critical information throughout the facility. The critical internal contact list is as follows in the table below (*To be completed by Contractor*).

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM**PHASE 2 (TT-L1071)**

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Table: Incident Command System Contact List

Name	Title/Role	Contact Number/s
	Emergency Operations Coordinator	
	Alternate Emergency Operations Coordinator	
	Project Manager	
	General Equipment Supply Officer	
	Laboratory Team Leader	
	Safety Officer	
	First Responder	
	Security Officer	
	Admin/ Liaison Officer	
	Planning and Financial Chief	

6.13.2.2 Emergency contacts and Coordination with Local Emergency Authorities

It is the responsibility of the Project Manager to notify the responsible Government of the Republic of Trinidad and Tobago authorities. Once the internal response system has been initiated, the Liaison Officer or EOC will establish and maintain necessary communication with the external agencies. The Office of Disaster Preparedness and Management (ODPM) have responsibility for implementation of the National Disaster Plan and overall coordination of the response activities and countermeasures in the event of an emergency. An external contact list of appropriate first responders is in the Table

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES**

below. The Contractor shall modify and add any additional contact deemed useful in the event of an emergency

Table: External Emergency Contact List

Responsible Persons/Agency	Contact Numbers
Trinidad and Tobago Fire Service (TTFS) 1b Wrightson Rd, Port of Spain, Trinidad & Tobago	Emergency Number-990 Phone: +1 868-226-8837 226-TTFS (8837)
Office of Disaster Preparedness (ODPM) 4A Orange Grove Road, Trincity, Tacarigua	ODPM Emergency – 511
Trinidad and Tobago Defence Force #1 Airways Road, Chaguaramas	1 (868) 634-4013/ 634-4554
Trinidad and Tobago Meteorological Service Rawinsonde Building, Piarco International Airport, Golden Grove Rd, Trinidad & Tobago	1 868-669-5465
Environmental, Health and Safety Unit #42 Chootoo Road, El Socorro Extension South, Aranguez Trinidad	(868) 225-3532
Police Rapid Response	999
Global Medical Response of Trinidad and Tobago – GMRTT	811
National Ambulance Service	811 OR

	1 (868)-217-4MOH (4664)
Crime Stoppers	800 TIPS (8477)

Each emergency response plan will be reviewed carefully with all employees and workers and posted in an area where all will have access to it. The written plans will be available to the employees/workers and kept on site.

Practice evacuation drills will be conducted at least twice per year to allow employees to become familiar with the emergency procedures, their evacuation routes, and assembly locations, so that if an actual emergency should occur, they will respond properly. Outside resources, such as fire and police departments will be included in these drills when possible. After each drill management and employees will evaluate the effectiveness of the drill and identify the strengths and weaknesses of the plan and work to improve it.

Operations and personnel may change over the project lifetime and an out-dated plan will be of little use in an emergency. The ERP will be reviewed at least annually and updated whenever someone's emergency actions or responsibilities change, or when there is a change in the layout or design of the facility, new equipment, hazardous materials, or processes are introduced that affect evacuation routes, or introduce new hazards that require special actions.

6.13.3 Management Measures

The following measures will be implemented before and during operations to reduce risks and improve response readiness. This includes both engineered resilience features and operational procedures:

- Corrosion and Material Durability: Given proximity to water and humidity, materials and coatings resistant to corrosion will be used for tanks, piping, and infrastructure. Equipment sensitive to moisture will be sealed or located inside protected shelters.
- Seismic Safety: Foundations will be engineered (e.g. compacted fill, deep piles) to minimize differential settlement or tipping during an earthquake. Tanks and heavy equipment (e.g. generators) will be anchored. Structural design follows the Caribbean earthquake-resistant guidelines. Post-earthquake, the plant supervisor will conduct immediate visual inspections of structures, piping, and tanks for damage.
- Backup Power and Energy: To address power outages, an on-site backup generator (or multiple generators) will be installed with enough fuel for at least 72 hours of continuous operation. Generator and critical electrical equipment will be located above potential flood

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

levels. The electrical system will be pre-wired to allow integration of future renewable backup (e.g. solar panels for SCADA/telemetry).

- **Alternate Water Supply:** The plan will identify alternate water sources for emergency use (for example interconnection with neighboring systems, tanker-truck supply, bottled water programs) and establish mutual aid agreements with nearby utilities. These agreements ensure sharing of water, equipment, or personnel if any plant is offline.
- **Communications and Command:** A clear chain of command is established for emergency response. Primary and backup emergency contact information (ODPM, Fire Service, Police, hospital, WASA leadership) will be posted prominently at each site. An emergency operations center (EOC) or incident command post protocol will be set up for major events, with designated roles (incident commander, safety officer, communications officer, etc.).
- **Training and Exercises:** All staff and contractors will receive regular training on emergency procedures. This includes first aid and CPR; firefighting and extinguisher use; evacuation routes; handling of hazardous materials (e.g. chlorine leaks); and hazards specific to the plants (flood, storm, earthquake safety). Annual drills (tabletop and field exercises) involving on-site personnel, community representatives, and regional responders (ODPM, TTPS, Fire Service) will be conducted to test and refine the Emergency Plan.
- **Standard Operating Procedures (SOPs):** Written SOPs will guide actions before, during, and after emergencies, including:
 - *Pre-Event Shutdown:* Steps to secure the site and equipment when a storm or hazard is imminent (e.g. safely halt pumping, isolate chemical processes, remove or tie down loose objects).
 - *Generator and Fuel Management:* Procedures for starting and switching to backup power and managing fuel inventory and refueling during prolonged outages.
 - *Post-Event Inspection:* Inspection checklists for structural integrity, equipment function, water quality, and environmental hazards (e.g. chemical spills, debris) following a disaster.
 - *Recovery and Restart:* Steps to de-water flooded areas, clear debris, flush and disinfect pipelines, and gradually bring the plant back online, prioritizing safety checks.
- **Fire Safety:** The site will have fire risk controls including proper storage of flammables (e.g. fuels, solvents) in approved cabinets, regular maintenance of electrical panels (thermography or inspections), and no-smoking areas. Fire extinguishers and hoses will be provided at multiple locations, and personnel will be trained in their use. In a fire emergency, staff will immediately begin on-site firefighting (if safe) and evacuate according to the plan,

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

while alerting the island's Fire Service. Contact details for the local fire station will be displayed.

- Community Engagement: WASA will hold outreach sessions to inform nearby communities about the emergency plan: how to receive alerts about water supply issues, where to find emergency potable water if needed, and what to do (e.g. boil-water advisories). This includes coordinating with local authorities on evacuation sheltering or water distribution points.

6.13.4 Monitoring and Compliance

WASA's Environmental Health & Safety (EHS) Officer will conduct ongoing monitoring to ensure all emergency measures are current and effective. This includes:

- Reviewing and updating the Emergency Plan and hazard protocols at least annually or after any significant event.
- Tracking key indicators, such as maintenance logs for emergency equipment (generators, pumps, fire gear), checked monthly; training records (first aid, evacuation) every six months; and drill reports (quarterly) to evaluate performance.
- Performing audits of structural safeguards and compliance with building and safety codes.
- After any incident, a formal after-action review will identify lessons learned, and corrective actions will be implemented.

Results of these monitoring activities will be reported to WASA project leadership and shared with stakeholders as appropriate. The goal is continual improvement: the plan will be revised based on new guidance, technological advances, and lessons from exercises and real emergencies.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

6.13.5 Indicators

The following KPIs have been selected to evaluate the effectiveness of the emergency response measures.

Key Performance Indicators (KPIs)	Monitoring and Measurement	Frequency	Responsibility
Emergency Response Readiness Score (availability and condition of emergency equipment, PPE, first-aid kits, communication devices)	Inspection of equipment readiness checklist; verification that minimum readiness thresholds are met	Monthly	WASA Site Supervisor / EHS Officer
Emergency Comms & Alert System Functionality	Testing and validation of communication systems and posted emergency contacts	Monthly	EHS Officer / Plant Operations Lead
Evacuation Route & Assembly Point Compliance	Inspection of signage, access routes, lighting, and obstruction-free pathways	Quarterly	EHS Officer
Emergency Response Team (ERT) Activation Capability	Review of roster updates, availability confirmation, and contact accuracy	Quarterly	WASA Emergency Manager
First-Aid & Emergency Skills Certification (number and percentage of staff currently certified)	Review of valid certifications and training records	Semi-Annual	EHS Officer
Emergency Response Time (time from incident detection to action taken during drills)	Measurement during simulation exercises and drills	Quarterly	EHS Officer / Drill Coordinator
Backup Power System Reliability (generators, UPS, fuel supply)	Functional testing and review of generator logs; verification of fuel inventory	Monthly	Mechanical/Operations Supervisor
Post-Event Review and After-Action Reports Completed	Review of documented incidents, corrective actions, and lessons learned	After each major incident	EHS Officer / Incident Commander
Corrective Actions Closed Out on Time	Track number of corrective actions implemented vs. pending	Quarterly	WASA Project Manager

Emergency Water Supply & Distribution Readiness	Inspection of emergency supply systems and verification of contingency logistics	Semi-Annual	WASA Operations Division
---	--	-------------	--------------------------

6.13.6 Roles and Responsibilities

- WASA Management (Project Lead & EHS Officer): Ultimate responsibility for the Emergency Plan. They ensure resources are available (equipment, training, drills) and that all staff and contractors know and follow the procedures. The EHS Officer documents compliance and coordinates reporting to IDB and authorities.
- WASA Personnel and Contractors: All on-site staff must understand and execute emergency procedures (evacuation, shutdown, firefighting). Designated emergency team members (e.g. Incident Commander, Safety Officer) have specific duties during a crisis. They must maintain communications with off-site emergency agencies as needed.
- Emergency Services (ODPM, Fire Service, Police): WASA will maintain active liaison with these agencies. In an emergency, they support the response (e.g. firefighting, security, medical aid). Roles of these first responders and communication protocols are pre-arranged.

6.14 Local Employment and Gender Inclusion Management Plan (LEGIMP)

6.14.1 Introduction and Objectives

This Local Employment and Gender Inclusion Management Plan outlines the commitments and measures to ensure equitable access to employment opportunities for residents of the Salybia-Matura-Balandra-Rampanalgas corridor and promote fair, inclusive labour practices in the implementation of the Water Treatment Plant and Transmission Pipeline Project.

The objectives of the Plan are to:

- Promote local employment, prioritising suitably qualified residents living along the project corridor.
- Ensure gender-inclusive hiring practices, with specific attention to reducing barriers faced by women in the construction sector.
- Establish transparent, fair, and accessible recruitment procedures.
- Strengthen community trust and reduce grievances related to “locals being bypassed.”
- Support decent work conditions in accordance with national labour laws and international standards.
- Ensure safe, respectful working environments for women and vulnerable groups, aligned with the Worker Code of Conduct (CoC) (See Appendix 1).
- Build local capacity where feasible through training and skills transfer.

The Plan supports the OHS and Labour Management Plan, GBVH Prevention and Response Plan, Worker CoC, Stakeholder Engagement Plan (SEP), and the Grievance Redress Mechanism (GRM).

6.14.2 Management Measures

The Plan establishes local hiring commitments and takes into consideration gender inclusion measures, the reduction of barriers for women,

6.14.2.1 Local Hiring Commitments

- Prioritise the hiring of residents in the Matura-Salybia-Balandra-Rampanalgas area.
- Maintain a Local Employment Registry managed jointly by the Contractor and Community Liaison Officer (CLO).
- Advertise vacancies early within affected communities through community boards, WhatsApp groups, leaders, and local organisations.
- Ensure transparency in job criteria, required skills, and application processes.
- Provide feedback to unsuccessful candidates when feasible.

6.14.2.2 Gender Inclusion Measures

- Actively encourage women to apply for positions in:

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- traffic control,
 - administrative roles,
 - site support roles,
 - environmental and social roles, and
 - skilled and unskilled labour where feasible.
- Include a gender-friendly recruitment statement in all job notices.
 - Avoid biased job descriptions or discriminatory selection practices.
 - Schedule work activities in ways that accommodate women's safety needs.
 - Provide safe sanitation facilities for women and men separately.

6.14.2.3 *Reducing Barriers for Women*

- Provide awareness sessions on gender equality for male workers and supervisors as part of worker induction and training.
- Integrate women's needs into the OHS plan (PPE sizing, safety considerations, toilet facilities).

6.14.2.4 *Recruitment and Employment Processes*

- Transparent, merit-based hiring with documented decision-making.
- Maintain a record of:
 - applicants,
 - hired workers, and
 - reasons for non-selection.
- Prohibit fees, coercion, or nepotism in hiring.
- Encourage the Contractor to include local subcontractors and workers where possible.

6.14.2.5 *Equal Opportunity and Non-Discrimination*

- No discrimination based on gender, pregnancy, disability, ethnicity, age, or religion.
- Ensure women are not concentrated only in low-paying roles.
- Prohibit dismissing or penalising women for pregnancy or caregiving responsibilities.
- Consider the recruitment of workers with disabilities where possible.

6.14.2.6 *Worker Conduct and Community Interaction*

In line with the Worker CoC, workers must:

- Treat fellow workforce and community members respectfully.
- Avoid sexual harassment, intimidation, or inappropriate behaviour.
- Interact professionally, especially when working near homes, schools, clinics, and shops.
- Report any inappropriate conduct immediately to supervisors or the CLO.

6.14.2.7 Worker Grievance Mechanism (Labour GRM)

- Maintain a dedicated grievance system for labour concerns such as:
 - Discrimination,
 - Unfair treatment,
 - Harassment,
 - Unsafe conditions, and
 - Wage issues
- Ensure anonymous reporting options for women.
- Integrate gender-sensitive handling procedures.

6.14.3 Monitoring and Compliance

Monitoring ensures that local hiring and gender-inclusion commitments are consistently implemented and verifiable.

Monitoring Activities

- Weekly tracking of workforce composition by:
 - gender,
 - community of origin,
 - job category.
- Monthly audits of recruitment processes.
- Review of worker GRM entries to identify patterns of exclusion or discrimination.
- Regular supervision of work areas to ensure safe conditions for women.
- Verification of job advertisements and engagement records.

Compliance Mechanisms

- Non-compliance triggers Corrective Action Plans issued by WASA or the Supervisory Consultant.
- Persistent failure to prioritise local hiring may result in contractual penalties.
- GBVH violations result in immediate disciplinary action or removal from project.
- Progress reported monthly as part of the ESMP compliance dashboard.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMDG SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

6.14.4 Indicators (KPIs)

The project's progress will be tracked through the following indicators.

KPI	Monitoring Method	Frequency	Responsibility
Percentage of workforce from local communities	Worker registry; HR records	Weekly	Contractor
Number and percentage of female workers hired	HR records; gender disaggregation	Weekly/ Monthly	Contractor; WASA
% of job advertisements circulated within communities	Communication logs	Weekly	Contractor (CLO)
Number of women applying versus hired	Application records	Monthly	Contractor
Number of labour-related grievances	Worker GRM	Weekly/ Monthly	Contractor; WASA
Induction and training sessions conducted for employed workers (including women)	Training logs	Monthly	Contractor
Incidents of discrimination/harassment reported & resolved	HR & GBVH log	Monthly	Contractor; WASA

6.14.5 Roles and Responsibilities

Although these principles are well established, it remains important to clearly define roles and responsibilities to support fair employment practices, advance gender inclusion, and maintain transparent labour processes throughout the project. This clarity helps the Contractor and WASA to work collaboratively with community representatives and remain aligned in meeting the project's commitments.

ENTITY / ROLE	KEY RESPONSIBILITIES
WASA	Oversight of local hiring and gender inclusion; monitor compliance; review HR records; ensure equal opportunity standards; lead corrective measures where needed.
CONTRACTOR	Implement transparent hiring; advertise jobs locally; track workforce data; enforce non-discrimination; create safe environments for women; provide training; manage labour GRM.
CONTRACTOR'S COMMUNITY LIAISON OFFICER	Maintain Local Employment Registry; ensure community access to job information; support women applicants; facilitate communication; document outreach.
SUPERVISORY CONSULTANT	Verify hiring processes; review workforce composition; ensure gender inclusion measures are applied; report non-compliance to WASA.
CONTRACTOR HSQ MANAGER/OFFICER	Ensure worksites are safe for male and female workers; monitor behaviour; enforce Worker CoC.

ENTITY / ROLE	KEY RESPONSIBILITIES
PROJECT WORKERS	Comply with workplace rules; uphold respectful behaviour; report unfair treatment or safety concerns.

6.15 Worker Health and Safety Management Plan (Occupational Health and Safety and Labour Management)

6.15.1 Introduction and Objectives

The Worker Health and Safety Management Plan (OHS & Labour Management Plan) outlines the measures required to protect the wellbeing, rights, and working conditions of all personnel involved in the Salybia-Matura Water Treatment Plant and Transmission Pipeline Project, including subcontractors, temporary workers, and site-based staff.

The objectives of this Plan are to:

- Ensure safe and healthy working conditions throughout construction activities, particularly trenching, installation of pipelines, operation of heavy equipment, and project-related reinstatement works along the Toco Main Road.
- Establish clear labour management practices that comply with Trinidad and Tobago labour laws and international safeguard requirements.
- Prevent workplace injuries, accidents, and occupational diseases.
- Promote responsible worker conduct in communities, including compliance with the Worker CoC.
- Ensure fair, transparent, and non-discriminatory procedures working hours, grievance management, and worker rights.
- Strengthen coordination between the Contractor, WASA, HSQ team, the Supervisory Consultant, and emergency responders.

The Plan complements the LEGIMP, the Community Health and Safety Management Plan (CHSMP), Worker Code of Conduct (Worker Behaviour Anti-Harassment Plan) (Appendix 10), Traffic and Road Safety Management Plan, SEP, and GRMs.

6.15.2 Management Measures

6.15.2.1 Compliance with National Legislation and Standards

All construction and labour practices will comply with:

- Occupational Safety and Health Act of Trinidad and Tobago
- Minimum Wages and Employment Rights legislation
- International Labour Organization (ILO) Core Standards

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- WASA and CDB/IDB/IFC Environmental and Social Safeguards
- Contractor's CESMP and HSQ systems

6.15.2.2 Worker Recruitment and Labour Conditions

- Transparent recruitment processes, favouring local employment where possible (Matura, Salybia, Balandra, Rampanalgas).
- Equal opportunity for male and female workers; no discrimination on the basis of gender, age, ethnicity, disability, or political affiliation.
- Written contracts for all workers outlining terms, benefits, and rights.
- Clear working hours, overtime rules, and rest periods communicated upon hiring.
- Prohibition of child labour and forced labour. No worker under the age of 18 years will be hired as per the Children (Amendment) Act 2000
- Site access controlled by sign-in logs and worker identification.

6.15.2.3 Worker Induction and Training

Mandatory induction for all workers covering:

- OHS requirements and site-specific hazards;
- Safe trenching practices;
- Heavy equipment operation rules;
- Traffic safety and roadside works;
- Emergency response procedures;
- Use of Personal Protective Equipment (PPE);
- Environmental protection;
- Worker Code of Conduct (Appendix 10) and expected respectful behaviour toward other project-related personnel and affected communities; and
- Grievance reporting by workers.

Refresher training will be held monthly, and toolbox talks about site hazards and precautions will be conducted daily.

6.15.2.4 Personal Protective Equipment

All workers are expected comply with PPE protocols established for the project including the use of:

- Hard hats;
- Safety boots;
- High-visibility vests;
- Safety gloves;
- Eye and ear protection;
- Respiratory protection measures (dusty environments); and
- Fall protection measures where necessary.

Workers will not be able to enter the worksite without the required PPE. Supervisors will enforce compliance.

6.15.2.5 Safe Work Procedures

1. Trenching and Excavation

- Daily inspections of trenches for stability.
- Shoring, benching, or sloping where depth exceeds regulatory thresholds.
- Barriers and warning tape surrounding open trenches.
- No worker allowed in trench during heavy rainfall.
- Safe entry/exit using ladders or ramps.

2. Heavy Vehicle and Equipment Operations

- Only certified operators allowed to drive heavy machinery.
- Spotters used for reversing or navigating in narrow areas.
- Equipment parked safely and locked after work hours.
- Strict speed limits enforced within worksite and along main roads.

3. Roadside and Traffic-Adjacent Works

- Implementation of Traffic Management and Road Safety Plan (see Section 6.16).
- Use of flag personnel and signage.
- Safe pedestrian pathways maintained for both workers and community members.

4. Working in Sensitive Areas

- Additional caution near schools, homes, shops and other sensitive areas.
- Avoid work near these sites during peak community hours.

5. Environmental Health (dust, noise, vibration)

- Implementation of the dust suppression measures outlined in the Air Quality and Dust Control Plan (see Section 6.5).
- Implementation of noise control and limited working hours as outlined in the NVMP.
- Provide at least two weeks' advance notification to nearby residents, businesses, schools, and other sensitive receptors prior to high-impact construction activities.
- Close monitoring air quality, noise and vibration complaints around social sensitive receptors.

6.15.2.6 Worker Grievance Mechanism (Internal GRM)

The Contractor must maintain a dedicated worker grievance channel separate from community grievances. The GRM should feature measures to protect workers' rights and to promote safe environment and respectful interactions. These should include:

- Confidential reporting;
- Anonymous submissions allowed;
- Clear timelines for response (acknowledge within 24 hours; resolve in 7-14 days);
- No retaliation for reporting; and
- Integration with broader GRM oversight by WASA.

6.15.2.7 Worker Accommodation and Welfare

Worker welfare provisions will be maintained to ensure safe, comfortable, and secure working conditions throughout the project. To ensure this, the following will be implemented:

- Adequate sanitation for men and women, drinking water, and shelter from sun/rain.
- Safe storage for tools and personal belongings.
- Worker transportation safety (project roadworthy vehicles, mandated seatbelts, trained drivers).

6.15.2.8 Emergency Preparedness and Response

Emergency preparedness measures will be maintained to ensure rapid, coordinated, and effective response to any incident that may occur during project activities. These measures will be implemented:

- First aid kits at all work fronts;
- Supervisors with first aid skills;
- Emergency contact numbers posted visibly;
- Spill kits for chemical/fuel handling;
- Coordination with the Sangre Grande Fire Station, Eastern Regional Health Authority (ERHA), Matura Police Station and Sangre Grande Regional Cooperation (SGRC) Disaster Unit.
- An incident drill early in the project with additional drills if the following occur:
 - The workforce changes substantially,
 - There is an incident or near-miss, or
 - High-risk activities escalate (e.g., night works).

6.15.2.9 Enforcement and Disciplinary Actions

Guidelines for workers regarding violations of OHS rules, risky behaviour, or CoC breaches may result in:

- Verbal or written warnings;

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Mandatory retraining;
- Suspension;
- Removal from site; and
- Legal consequences (for severe violations).

6.15.3 Monitoring and Compliance

Monitoring ensures consistent implementation of OHS procedures and labour management standards.

Monitoring Activities

- Daily site inspections by the HSQ Officer.
- Weekly audits of PPE use and compliance.
- Monthly review of workplace incidents, near misses, and corrective actions.
- Verification of worker contracts and training attendance.
- Inspection of trenches, equipment, and traffic control setups.
- Monitoring worker fatigue, overtime, and working hour records.

Compliance Mechanisms

- Non-compliance notices issued by WASA or Supervisory Consultant.
- Corrective Action Plans implemented within specified timeframes.
- Repeated violations may lead to contractual penalties.
- Findings included in monthly ESMP compliance reporting.

6.15.4 Indicators (KPIs)

The project's progress will be tracked through the following indicators.

KPI	Monitoring Method	Frequency	Responsibility
Number of OHS inductions completed	Training logs	Monthly	Contractor
% of workers equipped with full PPE	Site inspections	Daily	HSQ Officers
Number of near misses and incidents	Incident log	Daily/ Weekly	Contractor; Supervisory Consultant
Time taken to close corrective actions	HSQ weekly report	Weekly	Contractor
Number of toolbox talks conducted	Toolbox logs	Daily	Supervisors
% of workers with written contracts	HR records	Monthly	Contractor

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Worker grievances received and resolved	Worker GRM log	Weekly	Contractor; WASA
Roadside safety compliance	Traffic control inspection	Daily	HSQ Officers

6.15.5 Roles and Responsibilities

The roles and responsibilities of the parties involved in implementing the project's labour and safety requirements are outlined below.

ENTITY / ROLE	KEY RESPONSIBILITIES
WASA	Oversight of OHS and labour practices; review incident reports; enforce compliance; escalate safety violations; ensure workers' welfare standards are maintained.
CONTRACTOR	Implement daily OHS practices; provide PPE; train workers; enforce CoC; maintain worker GRM; document incidents; ensure safe trenching and heavy equipment operations.
HSQ MANAGER/OFFICERS	Daily inspections; hazard identification; maintain OHS documentation; conduct toolbox talks; verify PPE compliance; lead accident investigations. Provide medical and safety support to public emergency responders; respond to accidents; participate in emergency drills.
SUPERVISORY CONSULTANT	Independent OHS oversight; verify compliance; audit training records; issue corrective action requests.
CONTRACTOR'S SUPERVISORS/ FOREMEN	Direct enforcement of safe work procedures; manage crew behaviour; ensure workers understand daily tasks and hazards.
PROJECT SITE WORKERS	Comply with OHS rules; use PPE; report unsafe conditions; follow supervisor instructions; wear project identification.

6.16 Worker Behaviour and Anti-Harassment Plan

6.16.1 Introduction and Objectives

The Worker Behaviour and Anti-Harassment Plan outlines the measures to prevent, identify, and respond to any form of gender-based violence and harassment (GBVH), or inappropriate conduct involving project workers and community members.

The objectives of this Plan are to:

- Establish a zero-tolerance policy toward all forms of GBV, SEA, SH, and harassment.
- Ensure all workers, including subcontractors, sign, understand, and comply with a Worker Code of Conduct (CoC) (Appendix 4).
- Protect women, girls, older adults, persons with disabilities, and other vulnerable groups living along the Salybia-Matura-Balandra/Rampanalgas corridor.
- Reduce risks associated with worker-worker interactions and worker-community interactions, especially during trenching, access restrictions, and community engagements.
- Provide accessible, confidential channels for reporting GBVH-related grievances.
- Strengthen coordination with WASA, the Contractor, the Supervisory Consultant, and community stakeholders to manage incidents effectively.
- Ensure that survivors receive timely, confidential, and survivor-centred support.

This Plan supports the SEP, GRM, OHS and Labour Management Plan, and the CHSMP.

6.16.2 Management Measures

6.16.2.1 Code of Conduct Requirements

All workers (including subcontractors) must:

- Sign a GBVH-specific Code of Conduct prior to starting work.
- Receive orientation on expected behaviours and consequences of violations.
- Re-sign the Code of Conduct if project conditions change or during annual refresher training.
- Wear identifiable uniforms/ID badges at all times.
- Avoid entering private properties without explicit permission.
- Respect community norms, privacy, and cultural expectations.

The CoC as presented in Appendix 4 prohibits:

- Sexual harassment, exploitation, or abuse of community members or co-workers.
- Sexual comments, gestures, unwanted attention, or propositions.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Relationships with minors (under 18), regardless of consent.
- Any sexual relations that are exploitative, unbalanced, or linked to power dynamics.
- Transactional sex or solicitation.
- Use of threats, force, or coercion.
- Retaliation against survivors or complainants.

6.16.2.2 *Worker Training and Behavioural Oversight*

- Mandatory induction training for all workers on GBVH, respectful behaviour, and reporting obligations.
- Monthly toolbox talks on respectful interaction, safe community engagement, and gender sensitivity.
- Supervisor-level training on identifying risks, enforcing the CoC, and responding to incidents.
- Signage posted at site offices summarising CoC rules and reporting channels.
- Clear disciplinary procedures (warnings → suspension → removal → legal reporting if applicable).

6.16.2.3 *Community Awareness*

- Communicate CoC commitments to local communities (Matura, Salybia, Balandra/Rampanalgas).
- Share reporting channels with community groups, women's networks, health centres, and vulnerable groups.
- Conduct brief awareness sessions at community meetings and schools, emphasising:
 - prohibited behaviours
 - how to report concerns
 - survivor rights and confidentiality

6.16.2.4 *Reporting and Survivor-Centred Response*

GBVH-related grievances follow the GRM, with enhanced safeguards:

- Complaints can be anonymous and confidential.
- Female community members may report via female staff (CLO, WASA rep).
- Sensitive complaints bypass Contractor and go directly to WASA's designated GBVH focal point.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Information is restricted to authorised personnel only.
- Immediate referral to medical, psychosocial, or legal support services where necessary.
- No survivor is required to provide written statements or engage beyond what they choose.

6.16.2.5 Incident Management

- Immediate safety assessment and survivor-centred response.
- Contractor removes alleged offender from community interactions pending investigation.
- WASA GBVH focal point oversees investigation and ensures due process.
- Coordinated response with Police or gender-based violence service providers where required.
- All actions documented while preserving confidentiality.

6.16.2.6 Risk Mitigation in Worker–Community Interaction

- Limit worker access to schools, community centres, and sensitive areas unless authorised.
- Enforce working-hour limits to avoid late-evening presence in communities.
- Avoid hiring practices that favour one gender unfairly; encourage women's participation.
- Monitor worker accommodation arrangements (if applicable) for GBVH risks.

6.16.3 Monitoring and Compliance

Monitoring ensures all mitigation measures and Code of Conduct provisions are implemented consistently.

Monitoring Activities

- Daily supervision of worker behaviour by site supervisors.
- Weekly review of any GBVH reports or early warning signs.
- Verification of worker signatures on CoC forms.
- Random interviews with workers and community members to assess behavioural compliance.
- Monthly reporting to WASA on GBVH implementation status.
- Oversight audits by the Supervisory Consultant.

Compliance Mechanisms

- Corrective Action Plans issued for weak enforcement.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Mandatory removal of workers for serious CoC violations.
- Documentation of disciplinary actions in Contractor records.
- Annual review of the GBVH plan and CoC provisions.

6.16.4 Indicators

KPI	Monitoring Method		Frequency	Responsibility
% of workers who signed CoC	Contractor records	HR	Monthly	Contractor
Number of GBVH induction and refresher sessions held	Training logs		Monthly	Contractor; WASA
Number of GBVH-related grievances reported	GRM log		Weekly/Monthly	WASA; CLO
Time taken to respond to GBVH complaints	GRM tracking		Weekly	WASA
% of workers disciplined or removed for violations	HR records	disciplinary	Quarterly	Contractor
Community awareness events conducted	SEP records		Monthly/Quarterly	WASA; CLO
Availability of survivor referral support	Service confirmations	provider	Quarterly	WASA

6.16.5 Roles and Responsibilities

Effective prevention and response require coordinated responsibilities among the Contractor, WASA, community representatives, and the Supervisory Consultant. Clear accountability ensures zero tolerance for GBVH and protects affected community members.

ENTITY / ROLE	KEY RESPONSIBILITIES
WASA	Oversight of GBVH plan; designate GBVH focal point; ensure CoC enforcement; manage sensitive GBVH grievances; coordinate with service providers; ensure sanctions are applied.
CONTRACTOR	Ensure all workers sign CoC; conduct training; supervise worker behaviour; enforce sanctions; immediately remove workers involved in GBVH incidents; maintain confidential records.
SUPERVISORY CONSULTANT	Monitor compliance; verify implementation; review training materials; audit GBVH reporting and response; escalate issues to WASA.
COMMUNITY LIAISON OFFICER	Maintain safe and respectful engagement; receive confidential complaints; support survivors; maintain referral pathways. Work with community leaders to share information on the project's zero tolerance policy regarding all forms of violence and harassment, the Worker Code of Conduct and expected worker behaviour. Where required identify and liaise with the TTPA and relevant GBV service providers in providing the necessary support for survivors (including medical, counselling, psychosocial, legal support to survivors), where required. Also to inform residents about GRM reporting channels.
HSQ MANAGER / OFFICERS	Observe worker interactions; report violations; ensure the CoC displayed; support investigations.

6.17 Community Health and Safety Management Plan

The Community Health and Safety Management Plan (CHSMP) sets out the actions required to safeguard the health, safety, and well-being of communities along the Salybia-Matura Water Treatment Plant site and transmission pipeline corridor.

The Plan aims to:

- Identify and manage the community health and safety risks arising from construction and operational activities.
- Maintain safe access for residents, businesses, schools, and vulnerable groups along the Toco Main Road and nearby communities.
- Prevent accidents involving residents and other visiting or passing through the main road, including road users, pedestrians, and children.
- Ensure timely, transparent, and accessible communication with affected communities throughout the project lifecycle.
- Strengthen coordination among WASA, the Contractor, MOWT, and Municipal Corporations to ensure safe work execution and rapid response to incidents.

The CHSMP forms part of the project's broader ESMS and supports the SEP, Traffic and Road Safety Management Plan, Project Emergency Response Plan (ERP), Water Quality Management Plan, and the Project's Grievance Redress Mechanism (GRM).

6.17.1 Management Measures

6.17.1.1 Traffic and Road Safety

- Implement a Traffic and Road Safety Management Plan with phased trenching, clear signage, designated pedestrian routes, flag personnel, and speed control measures.
- Maintain safe access to homes, schools, businesses, health facilities and beaches vicinity of the project's right-of-way.
- Install temporary crossings strategically to maintain continuous, safe access for residents, businesses, and emergency movement while trenching works are ongoing.
- Ensure nighttime lighting of work zones.
- Coordinate with MOWT for road reinstatement and use of road protection mats in vulnerable sections.

6.17.1.2 Worksite and Public Safety

- Secure all work areas with fencing, barriers, warning tape, and safety signage.
- Cover or barricade open trenches and ensure safe equipment operation protocols.
- Provide community sensitisation sessions on construction risks at schools, health centres and community focal points.
- Ensure adequate lighting at high-traffic or high-risk areas.

6.17.1.3 Air Quality, Noise and Vibration Control

- Use dust suppression measures (watering, covering material stockpiles, vehicle washing).
- Limit works near sensitive receptors to daytime hours.
- Install temporary noise barriers near schools, health facilities, and homes.

6.17.1.4 Service Continuity and Water Supply Risks

- Provide advance notification of planned service interruptions, specifying timing and duration.
- Provide temporary water supply (e.g., truckborne water) for essential services if necessary.
- Maintain real-time communication channels for urgent interruptions.

6.17.1.5 Emergency Response and Incident Management

- Maintain an Emergency Response Plan (ERP) including procedures for:
 - traffic accidents
 - trench collapse
 - community injuries
 - chemical spills
 - operational failures (during the O&M phase)
- Conduct joint emergency drills with WASA, Contractor, MOWT and first-responders.

6.17.1.6 Community Engagement and Grievance Management

- Provide ongoing updates via radio, WhatsApp groups, community boards, and door-to-door notices.
- Implement a project GRM which ensures accessibility to older adults (the elderly), PWDs, low-literacy groups, and persons who experienced harassment and violence including gender-based violence.
- Maintain an incident log and ensure all complaints are acknowledged within 24 hours and resolved within agreed timelines.

6.17.1.7 Gender and Vulnerable Groups

- Ensure safe access routes for children, older women and men, and PWDs.
- Avoid work scheduling that conflicts with school travel or peak community activity hours.
- Integrate gender-safe reporting channels in the GRM (confidential, alternative pathways).

6.17.2 Monitoring and Compliance

This section outlines the procedures, inspection activities, and reporting mechanisms that will be used to verify adherence to safety measures, identify non-compliance, and ensure timely corrective actions. Monitoring will be conducted jointly by WASA and the Contractor's HSQ Team.

Monitoring Activities

- Daily inspection of barricades, signage, lighting, and traffic control points.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Weekly checks of noise, dust, and vibration control measures.
- Weekly verification of safe pedestrian access routes.
- Continuous monitoring of community notifications and GRM responses.
- Monthly review of road reinstatement and site restoration progress.
- Quarterly emergency response drills during construction; biannual during operations.
- Water quality monitoring as per the Water Quality Management Plan (WQMP).

Compliance Mechanisms

- Non-compliance notices issued by WASA or the Supervisory Consultant.
- Corrective Action Plans developed and implemented within agreed timelines.
- Inclusion of compliance performance in monthly site meetings and reporting.
- Enforcement of contractual penalties for repeated safety violations.

6.17.3 Indicators

The following are the KPIs for Community Health and Safety:

KPI	Monitoring and Measurement Method	Frequency	Responsibility
Number of community incidents/near misses	Review of incident logs, daily HSQ reports	Daily/Weekly	Contractor HSQ; WASA
Percentage of worksites secured with barriers, signage, lighting	Site inspections using checklist	Daily	Contractor; Supervisory Consultant
Number of community notifications issued prior to disruptions	Communication logs; SEP tracker	Weekly	Contractor; WASA
Time taken to resolve community grievances	GRM database; follow-up verification	Weekly/Monthly	Contractor; WASA
Percentage of reinstated road sections meeting MOWT standards	Joint inspections; reinstatement audits	Weekly/Monthly	Contractor; MOWT; WASA
Dust/noise exceedances at sensitive receptors	Monitoring equipment logs; visual inspections	Weekly	Contractor
Completion of emergency drills	Drill reports; attendance sheets	Quarterly (construction)/ Biannual (operations)	WASA; Contractor
Continuity of water service (operational phase)	O&M logs	Monthly	WASA

6.17.4 Roles and Responsibilities

The duties of each participating entity (WASA, the Contractor, supervisory personnel, etc.) to support safe operations, effective communication, and rapid response to any incidents affecting community wellbeing are outlined below.

ENTITY / ROLE		KEY RESPONSIBILITIES
WASA		Oversight of CHSMP implementation; community communication; ensuring road reinstatement compliance; coordination with MOWT and Municipal Corporations; water service continuity; emergency response; GRM oversight.
CONTRACTOR		Daily implementation of safety measures; traffic management; securing worksites; community notifications; incident reporting; grievance response; monitoring and reporting; maintaining barriers, signage, and access. Conducting road work and reinstate good road conditions in keeping with MOWT standards and approvals.
CONTRACTOR	HSQ	Conduct safety inspections; maintain CHS logs; verify compliance; train workers; support emergency drills; document incidents.
CONTRACTOR	LIAISON	Serving as primary communication point with communities; receive and forward grievances; maintain community engagement log; support public safety sensitisation.
SUPERVISORY	CONSULTANT/WASA	Providing oversight and verification; auditing compliance; issuing corrective actions; facilitating coordination between agencies; reporting to WASA.

6.18 Traffic and Road Safety Management Plan

This Plan provides a framework for managing all vehicular movement and related activities associated with the construction and operation of the Plant. The purpose of this plan is to ensure the safe and efficient movement of vehicles, machinery, materials, and personnel, minimizing risks to workers, local communities, and road users, while maintaining the integrity of public roadways and access routes.

Objectives

1. Identify traffic and road safety risks associated with project activities, particularly during construction.
2. Develop control measures to prevent accidents, property damage, and injuries involving project vehicles or the public.
3. Ensure compliance with national road traffic laws, MOWT guidelines, and IDB safeguard requirements.
4. Establish clear roles, responsibilities, and communication protocols for road safety management.
5. Engage with local authorities and communities to coordinate traffic management and respond to safety concerns.
6. Promote safe driving behaviour among project staff, contractors, and suppliers through training and enforcement.
7. Protect vulnerable road users — pedestrians, cyclists, and schoolchildren — near construction areas and community access roads.

6.18.1 Management Measures

- A detailed site-specific TMP shall be developed prior to mobilization, identifying access routes, delivery schedules, speed limits, and signage placement. TMP to be approved by WASA and MOWT.
- Use designated haul routes approved by MOWT to minimize disturbance to residential areas and schools.
- Establish staging and laydown areas away from public roads.
- Enforce a maximum speed limit of 30 km/h within communities and 10 km/h within construction zones.
- Post speed limit signs at critical points.
- Install reflective signage, barriers, cones, and flag personnel at all entry points and intersections.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Provide nighttime lighting and reflective tape for visibility.
- Install “Children Crossing”, “Heavy Vehicles Turning”, and “Slow Down Construction Ahead” signs near community access roads.
- Notify local residents, schools, and businesses in advance of major transport or roadworks.
- Provide safe pedestrian crossings or detours where needed.
- Schedule large deliveries outside peak hours (6–9 a.m. and 3–6 p.m.) to reduce congestion and risk.
- Require all drivers to have valid Trinidad and Tobago driving licenses appropriate for the vehicle class.
- Enforce zero-tolerance policy on speeding, mobile phone use, and impaired driving.
- Conduct daily vehicle pre-start inspections (brakes, tires, lights, horn, mirrors).
- Maintain vehicle logbooks and inspection checklists.
- Maintain all project access roads in good condition; immediately repair potholes or ruts caused by project traffic.
- Use water spraying and gravel compaction on unpaved roads to control dust.
- Cover truckloads of soil, sand, or aggregates with tarpaulins during transport.
- Provide first aid kits, fire extinguishers, and spill kits in all vehicles.
- Conduct induction training for all drivers and heavy equipment operators.

6.18.2 Monitoring and Compliance

The Plan will comply with the following regulations and standards:

- Motor Vehicles and Road Traffic Act (Chap. 48:50) – licensing, vehicle operation, and driver conduct.
- EMA CEC conditions relating to road use, traffic control, and dust management.
- OSH Act, 2004 – provisions on safe access, movement, and operation of equipment.
- MOWT Construction Traffic Guidelines (2019) – requirements for temporary signage, traffic diversion, and flagging.
- IDB ESPS 4 – obligations for community safety, road risk management, and emergency preparedness.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

6.18.3 Indicators

The following KPIs have been selected to evaluate the effectiveness of the traffic management measures.

Table 6-14: Key Performance Indicators for Traffic Management

INDICATOR	TARGET / PERFORMANCE STANDARD	FREQUENCY	MEANS OF VERIFICATION	RESPONSIBLE PARTY
% OF VEHICLES WITH VALID INSPECTION CERTIFICATES	100%	Monthly	Inspection logs	Contractor / WASA
% OF DRIVERS TRAINED IN ROAD SAFETY	100%	Quarterly	Training records	WASA HR / Contractor
NUMBER OF TRAFFIC INCIDENTS OR NEAR-MISSES	0	Ongoing	Incident logs	Contractor / WASA
% OF WORK ZONES WITH ADEQUATE SIGNAGE	100%	Monthly	Site inspection	WASA HSE Officer
% OF ROUTES MAINTAINED AT BASELINE CONDITION	100%	Monthly	Maintenance records	WASA / Contractor / MOWT
NUMBER OF COMMUNITY COMPLAINTS RELATED TO TRAFFIC	≤1 per month	Monthly	Grievance log	WASA Community Liaison
% OF LOADS PROPERLY COVERED	100%	Random checks	Visual inspections	Contractor / WASA

6.18.4 Roles and Responsibilities

It is the responsibility of the WASA and all contractors to ensure that all mitigation measures are carried out and that monitoring reports are prepared. The Contractor should ensure that an Environmental Health and Safety (EHS) Officer is employed to oversee the specific requirements of this plan.

WASA is responsible for assigning contractors as the responsible parties for undertaking the monitoring required and for implementing the mitigation measures necessary. The Site and surrounding environment will be monitored by WASA and contractors for negative impacts caused by the construction works.

Table 6-15: Roles and Responsibilities for Traffic Management

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

ENTITY / ROLE	KEY RESPONSIBILITIES
WASA PROJECT MANAGER	Overall oversight of traffic and road safety compliance; approval of Traffic Management and Road Safety Plan; coordination with MOWT and EMA.
WASA HSE UNIT	Ensure plan implementation; review incident reports; provide safety training and awareness materials.
CONTRACTOR / SITE MANAGER	Day-to-day traffic management; ensure driver compliance; conduct inspections; report accidents immediately; inspect signage and barriers; enforce PPE and speed limits; maintain traffic logs.
DRIVERS AND OPERATORS	Comply with all road safety rules; perform vehicle checks; immediately report unsafe conditions or incidents.
MINISTRY OF WORKS AND TRANSPORT (MOWT)	Approve haul routes; inspect road conditions; enforce traffic laws.
EMA	Regulatory oversight to ensure CEC compliance on vehicle operation and dust control.
COMMUNITY LIAISON OFFICER	Communicate traffic schedules, safety notices, and grievance mechanisms to local residents.

6.19 Security Management Plan

6.19.1 Monitoring Standards

The safety and security of the workers and equipment would be the responsibility of the Contractors. They should coordinate with the Trinidad and Tobago police services when operating in areas with high risk to ensure the safety of equipment and all stakeholders.

6.19.2 Monitoring Frequency

Monitoring for safety and security should be carried out throughout all phases of the project.

6.19.3 Management and Mitigation Measures

The Contractor will be responsible for the following measures to ensure the safety and security of personnel and equipment during all phases of the project. The risk level and impact to the site(s) will have to be assessed and the appropriate mitigation measures devised. Some mitigation measures include:

- o Creation of site-specific security plan based on an assessment of the security risk.
- o Liaise and communicate with the Trinidad and Tobago Police Service to assess the risk associated with each site for every stage of the project.
- o Contact the Police for the area to advise of areas where work will be conducted prior to commencement of work.
- o Ensure that key assets and property are secured or removed to a secure location when not in use.
- o Where possible ensure perimeter of areas has appropriate security fencing and areas are well illuminated.
- o Control site access by ensuring limited access points and controlled entry.
- o Engage with community members and encourage them to report suspicious activities to the BPS.
- o Encourage security awareness among employees and ensure security supervisor is always at the site.
- o Maintain a security risk register and periodically review the security risk plan to update the security mitigation measures.
- o Contract licensed security services to guard and patrol sites where necessary. Security personnel should be unarmed and properly trained in de-escalation techniques.
- o Consider the use of technology, such as tagging, GPS tracking and video surveillance to detect and alert for any security issues or treats.
- o Ensure that police forces and/or private security guards safeguarding the project area comply with the project's Code of Conduct provisions regarding the prohibition of sexual and gender-based violence and SEAH.

- o Ensure the participation of police forces/private security guards participation in trainings related to the prevention of sexual and gender-based violence particularly between workers and between workers/contractors and beneficiaries.

6.19.4 Key Performance Indicators

The following KPIs in the Table below have been select in order to evaluate the effectiveness of the plan to mitigate against treats to security.

Table: Key Performance Indicators

KEY PERFORMANCE INDICATORS	HOW WILL IT BE MONITORED AND MEASURED	RESPONSIBILITY	FREQUENCY
Security Risk Register	Review and inspection of documentation	Contractor; Results to be presented to the Implementing Agency	Daily
Incident Log	Review and inspection of documentation	Contractor; Results to be presented to the Implementing Agency	
Number of Police Officers or Private Security Guards that participated in trainings to prevent sexual and gender-based violence / Total number of Police Officers and Private Security Guards safeguarding the project	Review of training schedules and attendance sheets	Contractor; Results to be presented to the Implementing Agency	Monthly

6.19.5 Roles and Responsibilities

The Implementing Agency is responsible for assigning the ENGINEER and the CONTRACTOR as the responsible parties for undertaking the monitoring required and for implementing the mitigation measures necessary.

The site and surrounding environment will be monitored by the ENGINEER for negative impacts caused by the construction Works. The ENGINEER will notify the CONTRACTOR in writing of any observed noncompliance with local environmental laws regulations, permits, and other elements of the CONTRACTOR's Environmental Protection Plan. The CONTRACTOR shall, after receipt of such notice, inform the ENGINEER of the proposed corrective action and take such action when approved by the Contracting Officer.

The ENGINEER may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the CONTRACTOR for any such suspensions. This is in addition to any other actions the ENGINEER may take under the Contract, or in accordance with applicable laws.

6.19.6 Data Analysis and Reporting

If there are any security incidents, these are to be reported to the Implementing Agency and the Local Police within 24 hours. The implementing agency will be required to ensure the appropriate mitigation measures are implemented, and the Local Police will be responsible for investigating the incident.

6.20 Stakeholder Engagement Plan

This SEP outlines the approach for systematically identifying, informing, and engaging stakeholders affected by the Salybia-Matura Water Treatment Plant and Transmission Pipeline Project.

The objectives of the SEP are to:

- Ensure transparent, timely, and culturally appropriate communication with all directly and indirectly affected communities, including Matura, Salybia, Balandra/Rampanalgas and fringe areas of Sangre Grande.
- Support safe implementation of construction activities by informing stakeholders of works, disruptions, risks, and mitigation measures.
- Provide an accessible and responsive Grievance Redress Mechanism (GRM) for all communities and other stakeholder groups, including vulnerable populations.
- Strengthen coordination between WASA, the Contractor, MOWT, SGRC and other entities to ensure consistent messaging and effective engagement.
- Manage expectations concerning project timelines, service improvements, temporary disturbances, and long-term benefits.
- Promote long-term trust and operational sustainability through ongoing engagement during the operational phase.

The SEP is aligned with the project's CHSMP, Traffic Management and Road Safety Plan, Project GRM, Project Emergency Response Plan, and ESMS.

6.20.1 Management Measures

6.20.1.1 Stakeholder Identification and Mapping

Identify all relevant groups, including:

- Local communities along the pipeline corridor (Matura, Salybia, Balandra/Rampanalgas, Sangre Grande fringe communities).
- Vulnerable groups (children, older adults, low-income households, persons with disabilities, women-headed households, unemployed persons).

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Schools (primary and secondary), outreach (health) centre (Matura), local churches, and community groups.
- Farmers, fisherfolk, small vendors, business owners, and guest house, Air BnB, tour, and other tourism operators.
- Government agencies (WASA, MOWT, SGRC, Trinidad and Tobago Fire Service (TTFS), Trinidad and Tobago Police Service (TTPS), Public and Private Utilities [such as T&TEC, Telecommunications – Telecommunications Services of Trinidad and Tobago Limited - TSTT]).
- Transport service providers and road users.
- The media.
- The public.

The Contractor's CLO will maintain an updated stakeholder database throughout the project.

6.20.1.2 *Communication and Information Disclosure*

The CLO will:

- Issue advance notifications about construction schedules, road disruptions, traffic diversions, service interruptions, and reinstatement works.
- Use multiple channels:
 - community WhatsApp groups;
 - printed notices and flyers;
 - loudspeaker announcements where appropriate;
 - local radio updates;
 - community notice boards;
 - door-to-door outreach for vulnerable households; and
- Provide regular updates on progress and upcoming works, including any expected changes.

6.20.1.3 *Engagement Activities*

- Conduct regular community meetings and targeted small-group discussions.
- Hold briefings with schools, clinics, businesses, and transport operators.
- Provide safety awareness sessions for schoolchildren, elders, and vulnerable groups.
- Use the CLO and community focal points to maintain continuous feedback loops.
- Document all engagement activities using standardised attendance sheets and contact logs.

The proposed Stakeholder Communication Schedule is provided as Appendix 5.

6.20.1.4 *Project Grievance Redress Mechanism*

- Maintain a confidential, accessible Project GRM that allows reporting through:

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- phone, WhatsApp, SMS.
 - in-person to CLO or Contractor.
 - community representatives.
 - suggestion boxes at community facilities.
- Acknowledge all grievances within 24 hours and resolve within agreed timelines.
 - Track all cases in a GRM database and share summaries at monthly site meetings.
 - Include gender-sensitive and anonymous reporting pathways.

Further details on the GRM will be provided in the Grievance Redress Plan (see Section 6.20).

6.20.1.5 *Engagement with Government and Institutional Stakeholders*

- Conduct regular coordination meetings among the following with scheduling set by the parties:
 - WASA;
 - Contractor;
 - Community leader or representatives;
 - Supervisory Consultant
- Share work schedules, road reinstatement plans, and safety updates.
- Coordinate public notices to avoid conflicting information.

6.20.1.6 *Community Inclusion and Expectation Management*

- Clearly communicate project benefits and limitations (pipeline length, service boundaries, commissioning timelines).
- Engage communities early on any issues related to temporary service disruptions (at least 2 weeks in advance), reinstatement, or service variability.
- Provide channels for community ideas and feedback on reinstatement, disturbance mitigation or project-related emergencies.

6.20.2 *Monitoring and Compliance*

Monitoring ensures that stakeholder engagement activities are implemented as planned and that communities remain well-informed throughout construction and operations.

Monitoring will include:

- Daily updates from the CLO on community interactions.
- Weekly verification of issued notices, communication channels, and GRM cases.
- Review of meeting minutes, attendance sheets, and community feedback logs.
- Monthly audits by WASA or the Supervisory Consultant on engagement quality and responsiveness.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Tri-party reviews (WASA–Contractor–MOWT) for coherence of public information related to traffic and reinstatement.

Compliance will be reinforced through:

- Corrective Action Plans for inadequate engagement or communication gaps.
- Reporting performance in monthly progress reports.
- Contractual requirements tied to communication obligations.

6.20.3 Indicators

The KPIs for stakeholder engagement are the following:

KPI	Monitoring & Measurement Method	Frequency	Responsibility
Number of community notifications issued prior to construction disruptions	Communication logs; CLO records	Weekly	Contractor; WASA
Percentage of affected households receiving advance notice	Field verification; door-to-door confirmation	Weekly	Contractor CLO
Number of community meetings held and attendance rates	Meeting minutes; attendance sheets	Monthly	WASA; Contractor CLO
Time taken to acknowledge and resolve grievances	GRM database	Weekly/Monthly	Contractor CLO
Number of grievances received vs. resolved	GRM analytics	Monthly	Contractor; WASA
Level of satisfaction with engagement (from community feedback)	Community checks; follow-up calls	Mid-project and end of project	Contractor CLO; WASA
Accuracy and consistency of public information issued	Tri-agency verification	Monthly	WASA; MOWT; Contractor
Participation of vulnerable groups in engagement activities	Attendance disaggregated by gender, age, and vulnerability	Monthly	Contractor CLO

6.20.4 Roles and Responsibilities

Strong engagement requires that all parties coordinate actively, share information on time, ensure inclusive participation, and communicate clearly throughout the project. The following assigns specific roles and responsibilities to each agency, the Contractor, and the CLO to make this happen.

ENTITY / ROLE	KEY RESPONSIBILITIES
WASA/ SUPERVISORY CONSULTANT	SEP Oversight, compliance checks, and verification; advising on engagement strategy; reviewing communication materials; ensuring alignment with ESMS.
CONTRACTOR	Daily engagement activities; issuing notifications; maintaining CLO presence; responding to grievances; coordinating with WASA before releasing public information; documenting engagement; supporting safety awareness sessions. Overall responsibility for SEP implementation; oversight of communication; approval of notices; GRM management; liaison with MOWT, Fire Station, Police Station, ERHA, and SGRC; ensure consistent messaging; integrate engagement findings into decision-making.
CONTRACTOR COMMUNITY LIAISON OFFICER	Main point of contact for communities; daily engagement and issue tracking; maintaining contact lists; door-to-door outreach; assisting vulnerable households; logging grievances; providing updates to WASA and Contractor. Work with local leaders to disseminate notices through community channels including community meetings, to obtain local context and emergency coordination. Coordinate with MOWT regarding the reinstatement of the Toco Main Road; roadworks communication, traffic diversions, notices to the public, and reinstatement updates. Work with emergency responders (Police, Fire, Health Facilities) in emergency coordination; receive information on works that may affect access or response times.

6.21 Grievance Redress Plan

6.21.1 Introduction and Objectives

The following GRM provides a structured, transparent, and accessible process for the affected communities and other stakeholders to raise concerns, lodge complaints, receive redress and feedback related to the Salybia-Matura Water Treatment Plant and Transmission Pipeline Project.

The objectives of the GRM are to:

- Ensure that all grievances, particularly those related to road access, construction safety, road reinstatement, environmental nuisance, and service interruptions, are systematically recorded, assessed, and resolved in a timely and fair manner.
- Strengthen trust, transparency, and accountability between WASA, the Contractor, government agencies, and affected communities.
- Provide special support to vulnerable groups (older adults, persons with disabilities, women-headed households, low-literacy groups) to ensure equitable access to the mechanism.
- Reduce the risk of conflicts by addressing issues promptly before they escalate.
- Support continuous improvement of project performance by capturing trends and lessons learned.

The GRM aligns with the Stakeholder Engagement Plan (SEP), Community Health and Safety Management Plan (CHSMP), Traffic Management and Road Safety Plan, and relevant CESMP components. A Worker GRM will be implemented but this mechanism, though relatable, is separate and apart from this project SEP.

6.21.2 Management Measures

The following steps will be taken as part of the GRM:

6.21.2.1 Grievance Uptake and Submission

To ensure that persons with disabilities and other vulnerable groups effectively access a Grievance Redress Mechanism (GRM), the concept of universal design is applied, meaning that systems are designed from the outset to be usable by as many people as possible without requiring special adaptation. The mechanism outlined below therefore uses multiple channels for submitting complaints as listed above using different means, including both verbal/voice-based systems and written means as well as in-person and remote means. Grievances may be submitted through multiple channels to maximise accessibility:

- CLO – in person, by phone, WhatsApp, SMS;
- Verbal via the Contractor site office with clear signage and wayfinding systems;
- WASA project representatives;

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Public meetings or consultations (including wheelchair-accessible offices and meeting rooms and consultation venues);
- Written letters or complaint forms;
- GRM boxes at community facilities;
- Project email; and
- Anonymous submissions.

Physical barriers can prevent persons with mobility impairments from accessing grievance services as well as intellectual barriers and as such, the system allows for representation as follows:

- Permission for family members, caregivers, advocates, or disability organizations to assist complainants.
- Provision for support persons during interviews and hearings.
- Allowance of complaints to be submitted through authorized representatives.
- Partner with Disabled Persons' Organizations (DPOs).
- Disseminate information through disability networks.
- Use community meetings, radio, social media, and accessible materials using simple language and avoiding all jargons.
- Train community workers to assist persons with disabilities in filing complaints.

All grievances are treated confidentially, especially those involving safety, worker behaviour, or sensitive issues including GBVH complaints. The Grievance submission form in Appendix 6 aids this process.

6.21.2.2 *Registration and Acknowledgement*

- Every grievance receives a unique GRM Case ID.
- The CLO enters the grievance into the GRM Log within 24 hours.
- Acknowledgement is issued to the complainant within 24 hours, or immediately for safety-related cases.
- Anonymous cases will also be registered and investigated.

6.21.2.3 *Screening and Classification*

Grievances are screened and categorised according to type within 48 hours of receiving the complaint:

- Access restrictions/road disruptions;
- Noise, dust, vibration;
- Safety risks (open trenches, traffic hazards);
- Service interruptions (water supply, other project related utility disruptions – electricity, TSTT);
- Environmental issues – air quality, water quality, biodiversity, etc.;
- Worker behaviour;

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Land, property, drainage, reinstatement issues (road and access);
- Gender-based or vulnerable group-related concerns; and
- Requests for information.

Screening determines:

1. Urgency;
2. required investigation; and
3. responsible entity.

6.21.2.4 Investigation and Resolution

- HSQ team, CLO, and relevant technical staff will conduct site investigations.
- Root cause analysis is carried out for each complaint.
- Contractor/WASA implement corrective action measures, which may include:
 - reinstatement of access;
 - repairing damages;
 - reinforcing safety measures;
 - additional communication;
 - traffic adjustments; and
 - water supply alternatives.

IDB's Grievance Redress Mechanism - Independent Consultation and Investigation Mechanism (MICI)

Outside of the investigation and resolutions outlined above, should there remain outstanding issues for redress, project-affected people and communities can access the IDB's grievance mechanism, The Independent Consultation and Investigation Mechanism (MICI). MICI has been set up independently of IDB operations and management and which reports directly to the IDB's Executive Board, to consider grievances from individuals and communities affected by projects financed by the IDB Group.

MICI manages two mechanisms through which it assesses claims made by claimants:

- (ii) The Consultation Phase, which is a voluntary and flexible space for dispute resolution, under the impartial mediation of the MICI. Through this mechanism, the claimant(s), the Borrower and/ or the executing agency and the IDB have an opportunity to resolve their differences and reach an agreement that resolves the complaint;
- (ii) The Compliance Verification Phase, which consists of an investigation of facts by MICI to determine whether the IDB met its obligations with regards to the requirements of its ESPF.

Resolution timeframe

Resolution timelines will be applied based on the complexity of each grievance, as outlined below:

- Minor issues: within 7 days
- Moderate issues: within 14 days
- Complex issues requiring agency coordination: within 30 days

Complainants are informed of proposed and completed actions. Feedback on the completed actions will be sought from complainants.

6.21.2.5 Close-Out and Documentation

A grievance is closed only when:

1. Corrective action is completed;
2. The complainant confirms satisfaction, where applicable; and
3. The CLO records the closure in the GRM Log.

Cases may be closed without agreement only after escalation and final decision by WASA.

6.21.2.6 Escalation Procedure

If the complainant is dissatisfied:

Level 1: Contractor

Level 2: WASA Project Management Staff

Level 3: WASA Senior Management or an appointed Independent Reviewer

Level 4: National regulatory authorities (e.g., Regulated Industries Commission)

Escalation timelines are communicated clearly to complainants.

6.21.2.7 Disclosure and Awareness

- GRM Summary Posters displayed in communities.
- GRM process explained at all community meetings.
- CLO conducts local outreach, especially with vulnerable households.
- Hotline/WhatsApp numbers publicly posted.

6.21.2.8 Confidentiality, Data Protection and Non-Retaliation

- Complainants are protected from retaliation.
- Sensitive cases (e.g., violence, gender issues) handled discreetly.
- Records kept securely by WASA.

6.21.3 Monitoring and Compliance

Monitoring ensures that all grievances are managed efficiently and transparently.

Monitoring Activities

These activities include the following:

- Daily updates from the CLO on new grievances.
- Weekly review of the GRM Log by the Contractor HSQ Manager/Officer.
- Monthly verification by WASA and the Supervisory Consultant.
- Quarterly review of trends, systemic issues, and response time performance.
- Cross-checking actions implemented on the ground.
- Reporting on open, in-progress, and closed cases.

Compliance Measures

- Non-compliance triggers Corrective Action Plans issued by WASA or Supervisory Consultant.
- Repeated failure to respond effectively to grievances may lead to contractual penalties, especially Level 3 and Level 4 grievances or those that have progressively escalated over time without satisfactory conclusion.
- Performance included in monthly ESMP compliance reports.

6.21.4 Indicators

The performance of the GRM will be tracked through the following indicators.

KPI	Monitoring and Measurement Method	Frequency	Responsibility
Number of grievances received	GRM Log	Weekly	Contractor; CLO
Percentage acknowledged within 24 hours	Log audit	Weekly	Contractor
Percentage resolved within defined timelines	Log review; follow-up checks	Monthly	WASA; Contractor
Number of grievances escalated	Log analysis	Monthly	WASA
Grievance themes and trends	GRM report	Monthly	WASA
Satisfaction rate of resolved cases	Follow-up calls	Monthly	CLO
Participation of vulnerable groups	GRM disaggregation tracking	Monthly	CLO; WASA
Corrective actions implemented on time	Verification inspections	Weekly	Contractor; Supervisory Consultant/WASA

6.21.5 Roles and Responsibilities

Effective grievance resolution requires strong coordination between the Contractor, WASA, supervisory personnel, and community representatives. Roles must be clearly defined to ensure timely response and transparent accountability.

ENTITY / ROLE	KEY RESPONSIBILITIES
WASA	Oversight of GRM; approval of escalation decisions; quarterly analysis; coordination with government agencies; ensuring corrective actions are implemented; public disclosure of GRM summary.
CONTRACTOR	Primary recipient of grievances; implement corrective actions; maintain daily GRM Log; coordinate with CLO; ensure safety and reinstatement issues are addressed promptly.
COMMUNITY LIAISON OFFICER	First point of contact; receive and register grievances; acknowledge complaints; maintain communication with complainants; support vulnerable households; assist with investigations; keep records updated. Work with community leaders/focal points to inform residents, local businesses, guesthouses and organisations about the GRM; to support their communication about the project; and to report concerns early. Coordinate with community leaders, including the SGRC Councillor to inform residents about the GRM; to facilitate communication with residents about the project, local businesses, organisations, and guest houses; and to support their reporting concerns early. Work with partner agencies like MOWT, SGRC and utilities to address grievances relating to road reinstatement, traffic management and access disruptions; utility damage; and participate in joint inspections.
HSQ TEAM (CONTRACTOR)	Conduct site investigations; verify hazards; inspect access, signage, barriers; support resolution of safety and environmental grievances.
SUPERVISORY CONSULTANT	Independent oversight; verification of grievance handling quality; ensure compliance with ESMP; escalate serious unresolved issues to WASA.

6.22 Land Acquisition and Resettlement Framework

6.22.1 Avoidance and Minimisation Principles

Consistent with the requirements of IDB ESPS 5, the Project should seek to avoid land acquisition, physical displacement, economic displacement and livelihood impacts wherever feasible through careful route selection, engineering design, construction planning and optimisation of right-of-way requirements.

Particular attention should be given to avoiding or minimising impacts on:

- Residential properties and occupied structures;
- Agricultural lands and productive assets;
- Informal residential occupants;
- Informal agricultural occupants;
- Vulnerable persons and households;
- Commercial and livelihood activities;
- Sand and gravel extraction activities;
- Environmentally sensitive lands and protected areas; and
- Community resources and access arrangements.

Where impacts cannot be avoided, measures should be implemented to minimise impacts and ensure that affected persons are treated fairly and equitably. Compensation, assistance, livelihood protection and livelihood restoration measures should be implemented where required in accordance with this Plan.

The Project should apply the following hierarchy:

1. Avoid impacts where feasible.
2. Minimise unavoidable impacts.
3. Mitigate residual impacts.
4. Compensate affected persons where applicable.
5. Restore affected livelihoods where impacts occur.

6.22.2 Screening and Impact Identification

As detailed design progresses, all Project components should be screened to determine whether land acquisition, easements, rights-of-way, temporary land occupation, access restrictions, physical displacement or livelihood impacts may occur.

The screening process should include:

1. Confirmation of final land requirements and right-of-way requirements;
2. Verification of land ownership, tenure and occupancy arrangements;
3. Identification of affected assets and land uses;

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

4. Identification of affected land users and livelihood activities;
5. Identification of informal occupants and land users;
6. Identification of vulnerable persons and households;
7. Identification of potential physical and economic displacement risks; and
8. Determination of the nature and significance of potential impacts.

Table 10: Land Acquisition and Livelihood Screening Process

Step	Activity
1	Confirm final design, alignment and land requirements
2	Verify land ownership, tenure and occupancy arrangements
3	Identify affected assets, structures and land uses
4	Identify affected land users and livelihood activities
5	Identify informal occupants and land users
6	Identify vulnerable persons and households
7	Assess potential displacement and livelihood impacts
8	Determine required mitigation, compensation and restoration measures

6.22.3 Land Acquisition Process

Where land acquisition, easements, rights-of-way or other land access arrangements are required, the Project should implement a structured process to ensure that impacts are identified, assessed and managed in accordance with applicable national legislation and the principles established in this Plan.

The process should include verification of land ownership and occupancy, stakeholder engagement, asset identification, valuation, determination of applicable compensation and assistance measures, implementation of agreed measures and monitoring of outcomes.

Table 11: Land Acquisition and Land Access Process

Step	Description
Land requirement confirmation	Confirm final land requirements, alignments, rights-of-way and access requirements based on detailed design.
Land ownership and occupancy verification	Verify ownership, tenure, occupancy and land use arrangements, including formal and informal land users.
Stakeholder engagement	Engage affected persons, landowners, occupiers and other stakeholders regarding potential impacts and proposed arrangements.

Asset inventory and socio-economic surveys	Identify affected assets, structures, crops, trees, livelihood activities and vulnerable persons or households.
Valuation and entitlement determination	Determine applicable compensation, assistance and livelihood restoration measures.
Negotiation and agreement	Undertake negotiations and document agreed arrangements where applicable.
Compensation and assistance implementation	Implement applicable compensation, assistance and livelihood restoration measures.
Land access and construction commencement	Secure lawful access to affected lands and commence Project activities.
Monitoring and follow-up	Monitor implementation, address outstanding issues and evaluate outcomes.

Where State-owned lands are affected, the Project should obtain the necessary approvals, permissions, licences or other access arrangements from the relevant authorities prior to commencement of construction activities.

Where informal occupants or informal land users are identified, the Project should assess potential impacts and determine appropriate assistance, livelihood protection or livelihood restoration measures in accordance with the principles established in this Plan and the requirements of ESPS 5.

6.22.4 Census and Asset Inventory

Where land acquisition, easements, rights-of-way, temporary occupation of land or livelihood impacts are identified, a census and asset inventory should be undertaken to identify affected persons, affected assets and affected livelihood activities.

The census and asset inventory should be designed to establish an accurate record of ownership, occupancy, land use and asset conditions within the affected area and should be completed prior to implementation of compensation, assistance or livelihood restoration measures.

The inventory may include:

- Land parcels;
- Residential structures and associated improvements;
- Commercial structures and business assets;
- Agricultural lands, crops and trees;
- Farm buildings, fencing and other agricultural infrastructure;
- Sand and gravel extraction areas and associated assets;

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Community assets and facilities;
- Informal residential occupation;
- Informal agricultural occupation;
- Access arrangements and rights of use; and
- Other affected assets or resources.

The results of the census and asset inventory should be used to support impact assessments, valuation activities, eligibility determinations and development of compensation and livelihood restoration measures.

6.22.5 Socio-Economic Surveys

Where land acquisition, displacement or livelihood impacts are identified, socio-economic surveys should be undertaken to establish baseline conditions and inform the development of compensation, assistance, livelihood protection and livelihood restoration measures.

The surveys should seek to understand the characteristics of affected households, land users and livelihood activities and may include:

- Household composition and demographic characteristics;
- Sources of income and livelihood activities;
- Land ownership, occupancy and land use arrangements;
- Agricultural production and resource use activities;
- Business and commercial activities;
- Dependence on natural resources;
- Vulnerability considerations;
- Existing access arrangements;
- Housing conditions; and
- Livelihood restoration needs.

Particular attention should be given to vulnerable persons and households, informal residential occupants, informal agricultural occupants and other groups that may be disproportionately affected by Project activities.

The results of socio-economic surveys should be used to support eligibility determinations, compensation planning, livelihood restoration planning and monitoring activities undertaken under this Plan.

6.22.6 Valuation Methodology

Valuation of affected assets should be undertaken using appropriate and recognised valuation methods and, where required, qualified valuation professionals.

Valuation activities may include:

- Land;
- Residential structures and associated improvements;
- Commercial structures and business assets;
- Crops and trees;
- Agricultural infrastructure;
- Sand and gravel extraction assets where applicable; and
- Other affected assets and resources.

Compensation should be determined in accordance with applicable national legal requirements and relevant IDB requirements.

Eligibility for compensation or assistance will depend on the nature of the impact and the status of the affected person. Persons with formal legal rights to land may be eligible for compensation for affected lands and associated assets, where applicable. Persons without formal legal rights to land may not be eligible for compensation for the land itself but may be eligible for compensation for affected structures, crops, trees and other non-land assets, as well as assistance, livelihood protection or livelihood restoration measures where applicable.

Valuation and entitlement determinations should be undertaken following completion of land ownership investigations, asset inventories, socio-economic surveys and stakeholder engagement activities.

6.22.7 Eligibility Criteria

Eligibility for compensation, assistance, livelihood protection or livelihood restoration measures should be determined based on the nature of the impact and the status of the affected person, household, land user or livelihood activity.

Eligibility determinations should be informed by land ownership investigations, occupancy verification, asset inventories, socio-economic surveys and stakeholder engagement activities undertaken by the Project.

Table 12: Preliminary Eligibility Categories

Category		Potential Eligibility
Legal Landowners		Compensation for affected land and assets, together with other applicable assistance measures.
Leaseholders and Tenants		Compensation and assistance for affected assets, investments, access arrangements and livelihood activities where applicable.
Residential Occupants		Assistance and compensation where occupancy, structures or access arrangements are affected.
Agricultural Users		Compensation for affected crops, trees, agricultural infrastructure and other productive assets where applicable.
Informal Residential Occupants		Compensation for affected structures and non-land assets, together with applicable assistance and livelihood restoration measures where required.
Informal Agricultural Occupants		Compensation for affected crops, trees and other productive assets, together with applicable livelihood restoration measures where required.
Commercial Enterprises		Compensation, assistance and livelihood restoration measures where business activities are affected.
Sand and Gravel Extraction Operators and Workers		Assistance and livelihood restoration measures where Project activities result in demonstrable impacts on extraction activities or associated livelihoods.
Resource Users within Protected Areas		Assistance and livelihood restoration measures where Project activities result in demonstrable impacts on resource use activities or livelihoods.

Eligibility requirements and entitlements will be refined following completion of detailed design, impact assessments, asset inventories, socio-economic surveys and stakeholder engagement activities.

6.22.8 Entitlement Framework

The entitlement framework establishes the types of compensation, assistance and livelihood restoration measures that may be provided depending on the nature of the impact.

Table 13: Preliminary Entitlement Framework

Impact Type	Potential Entitlement
Permanent loss of land	Compensation in accordance with applicable legal requirements and Project commitments.

Permanent easement or right-of-way restrictions	Compensation, assistance or other measures as appropriate to the nature of the restriction.
Temporary occupation of land	Restoration of land and compensation where applicable.
Loss of residential structures or improvements	Compensation for affected structures and improvements together with applicable assistance measures.
Loss of crops or trees	Compensation where applicable.
Loss of agricultural infrastructure	Compensation or replacement where applicable.
Temporary business disruption	Appropriate assistance and livelihood protection measures.
Loss of livelihood opportunities	Livelihood restoration measures where applicable.
Temporary loss of access	Appropriate mitigation and assistance measures.
Impacts on informal residential occupants	Compensation for affected non-land assets together with applicable assistance and livelihood restoration measures.
Impacts on informal agricultural occupants	Compensation for affected crops, trees and productive assets together with applicable livelihood restoration measures.
Impacts on extractive activities	Appropriate livelihood protection, livelihood restoration or other assistance measures where applicable.

The final entitlement framework should be refined following completion of detailed design, impact identification activities, socio-economic surveys and stakeholder engagement processes.

6.22.9 Compensation Procedures

Where compensation is required, the following principles should apply:

- Compensation should be determined using appropriate valuation methods and relevant professional expertise where required.
- Affected persons should be informed of applicable compensation arrangements and entitlement provisions.
- Compensation agreements should be documented and maintained on file.
- Compensation and applicable assistance measures should be implemented prior to the commencement of activities that result in the loss of land, assets, access or livelihood opportunities, unless otherwise agreed.
- Appropriate records should be maintained throughout the process.
- Stakeholders should have access to the Project Grievance Mechanism to raise concerns relating to compensation, eligibility or valuation matters.

Compensation procedures should be implemented in a fair, transparent and consistent manner and should be supported by appropriate stakeholder engagement and disclosure activities.

6.22.10 Special Assistance for Vulnerable Persons

Where vulnerable persons or households are identified, additional assistance measures should be considered to reduce the risk of disproportionate adverse impacts and facilitate meaningful participation in Project processes.

Such measures may include:

- Additional consultation and engagement activities;
- Assistance with understanding and accessing compensation processes;
- Assistance with documentation requirements where necessary;
- Additional livelihood protection or livelihood restoration measures;
- Relocation support where applicable; and
- Referrals to relevant social support programmes or services where appropriate.

Particular attention should be given to vulnerable households that may experience greater difficulty in adapting to land acquisition, access restrictions, displacement or livelihood disruptions.

6.22.11 Documentation and Recordkeeping

WASA should maintain appropriate records relating to:

- Land requirements and right-of-way investigations;
- Land ownership and occupancy verification activities;
- Asset inventories and census activities;
- Socio-economic surveys;
- Consultation and stakeholder engagement activities;
- Compensation agreements and payment records;
- Livelihood protection and livelihood restoration measures;
- Grievances and resolutions;
- Monitoring activities; and
- Reporting and compliance documentation.

Records should be maintained in accordance with applicable Project procedures, data management requirements and relevant confidentiality obligations.

6.22.12 Monitoring and Compliance

Implementation of the land acquisition, compensation and resettlement-related measures described in this Plan should be monitored throughout Project implementation to verify compliance with applicable legal requirements, Project commitments and IDB Environmental and Social Performance Standards.

Monitoring activities may include:

- Verification of implementation of compensation and assistance measures;
- Review of stakeholder engagement activities;
- Monitoring of grievances and resolutions;
- Monitoring of impacts on vulnerable persons and households;
- Monitoring of livelihood restoration activities where applicable; and
- Verification of compliance with the procedures established under this Plan.

Where monitoring identifies gaps, non-compliance or unforeseen impacts, corrective actions should be developed and implemented in a timely manner.

6.22.13 Indicators (KPIs)

Table 14 presents the key performance indicators that should be used to monitor implementation of the land acquisition and resettlement framework.

Table 14: Land Acquisition and Resettlement KPIs

Key Performance Indicator	How Will It Be Monitored and Measured	Responsibility
Land ownership, occupancy and asset investigations completed prior to land acquisition or construction activities	Review of investigation reports and verification records	WASA / Supervising Consultant
Affected persons identified and recorded through census and asset inventory activities	Review of census, asset inventory and socio-economic survey records	WASA
Compensation and assistance measures implemented prior to impact occurrence where applicable	Review of compensation and implementation records	WASA
Grievances relating to land acquisition, compensation or resettlement addressed within established timeframes	Review of grievance records	WASA

Monitoring activities completed and Review of monitoring reports	WASA	/
corrective actions implemented where and corrective action records	Supervising	
required	Consultant	

6.22.14 Roles and Responsibilities

Table 15 outlines the principal responsibilities for implementation of the land acquisition and resettlement framework.

Table 15: Roles and Responsibilities for Land Acquisition and Resettlement

Party	Responsibility
WASA	Overall implementation of land acquisition, compensation, assistance and resettlement-related activities and compliance with this Plan.
Supervising Consultant	Monitoring, verification and reporting on implementation of land acquisition and resettlement measures.
Construction Contractor	Compliance with land access requirements, implementation of mitigation measures and support for stakeholder engagement activities.
Community Liaison Officer (CLO)	Stakeholder engagement, communication and support to affected persons throughout implementation.
Social Specialist	Support land acquisition planning, socio-economic surveys, impact assessments, livelihood restoration planning and monitoring activities.
Commissioner of State Lands and Other Relevant Authorities	Support matters relating to State lands, approvals, access arrangements and other statutory requirements where applicable.
Affected Persons and Stakeholders	Participate in consultations, provide relevant information and engage in agreed compensation, assistance and livelihood restoration processes where applicable.

6.23 Livelihood Protection

6.23.1 Objectives

The objective of this section is to establish measures to avoid, minimise and manage livelihood-related impacts associated with Project planning, construction and implementation.

Specifically, the Project should seek to:

- Avoid unnecessary disruption to livelihood activities;
- Minimise impacts on agricultural production, extractive activities and other income-generating activities;

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Maintain access to properties, productive lands and livelihood resources wherever feasible;
- Minimise disruptions associated with land acquisition, rights-of-way and construction activities;
- Ensure timely communication regarding activities that may affect livelihoods;
- Identify and address livelihood-related concerns in a timely manner;
- Protect vulnerable persons and households from disproportionate impacts; and
- Reduce the potential for economic displacement during Project implementation.

6.23.2 Livelihood Risk Identification

Based on information currently available, the principal livelihood risks are expected to arise from land acquisition, right-of-way requirements, temporary occupation of land, access restrictions and construction activities associated with the transmission pipeline corridor.

The main livelihood activities potentially affected by the Project are summarised in Table 16.

Table 16: Potential Livelihood Risks

Livelihood Activity	Potential Risk
Agriculture	Loss of crops, trees, productive land, access restrictions, temporary occupation of land and disruption of agricultural activities.
Informal Agricultural Activities	Disruption of farming or cultivation activities undertaken without formal legal tenure, including impacts on crops, productive assets and access arrangements.
Sand and Gravel Extraction Activities	Temporary or permanent restrictions on access to extraction areas, disruption of extraction activities and impacts on associated livelihoods.
Commercial Activities	Temporary disruption of business operations, access restrictions, reduced accessibility and construction-related disturbances.
Informal Economic Activities	Temporary disruption of roadside vending, trading and other informal income-generating activities.
Resource-Based Livelihood Activities	Potential restrictions on access to natural resources within protected or environmentally sensitive areas.

The nature and extent of these risks will depend on the final alignment selected, right-of-way requirements, construction methods and the location of affected land users and livelihood activities. Potential impacts will be further assessed and refined as additional Project information becomes available.

6.23.3 Construction-Related Livelihood Protection Measures

The Project should implement livelihood protection measures throughout construction to minimise disruptions to affected persons, land users and livelihood activities.

6.3.1 Advance Notification

Where construction activities have the potential to affect land use, access arrangements or livelihood activities, advance notice should be provided to potentially affected stakeholders.

Notifications may include information regarding:

- Planned construction activities;
- Expected duration of works;
- Land access requirements;
- Temporary access restrictions;
- Construction schedules;
- Alternative access arrangements where applicable; and
- Contact information for Project representatives.

Where feasible, notifications should be provided prior to commencement of the relevant works.

6.3.2 Stakeholder Engagement

Affected stakeholders should be informed and consulted regarding construction activities that may affect livelihoods, access arrangements, land use activities or economic activities.

Stakeholder engagement activities may include:

- Meetings with affected landowners and occupiers;
- Discussions with agricultural users and farmers;
- Engagement with sand and gravel extraction operators and workers;
- Engagement with informal land users and livelihood groups;
- Community meetings;
- Distribution of notices and information materials; and
- Ongoing communication throughout construction.

Livelihood-related concerns identified through stakeholder engagement should be documented and addressed where appropriate.

6.3.3 Access Management

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Access management measures should be implemented to minimise disruption to affected properties, agricultural areas, livelihood activities and resource users.

Measures may include:

- Phased construction scheduling;
- Temporary access arrangements;
- Clearly marked access routes;
- Maintenance of property access where feasible;
- Coordination with affected stakeholders regarding access requirements; and
- Restoration of access following completion of works.

Construction activities should be planned to minimise unnecessary restrictions on access to properties, productive lands and livelihood resources.

6.3.4 Protection of Agricultural Activities

Where agricultural activities may be affected by Project construction, measures should be implemented to minimise disruption and avoid unnecessary damage to crops, trees, agricultural infrastructure and productive land.

Measures may include:

- Delineation of work areas;
- Avoidance of unnecessary disturbance outside approved work areas;
- Protection of crops, trees and agricultural infrastructure where feasible;
- Restoration of temporarily occupied agricultural areas following construction;
- Reinstatement of access arrangements; and
- Consultation with affected agricultural users regarding construction scheduling and access requirements.

6.3.5 Protection of Informal Livelihood Activities

Where informal livelihood activities may be affected, the Project should seek to minimise disruption through communication, planning and stakeholder engagement.

Measures may include:

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Advance notification of works;
- Identification of affected livelihood activities;
- Consultation regarding access requirements;
- Temporary access arrangements where feasible;
- Measures to minimise disruption to livelihood activities; and
- Consideration of livelihood restoration measures where impacts cannot be avoided.

6.3.6 Protection of Extractive Activities

Where sand and gravel extraction activities may be affected by Project construction, measures should be implemented to minimise disruption and maintain safe access arrangements where feasible.

Measures may include:

- Advance notification of construction activities;
- Consultation with affected operators and workers;
- Coordination regarding access routes and work schedules;
- Temporary access arrangements where feasible; and
- Consideration of livelihood protection or restoration measures where significant impacts occur.

6.3.7 Emergency Response Procedures

Where unforeseen Project activities result in significant disruption to access, livelihood activities or economic functions, the Project should implement appropriate response measures to address the situation.

Such measures may include:

- Immediate investigation of the issue;
- Engagement with affected stakeholders;
- Implementation of temporary corrective measures;
- Restoration of access where feasible;
- Additional communication and information disclosure; and

- Determination of any additional assistance measures that may be required.

All significant livelihood-related incidents should be documented and monitored to ensure timely resolution and continuous improvement of Project management measures.

6.23.4 Communication and Public Information

Timely communication is essential to minimise disruptions to livelihoods, land use activities and economic activities during Project implementation.

The Project should provide information regarding:

- Planned construction activities;
- Construction schedules;
- Land access requirements;
- Temporary access restrictions;
- Right-of-way requirements;
- Alternative access arrangements where applicable;
- Stakeholder engagement opportunities; and
- Grievance management procedures.

Information may be communicated through stakeholder meetings, community consultations, notices, signage, social media platforms, local media, direct engagement and other appropriate communication channels.

Particular attention should be given to landowners, occupiers, agricultural users, informal land users and other stakeholders whose activities may be affected by Project construction.

6.23.5 Grievance Management

Stakeholders should have access to the Project Grievance Mechanism (GM) to raise concerns relating to land acquisition, access restrictions, livelihood impacts, compensation, livelihood restoration or other Project-related matters.

All livelihood-related grievances should be documented, investigated and addressed in accordance with the procedures established under this Plan and the Stakeholder Engagement Plan.

Where grievances relate to compensation, land acquisition, displacement or livelihood restoration, efforts should be made to address concerns promptly and transparently through consultation and resolution processes established by the Project.

6.23.6 Monitoring of Livelihood Protection Measures

Implementation of livelihood protection measures should be monitored throughout Project implementation to assess effectiveness and identify any unforeseen impacts.

Monitoring activities may include:

- Tracking livelihood-related grievances;
- Monitoring access arrangements;
- Monitoring impacts on agricultural activities;
- Monitoring impacts on informal land users;
- Monitoring impacts on sand and gravel extraction activities;
- Monitoring stakeholder engagement activities;
- Monitoring implementation of mitigation measures; and
- Monitoring issues affecting vulnerable persons and households.

Where monitoring identifies significant livelihood impacts or unresolved concerns, additional mitigation, compensation or livelihood restoration measures should be considered.

6.23.7 Indicators (KPIs)

Table 17 presents the key performance indicators that should be used to monitor implementation of the livelihood protection measures described in this section.

Table 17: Livelihood Protection KPIs

Key Performance Indicator	How Will It Be Monitored and Measured	Responsibility
Potentially affected livelihood activities identified and assessed prior to construction	Review of impact assessments, stakeholder engagement records and survey findings	WASA / Supervising Consultant
Advance notification provided to affected stakeholders prior to commencement of relevant works	Review of notification records and stakeholder engagement documentation	WASA / Contractor
Access arrangements maintained or restored where required	Field inspections, stakeholder feedback and monitoring reports	Contractor / Supervising Consultant
Livelihood-related grievances addressed within established timeframes	Review of grievance records and resolution logs	WASA
Monitoring activities completed and corrective actions implemented where required	Review of monitoring reports and corrective action records	WASA / Supervising Consultant

6.23.8 Roles and Responsibilities

Table 18 outlines the principal responsibilities for implementation of the livelihood protection measures described in this section.

Table 18: Roles and Responsibilities for Livelihood Protection

Party	Responsibility
WASA	Overall implementation and oversight of livelihood protection measures and compliance with this Plan.
Supervising Consultant	Monitoring, verification and reporting on implementation of livelihood protection measures.
Construction Contractor	Implementation of livelihood protection, access management and mitigation measures during construction.
Community Liaison Officer (CLO)	Stakeholder engagement, communication and support to affected persons and communities.
Social Specialist	Assessment of livelihood impacts, identification of vulnerable persons and support to implementation and monitoring activities.
Affected Persons and Stakeholders	Participation in consultations, engagement activities and monitoring processes where applicable.

6.24 Livelihood Restoration

6.24.1 Objectives

The objective of this section is to establish a framework for restoring livelihoods and income-generating activities where Project impacts cannot be fully avoided, minimised or mitigated through the livelihood protection measures described in Section 6.

Specifically, the Project should seek to:

- Restore affected livelihoods and income-generating activities where impacts occur;
- Assist affected persons in re-establishing economic activities disrupted by Project implementation;
- Support vulnerable persons and households affected by livelihood impacts;
- Promote fair, transparent and equitable implementation of livelihood restoration measures; and
- Ensure consistency with applicable national requirements and relevant IDB Environmental and Social Performance Standards.

6.24.2 Livelihood Restoration Planning Process

Where livelihood impacts are identified, restoration measures should be developed and implemented in a manner proportionate to the nature, duration and significance of the impact.

Table 19: Livelihood Restoration Planning Process

Step	Activity
1	Identify affected livelihood activities and affected persons
2	Assess the nature and extent of livelihood impacts
3	Identify vulnerable persons and households
4	Determine appropriate restoration measures
5	Consult with affected persons regarding proposed measures
6	Implement agreed restoration measures
7	Monitor outcomes and effectiveness
8	Implement corrective actions where required

6.24.3 Eligibility for Livelihood Restoration Assistance

Eligibility for livelihood restoration assistance should be determined based on the nature and extent of Project-related impacts on livelihoods, income-generating activities or access to productive resources.

Potentially eligible persons may include:

- Agricultural users;
- Informal agricultural occupants;
- Commercial enterprises;
- Informal livelihood operators;
- Sand and gravel extraction operators and workers;
- Resource users affected by Project activities;
- Vulnerable persons and households; and
- Other persons whose livelihoods are demonstrably affected by Project activities.

Eligibility should be determined through impact assessments, socio-economic surveys, asset inventories and stakeholder engagement activities undertaken by the Project.

6.24.4 Livelihood Restoration Measures

Where livelihood impacts occur and cannot be adequately addressed through mitigation measures alone, one or more of the following restoration measures may be implemented.

7.4.1 Cash-Based Assistance

Where Project activities result in demonstrable livelihood losses that cannot be avoided or adequately mitigated, cash-based assistance may be considered.

The nature and extent of assistance should be determined based on:

- The severity and duration of the impact;
- The extent of livelihood disruption;
- The vulnerability of the affected person or household; and
- The availability of alternative mitigation measures.

7.4.2 Business Restoration Assistance

Where business activities are affected, restoration measures may include:

- Temporary access arrangements;
- Construction scheduling adjustments where feasible;
- Temporary relocation assistance where appropriate;
- Business continuity support measures; and
- Other site-specific measures intended to facilitate restoration of business operations.

7.4.3 Agricultural Restoration Measures

Where agricultural activities are affected, restoration measures may include:

- Compensation for affected crops, trees and productive assets where applicable;
- Restoration of temporarily occupied agricultural lands;
- Reinstatement of access arrangements;
- Rehabilitation of disturbed areas;
- Assistance with re-establishment of agricultural activities where appropriate; and
- Other measures appropriate to the nature of the impact.

7.4.4 Assistance for Informal Livelihood Activities

Where informal livelihood activities are affected, restoration measures may include:

- Temporary relocation assistance where feasible;

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- Assistance with re-establishment of livelihood activities;
- Enhanced stakeholder engagement and communication;
- Temporary access arrangements; and
- Other measures appropriate to the nature of the impact.

7.4.5 Assistance for Extractive Activities

Where Project activities result in demonstrable impacts on sand and gravel extraction activities or associated livelihoods, restoration measures may include:

- Temporary access arrangements where feasible;
- Assistance to address temporary livelihood disruptions;
- Restoration of access following construction; and
- Other measures appropriate to the nature and duration of the impact.

7.4.5 Vulnerable Household Assistance

Where vulnerable persons or households are affected by livelihood impacts, additional support measures may be implemented to reduce the risk of disproportionate adverse effects.

Potential measures may include:

- Enhanced consultation and engagement;
- Priority consideration during implementation of restoration measures;
- Additional livelihood support measures where required; and
- Referrals to relevant social support services or programmes where appropriate.

6.24.5 Monitoring and Compliance

Implementation of the livelihood restoration measures described in this section should be monitored to assess their effectiveness and determine whether affected persons have been able to restore livelihoods and income-generating activities impacted by the Project.

Monitoring activities may include follow-up consultations with affected persons, review of grievance records, assessment of restoration outcomes and monitoring of vulnerable households where applicable.

Where monitoring identifies that livelihood restoration measures have not achieved their intended outcomes, additional measures may be considered and implemented as appropriate.

6.24.6 Indicators (KPIs)

Table 18 presents the key performance indicators that will be used to monitor implementation and effectiveness of the livelihood restoration measures.

Table 18: Livelihood Restoration KPIs

Key Performance Indicator	How Will It Be Monitored and Measured	Responsibility
Affected livelihood activities identified and assessed	Review of assessment records and impact documentation	WASA / Supervising Consultant
Eligible affected persons receiving agreed restoration assistance	Review of implementation records	WASA
Vulnerable households receiving additional support measures where required	Review of monitoring and assistance records	WASA / CLO
Livelihood restoration grievances resolved within established timeframes	Review of grievance records	WASA
Livelihood restoration measures implemented and completed as planned	Monitoring reports and verification of implementation	WASA / Supervising Consultant

6.24.7 Roles and Responsibilities

Table 19 outlines the roles and responsibilities of the parties responsible for implementing, monitoring and reporting on the livelihood restoration measures described in this section.

Table 19: Roles and Responsibilities for Livelihood Restoration

Party	Responsibility
WASA	Overall implementation of the Livelihood Restoration Framework and provision of required assistance measures
Supervising Consultant	Monitoring, verification and reporting on implementation of livelihood restoration measures
Construction Contractor	Support implementation of restoration measures where required and comply with applicable Project requirements
Community Liaison Officer (CLO)	Stakeholder engagement, communication and support to affected persons
Social Specialist	Assessment of livelihood impacts, identification of vulnerable households and support to implementation and monitoring activities
Affected Persons	Participation in consultations and livelihood restoration activities where applicable

6.25 Cultural Heritage Management Plan

6.25.1 Chance Find Program/ Watching Brief

During construction activities, cultural heritage assemblages may be discovered or identified. The Chance Find Program is intended to manage impacts to known, probable and unknown cultural sites. Consultations and communication with the legal and regulatory institutions, such as the National Trust of Trinidad and Tobago should be held and procedures and protocols for assessing any unanticipated cultural heritage sites or materials encountered during the project construction phase should be developed and implemented as outlined below.

6.25.1.1 Chance/Find Protocols & Procedures

Essentially there are several main protocols involved in the implementation of a Chance Find Procedure. These include:

- The Chance Find Program includes the following procedures:
 - a. A local specialist or archaeologist should remain on call and shall provide oversight of the entire Chance Find Program.
 - b. The on-call specialist should be used on an as-needed-basis and will monitor the Chance Find Program.
 - c. The on-call specialists are only required to conduct field monitoring in the case of unusual or highly sensitive and important chance finds.
- A stop work authority/procedure should be affected in the immediate area for the protection of cultural heritage materials encountered during construction activities.
- Document and assess Chance Finds to determine if additional investigations are required.
- Adhere to any established protocols established in consultation with project management of Implementing Agency, Contractors, cultural heritage specialists, local regulatory bodies (for the design and implementation of additional investigations, if needed).
- Identify the roles and responsibilities of the various stakeholders involved.
- The archaeologist must be present during all ground disturbing works conducted within culturally sensitive areas.
- Ground works in other areas should be monitored by at least one member of the project staff who has previously received cultural heritage training.
- Considering that a chance find can be reported by any member of the project staff, it is important that cultural training be provided to all project staff and subcontractors.

If a Chance Find is encountered, the following steps should be undertaken:

1. Issue a stop work order in the vicinity of the find.

2. Inform the site supervisor or project manager.
3. Install temporary site protection measures such as warning tape or avoidance signs.
4. Inform all personnel of the Chance Find if access to any part of the work area is restricted.
5. Establish a localized no-go area needed to protect the Chance Find.
6. Arrange for the specialists to perform a preliminary evaluation to determine whether the Chance Find is cultural heritage and if so, whether it is an isolate or part of a larger site or feature.
7. Leave artefacts in place if possible; if materials are collected, they will be placed in bags and labelled by an archaeologist and transported to the relevant agency. Artefacts should not be allowed to be taken by any project personnel as personal possessions.
8. Document the finding via the use of photography, notes, GPS coordinates and maps as appropriate.
9. If the Chance Find proves to be an isolated find or not of cultural heritage, the specialist will authorize the removal of the site protection measures and activity in the area.

If, however, the specialist confirms the Chance Find as a cultural heritage of artefact or site of significance, inform the National Trust of Trinidad and Tobago, and initiate discussions about treatment as follows:

1. Prepare and retain archaeological monitoring records including initial reports whether they are later confirmed or not. The record shall include coordinates of all observations to be retained;
2. Develop and implement treatment plans for confirmed finds using the services of qualified cultural heritage experts;
3. If a Chance Find is a verified cultural heritage site, prepare a final Chance Find report once treatment has been completed;
4. While investigation is ongoing, co-ordination with onsite personnel is needed so as to keep them informed of the status and schedule of the investigations and inform them of when construction will resume.

In the event that mitigation is required, then expedient rescue excavations should be undertaken by the relevant archaeological specialists unless the chance find is of international importance. If this is the case, then special care should be taken and archaeologists with the appropriate expertise in addressing the find should be appointed.

6.26 Consultation Event outline

In accordance with ESPS 10 meaningful consultations are a requirement throughout the project period for all project interventions. As such a public consultation event is essential for the proposed

**DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES**

project to facilitate the disclosure of project information to allow stakeholders to understand the project's risks, impacts, and potential opportunities and development benefits from the project.

Following the publishing of the ESA and ESMP for the project intervention for public viewing, a public consultation event will be held with no less than 1 week's notice prior to the execution of a public consultation. At least 1 week prior to an event, public advertisement inviting the community should be communicated using multiple modes of communication. The following are some options for advertising that can be utilised for this project:

- Online websites
- Radio or television announcements
- Community Flyers – hard copy in mailboxes and posted community centres
- Community Flyers circulated in the what's App groups of community groups and other community based organisation
- Invitation Letters to government agencies, nongovernmental organisation, private sector and other local entities

To ensure that the consultation meets the requirements of ESPS 10, all communication will be published and presented in the English language, accessible and culturally appropriate, taking into account the needs of groups that may be differentially or disproportionately affected by the project or groups with specific information needs (e.g. disability, literacy, gender, mobility, or accessibility).

In order to make the public consultation accessible for the TT-L1071 program, multiple public consultation events are being recommended based on the groupings outlines below:

1. Project Locations North Central: Acono,
2. Project Locations North East: Matura, Salybia
3. Project Locations South West: Siparia, St. Margaret's, Petrotrin
4. Project Locations South East: Mayaro, Naparimo
5. Project Locations Tobago: Hillsborough, Charlotteville

The consultations will take place within a 1 to 2 week period in the evenings beginning at 5:30pm to facilitate the attendance of the working population.

The public consultations will be conducted with a independent chair person and will be conducted in a manner that provides opportunities to project-affected people and other relevant stakeholders, without fear of reprisal, to express their views on project risks, impacts, and mitigation measures, and on access to potential opportunities and development benefits, and allows the Borrower to consider and respond to any concerns or questions they have regarding the project interventions.

To facilitate accessibility a Hybrid approach is recommended at all the event to facilitate persons participating remotely in these consultations.

Additionally, each consultation will have a target number of attendees from stakeholders and groups that may be affected by the project activities. The Consultant will also strive to ensure an adequate gender ratio among the participants. A 50/50 balance of males to females is the recommended target.

WASA will serve as the host for the public consultations and will fund and make the logistical planning, venue and refreshments. The project consultants will support this process by assisting with the development of the agenda for the event and will facilitate at all events.

DRAFT

7 References

- Beard, J.S. (1946). The Natural Vegetation of Trinidad. Oxford Forestry Memoirs No. 20. Clarendon Press, Oxford.
- Belford, S., & Phillip, D. (2011). Rapid assessment of a coral reef community in a marginal habitat in the southern Caribbean: a simple way to know what's out there. *Asian Journal of Biological Sciences*, 4(7), 520-531.
- Devenish, E. S., & Sayer, C. (2007). A review of the ecology and conservation of the Neotropical river otter, *Lontra longicaudis* (Olfers, 1818), with special reference to Trinidad. *Living World, Journal of the Trinidad and Tobago Field Naturalists' Club*.
- Discover T&T (2020). Trinidad: A Land of Biodiversity. Discover Trinidad and Tobago. Available at: <https://www.discovertnt.com>. Accessed April 2026.
- IUCN (2015). The IUCN Red List of Threatened Species. Version 2015. Available at: <https://www.iucnredlist.org>. Accessed March 2026.
- Kenny, J. (1995). *Views from the bridge: a memoir on the freshwater fishes of Trinidad*. Trinprint.
- Nelson, H.P. (2004). An Account of the Vegetation of Matura National Park. Unpublished report, Forestry Division, Trinidad and Tobago.
- Newsday (2020). Protect Toco Reefs Too. Trinidad and Tobago Newsday, 2 January 2020. Available at: <https://newsday.co.tt>. Accessed November 2025.
- Phillip, D. A., Taphorn, D. C., Holm, E., Gilliam, J. F., Lamphere, B. A., & Lopez-Fernandez, H. (2013). Annotated list and key to the stream fishes of Trinidad & Tobago. *Zootaxa*, 3711(1), 1-64.
- Protected Areas TT (2017). Matura Forest and Coastal Zone: Profile of Sites. Available at: <https://protectedareastt.org.tt>. Accessed November 2025.
- Turtle Village Trust (2019). Status of Sea Turtles in Trinidad and Tobago. Available at: <https://turtlevillagetrust.org>. Accessed November 2025.
- Van den Eynden, V., Oatham, M., Alexander, B., Naranjit, A., Quashie, J., & Koonhow, B. (2007). Matura National Park ESA participatory biological baseline survey. *Unpublished Report. The University of the West Indies, St. Augustine, Trinidad*.
- University of the West Indies (UWI) St. Augustine (2006). Matura National Park Biological Survey: About Matura Environmentally Sensitive Area (MESA). <https://sta.uwi.edu/fst/maturaNP/index.asp>

8 Appendices

Appendix 1: Water Quality Analytical Report for the Matura River

WATER AND SEWERAGE AUTHORITY QUALITY CONTROL DEPARTMENT QUALITY CONTROL INFORMATION SYSTEM

ANALYTICAL REPORT

MATURA RAW (RIVER)

Date Taken	Time	Colour (HU) ≤ 15 HU	Turbidity (NTU) ≤ 5 NTU	Total Dis. Solids	Conductivity (µmhos)	pH 6.5 - 8.5 ±0.02	Total Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Hardness (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chlorides (mg/L)	Residual Chlorine ≥0.5mg/L ± 0.1	Sulphates (mg/L)	Manganese (mg/L)	Nitrates (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Aluminium ≤ 0.2 ±0.02 mg/L	Total Iron ≤ 0.3mg/L ±0.05ppm
14-Jan-13	01:30 PM	5	2.5	240	335	7.6			162	56	5.3	18								0.77
16-Apr-13	01:20 PM	0	3.0	204	290	7.6			210	57	16.0	10								
11-Jul-13	12:10 PM	5	3.2	155	315	8.3			164	56	5.8	9								0.61
25-Feb-14	10:45 AM			220	335	8.1	160	195	158	58	2.9	11			0				0.01	0.50
06-Jul-21	06:37 AM	2	11.0	486	700	8.6						96	0.3							0.09
07-Sep-21	06:58 AM	10	1.2	225	325	8.1	148	180				10								0.21
02-Nov-21	06:48 AM	2	1.0	228	340	8.2	164	200				10	0.1				5.4	0.3		0.07
23-Aug-22	08:00 AM	8	1.7	210	324.6	8.2	168	205				12								0.20

Prepared by:

Joseph Mohammed

Electronically signed by: Joseph Mohammed
Date: 12-Sep-2025 10:12:11 EDT

Mr. Joseph Mohammed
Quality Control Data Manager (Ag.)

Approved by:

Arlene Joseph-Josiah

Electronically signed by: Arlene Joseph-Josiah
Date: 12-Sep-2025 10:21:19 EDT

Mrs. Arlene Joseph-Josiah
Quality Control Manager (Ag.)

WATER AND SEWERAGE AUTHORITY
QUALITY CONTROL DEPARTMENT



TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 2: Water Quality Bacteriological Report for the Matura River



WATER AND SEWERAGE AUTHORITY QUALITY CONTROL DEPARTMENT QUALITY CONTROL INFORMATION SYSTEM

BACTERIOLOGICAL REPORT

MATURA RAW (RIVER)						
Date Taken	Time	Total Coliform (CFU/100mL) 0 cfu/100mL	Faecal Coliform (CFU/100mL) 0 cfu/100mL	Residual Free Chlorine (mg/L) ≥ 0.5 ± 0.1 mg/L	Class	Sampler
21-Mar-11	05:59 AM	132	200	0	Unsafe	Dayal Moonsammy
29-Mar-11	06:04 AM	128	92	0	Unsafe	Dayal Moonsammy
18-May-11	06:35 AM	16000	126	0	Safe	Frederick Harris
27-Feb-12	06:30 AM	136	110		Unsafe	Dayal Moonsammy
14-May-12	06:30 AM	8	ND		Safe	Dayal Moonsammy
20-Jun-12	06:20 AM	184000	1030		Unsafe	Frederick Harris
19-Jul-12	05:20 PM	19	32		Unsafe	Frederick Harris
13-Dec-12	06:30 AM	2300	1030		Unsafe	Frederick Harris
17-Jan-13	06:40 AM	830	600		Unsafe	Frederick Harris
19-Feb-13	06:50 AM	ND	ND	1.4	Safe	Frederick Harris
15-Mar-13	06:05 AM	TNTC	TNTC		Safe	Frederick Harris
24-Apr-13	06:12 AM	65	42	0	Unsafe	Kien Hernandez
20-May-13	06:25 AM	TNTC	6		Unsafe	Frederick Harris
25-Jul-13	06:05 AM	200	200	0	Unsafe	Kien Hernandez
18-Oct-13	06:30 AM	5500	1000		Unsafe	Frederick Harris
22-Jan-14	06:40 AM	ND	23		Unsafe	Frederick Harris
19-Feb-14	06:30 AM	290	19		Unsafe	Frederick Harris
18-Mar-14	06:10 AM	500	21	0	Safe	Kien Hernandez
23-Apr-14	06:15 AM	920	46	0	Unsafe	Kien Hernandez

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

BACTERIOLOGICAL REPORT

MATURA RAW (RIVER)						
Date Taken	Time	Total Coliform (CFU/100mL) 0 cfu/100mL	Faecal Coliform (CFU/100mL) 0 cfu/100mL	Residual Free Chlorine (mg/L) ≥ 0.5 ± 0.1 mg/L	Class	Sampler
20-May-14	06:03 AM	1170	106	0	Unsafe	Kien Hernandez
08-Jul-14	06:15 AM	ND	ND	1.8	Safe	Kien Hernandez
22-Aug-14	06:10 AM	1350	860	0	Unsafe	Kien Hernandez
14-Oct-14	06:10 AM	2500	120	0	Unsafe	Kien Hernandez
19-May-15	06:25 AM	1500	500	0	Safe	Kien Hernandez
23-Jun-15	06:27 AM	2200	100	0	Safe	Kien Hernandez
19-Aug-15	06:15 AM	1300	96	0	Unsafe	Kien Hernandez
20-Oct-15	06:20 AM	206	13	0	Safe	Kien Hernandez
23-Dec-15	06:23 AM	112	ND	0	Unsafe	Kien Hernandez
26-Jan-16	06:07 AM	490	2	0	Unsafe	Kien Hernandez
19-Apr-22	06:38 AM	ND*	ND*	1	Safe	David Hannibal
19-Jul-22	07:01 AM	ND*	ND	1.2	Safe	David Hannibal
23-Aug-22	08:00 AM	<10*	<10*		Safe	Kriston Parris
27-Sep-22	07:50 AM	ND**	ND	2.1	Safe	Kriston Parris
10-Feb-23	07:25 AM	ND	ND	3.2	Unsafe	David Hannibal

Prepared by:

Joseph Mohammed

Electronically signed by: Joseph Mohammed
Date: 12-Sep-2025 10:12:11 EDT

Mr. Joseph Mohammed
Quality Control Data Manager (Ag.)

Approved by:

Arlene Joseph-Josiah

Electronically signed by: Arlene Joseph-Josiah
Date: 12-Sep-2025 10:21:19 EDT

Mrs. Arlene Joseph-Josiah
Quality Control Manager (Ag.)

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 3: Conditional Severity Occurrence of the Matura Water Treatment Plant

#	Process	Asset Component	Problems Identified	Critical Rating				Recommended Resolution
				L	S	Score	CR	
	Civil							
1	Raw Water	Raw water intake	Excess sediment build around sump area	2	2	4	MEDIUM	Scheduled maintenance of sump area
	Raw Water	Weir	Makeshift sand bag catchment/weir	2	2	4	MEDIUM	Build a proper catchment area/weir
	Mechanical							
2	Raw Water	Flow Meter 6"	No flowmeter exists	2	1	2	LOW	Install 6" Flowmeter
	Raw Water	Gate valve 6"	Gate Valve leaking	2	1	2	LOW	Repair/service 6"gate valve
	Raw Water	Raw Water Pump	No standby raw water pump	4	2	8	HIGH	Install a standby raw water pump
	Raw Water	Raw Water Pump	Minor leak on raw water pump	2	1	2	LOW	Repair/service Raw water pump
	Filtration	Pressure gauge	No filter pressure gauge exists	2	1	2	LOW	Install a filter pressure gauge
	Filtration	Butterfly valve 6"	6" Butterfly valve on drain line corroded	2	2	4	MEDIUM	Repair/replace 6" butterfly valve on drain line
	Filtration	Filter backwash pump	Defective filter backwash pump	2	2	4	MEDIUM	Repair filter backwash pump
	Chlorination	Hypochlorite gauge	No standby hypochlorite dosing pump exists	3	1	3	LOW	Install a standby hypochlorite pump
	Chlorination	Hypochlorite pump	No hypochlorite gauge exists	3	1	3	LOW	Install a hypochlorite gauge
	Electrical & Instrumentation							
3	Raw Water	Lighting Fixtures	Poor illumination by raw water pump	2	1	2	LOW	Repair existing lights and install additional lighting fixtures on new poles

#	Process	Asset Component	Problems Identified	Critical Rating				Recommended Resolution
				L	S	Score	CR	
	Raw Water	Lighting Fixtures	Corroded lighting poles	2	1	2	LOW	Replace corroded lighting poles
	Raw Water	Chemical Monitor	Defective Chemtrac SCC 3500 chemical monitor	2	1	2	LOW	Service/Repair Chemtrac monitor
	Raw Water	Chemical Monitor	Electrical & Wiring exposed for Chemtrac unit	2	1	2	LOW	Electrical repairs/insulation required
	Filtration	Ph & Turbidity sensor	Ph & turbidity sensor not connected to system	3	3	9	HIGH	Connect Ph & turbidity sensor to system
	Filtration	Electrical Panel	Electrical & Wiring exposed in filter room	2	3	6	MEDIUM	Electrical repairs/insulation required
	Filtration	Stand by air blower	No standby air blower exists	4	3	12	HIGH	Install a standby air blower
	Filtration	Actuator	Defective actuator for filter # 1	3	3	9	HIGH	Repair/replace actuator
	Building	Generator	Standby Generator not operational	3	3	9	HIGH	Service/Repair standby generator
Facilities								
4	Raw Water	Raw water pump	Excess algae buildup on the plinth around raw water pump	2	1	2	LOW	General cleanup around raw water pump
	Raw Water	Grounds	Overgrown grass and bushes	2	1	2	LOW	Scheduled ground maintenance required
	Filtration	Steel support for filters	Vertical steel support for filters corroded	3	2	6	MEDIUM	Repair vertical steel supports for filters

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMDG
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 4: National Air Quality Standards (Max. Permissible Levels for Ambient Air Quality)

No.	Substance	Short-Term Maximum Permissible Levels		Long-Term Maximum Permissible Levels	
		Maximum Permissible Levels	Averaging Time	Maximum Permissible Levels	Averaging Time
Particulates					
1	Total Suspended Particulate (TSP)	150 $\mu\text{g}/\text{m}^3$	24 hours		
2	PM ₁₀	75 $\mu\text{g}/\text{m}^3$	24 hours	50 $\mu\text{g}/\text{m}^3$	1 year
3	PM _{2.5}	65 $\mu\text{g}/\text{m}^3$	24 hours	15 $\mu\text{g}/\text{m}^3$	1 year
Non-Metallic Inorganic Substances					
4	Carbon monoxide (CO)	100 000 $\mu\text{g}/\text{m}^3$	15 minutes		
		60 000 $\mu\text{g}/\text{m}^3$	30 minutes		
		30 000 $\mu\text{g}/\text{m}^3$	1 hour		
		10 000 $\mu\text{g}/\text{m}^3$	8 hours		
5	Nitrogen dioxide (NO ₂)	200 $\mu\text{g}/\text{m}^3$	1 hour	40 $\mu\text{g}/\text{m}^3$	1 year
6	Sulfur dioxide (SO ₂)	500 $\mu\text{g}/\text{m}^3$	10 minutes	50 $\mu\text{g}/\text{m}^3$	1 year
		125 $\mu\text{g}/\text{m}^3$	24 hours		
7	Ozone (O ₃)	120 $\mu\text{g}/\text{m}^3$	8 hours		
8	Sulfuric acid (H ₂ SO ₄)	100 $\mu\text{g}/\text{m}^3$	30 minutes		
9	Hydrogen sulphide (H ₂ S)	30 $\mu\text{g}/\text{m}^3$	30 minutes		
10	Ammonia (NH ₃)	3600 $\mu\text{g}/\text{m}^3$	30 minutes		
11	Total fluoride	1.0 $\mu\text{g}/\text{m}^3$	24 hours	0.4 $\mu\text{g}/\text{m}^3$	90 days
12	Hydrogen chloride (HCl)	100 $\mu\text{g}/\text{m}^3$	30 minutes		
13	Chlorine (Cl) and its compounds	300 $\mu\text{g}/\text{m}^3$	30 minutes		
14	Asbestos (fibres > 5 μm in length)	0.04 fibres/cm ³	24 hours		
15	Asbestos (total)	5 $\mu\text{g}/\text{m}^3$	30 minutes		
Metallic Substances					
16	Cadmium (Cd) and its compounds	5.0 $\mu\text{g}/\text{m}^3$ of total Cd in free and combined form	30 minutes		
17	Mercury (Hg) and its compounds	1.5 $\mu\text{g}/\text{m}^3$ of total alkyl Hg compounds	30 minutes		
		5.0 $\mu\text{g}/\text{m}^3$ of total Hg in free and combined form	30 minutes		

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMDG
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

No.	Substance	Short-Term Maximum Permissible Levels		Long-Term Maximum Permissible Levels	
		Maximum Permissible Levels	Averaging Time	Maximum Permissible Levels	Averaging Time
18	Antimony (Sb) and its compounds	75 µg/m ³ of total Sb in free and combined form	30 minutes	Sb and its compounds	75 µg/m ³ of total Sb in free and combined form
19	Beryllium (Be) Compounds	0.01 µg/m ³	24 hours		
20	Lead (Pb)	10 µg/m ³ of total Pb in free and combined form	30 minutes	1.5 µg/m ³ 0.5 µg/m ³	3 months 1 year
Organic Substances					
21	Biphenyl (C ₆ H ₅) ₂	60 µg/m ³	1 hour		
22	Carbon disulfide (CS ₂)	330 µg/m ³	24 hours		
23	Ethylbenzene (C ₆ H ₅ C ₂ H ₅)	1000 µg/m ³	24 hours		
24	Formaldehyde (CH ₂ O)	65 µg/m ³	24 hours		
25	Mercaptan (as Methyl Mercaptan- CH ₃ SH)	20 µg/m ³	1 hour		
26	Polychlorinated Biphenyls (PCBs)	0.15 µg/m ³	24 hours	0.035 µg/m ³	1 yr
27	Xylenes (C ₆ H ₄ (CH ₃) ₂) (isomers and mixture)	2300 µg/m ³	24 hours		
28	Total Dioxin and Furans	0.5 pg TEQ/m ³	24 hours		

PM₁₀ means Particulate Matter with an aerodynamic diameter of less than 10 µm;

PM_{2.5} means Particulate Matter with an aerodynamic diameter of less than 2.5 µm;

ng means nanogram or one-billionth of a gram which is expressed as 1 x 10⁻⁹ grams in scientific notation; and

pg means picogram or one-trillionth of a gram which is expressed as 1 x 10⁻¹² in scientific notation.

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 5: National Air Quality Standards (Stack Release Limits)

NO.	SUBSTANCE/PARAMETER	MAXIMUM PERMISSIBLE LIMITS mg/Nm ³
Particulate Substance		
1	Particulate matter	100 mg of particulate matter in each normal cubic metre of residual gases, (adjusted to a basis of 12 % CO ₂ for air emissions from fuel-burning equipment, if required by the specified test method)
Physical Parameter		
2	Opacity	20 % ¹
Non-Metallic Inorganic Substances		
3	Sulfur dioxide (SO ₂)	1000
4	Oxides of nitrogen (NO _x)	500 as NO ₂
5	Carbon monoxide (CO)	1000
6	Sulfuric acid (H ₂ SO ₄) mist or sulfur trioxide (SO ₃)	100 as SO ₃
7	Hydrogen sulfide (H ₂ SO ₄)	15
8	Ammonia (NH ₃)	50
9	Fluorine (F) and its compounds	5 as hydrogen fluoride (HF); or 5 as total fluoride
10	Acids and acid gases, as hydrogen chloride (HCl)	10 as HCl
11	Chlorine (Cl) and its compounds	5 as Cl
Metallic Inorganic Substances		
12	Lead (Pb) and its compounds	0.5 as Pb
13	Antimony (Sb) and its compounds	5 as Sb
14	Arsenic (As) and its compounds	0.8 as As
15	Cadmium (Cd) and its compounds	0.05 as Cd
16	Mercury (Hg) and its compounds	0.05 as Hg
17	Heavy metals (other)	5 as heavy metals (other)
Organic Substances		
18	Volatile Organic Compounds (VOCs)	20 as VOCs
19	Dioxins	0.2 ng TEQ/Nm ³ ²
20	Furans	0.2 ng TEQ/Nm ³

In order to calculate a TEQ, a toxic equivalent factor (TEF) is assigned to each member of the dioxin and dioxin-like compounds category. The TEF is the ratio of the toxicity of one of the

For the purposes of Schedule 2 -

¹ Opacity is to be measured by averaging opacity over any six-minute period.

² Toxic Equivalent (TEQ) is a calculated value that allows comparisons of the toxicity of different combinations of dioxins and dioxin-like compounds. The two most toxic compounds in the dioxin and dioxin-like compounds category are the comparison points. For example, a mixture weighing 10 g with a TEQ of 5 g would be as toxic as 5 g of either of those compounds.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Compounds in this category to the toxicity of the two most toxic compounds in the category, that is, 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (commonly referred to as dioxin) and 1, 2, 3, 7, 8 - pentachlorodibenzo-p-dioxin, which are assigned a TEF of 1. TEFs that have been established through international agreements currently range from 1 to 0.0001.

A TEQ is calculated by multiplying the actual grams weight of each dioxin and dioxin-like compound by its corresponding TEF (e.g., 10 grams $\times$ 0.1 TEF = 1 gram TEQ) and then summing the results. The number that results from this calculation is referred to as grams TEQ.

For example, consider the following 60g mixture:

10 g of compound A, with a TEF of 1
20 g of compound B, with a TEF of 0.5
30 g of compound C, with a TEF of 0.2

The TEQ of this mixture would be –

$$(10 \text{ g} \times 1) + (20 \text{ g} \times 0.5) + (30 \text{ g} \times 0.2) = 26 \text{ g TEQ}$$

This mixture of 60 g of various compounds would be as toxic as 26 g of either of the two most toxic compounds.

Sampling and analysis to determine compliance with the standards listed in Schedules 1 and 2 shall be in accordance with such methods as are approved by Authority.

DRY

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 6: National Water Quality Standards (Water Pollutants)

No.	Parameters or Substances	Quantity, Condition or Concentration at which substance or parameter is defined as a pollutant ^a
1.	Temperature	Maximum variation of 3 ⁰ C from ambient
2.	Hydrogen ion (pH)	Less than 6 or greater than 9
3.	Dissolved Oxygen Content (DO)	<4
4.	Five day Biological Oxygen Demand (BOD ₅ at 20 ⁰ C)	>10
5.	Chemical Oxygen Demand (COD)	>60
6.	Total Suspended Solids (TSS)	>15
7.	Total Oil and Grease (TO&G) or n-Hexane Extractable Material (HEM)	>10
8.	Ammoniacal Nitrogen (as NH ₃ -N)	>0.01
9.	Total Phosphorus (as P)	>0.1
10.	Sulphide (as H ₂ S)	>0.2
11.	Chloride (as Cl ⁻)	>250
12.	Total Residual Chlorine (as Cl ₂)	0.2
13.	Dissolved Hexavalent Chromium (Cr ⁶⁺)	>0.01
14.	Total Chromium (Cr)	>0.1
15.	Dissolved Iron (Fe)	>1.0
16.	Total Petroleum Hydrocarbons (TPH)	NIAA
17.	Total Nickel (Ni)	>0.5
18.	Total Copper (Cu)	>0.01
19.	Total Zinc (Zn)	>0.1
20.	Total Arsenic (As)	>0.01
21.	Total Cadmium (Cd)	>0.01
22.	Total Mercury (Hg)	>0.005
23.	Total Lead (Pb)	>0.05
24.	Total Cyanide (as CN ⁻)	>0.01
25.	Phenolic Compounds (as phenol)	>0.1
26.	Radioactivity	NIAA
27.	Toxicity	NATE
28.	Faecal Coliforms	>100

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 7: National Water Quality Standards (Water Pollutants)

No.	Water Pollutants	Receiving Environment			
	Parameters or Substances	Inland Surface Water	Coastal Nearshore	Marine Offshore	Environmentally Sensitive Areas and/or Groundwater
Levels or Conditions					
1.	Temperature	35	40	45	NIAA
2.	Dissolved Oxygen	>4	>4	>4	>4
3.	Hydrogen ion (pH)	6-9	6-9	6-9	6-9
4.	Five day Biological Oxygen Demand (BOD ₅ at 20°C)	30	50	100	10
5.	Chemical Oxygen Demand (COD)	250	250	250	60
6.	Total Suspended Solids (TSS)	50	150	200	15
7.	Total Oil and Grease (TO&G) or n-Hexane Extractable Material (HEM)	10	15	100	No release
8.	Ammoniacal Nitrogen (as NH ₃ -N)	10	10	10	0.1
9.	Total Phosphorous (as P)	5	5	5	0.1
10.	Sulphide (as H ₂ S)	1	1	1	0.2
11.	Chloride (as Cl ⁻)	250	NIAA	NIAA	NIAA
12.	Total Residual Chloride (as Cl ₂)	1	1	2	0.2
13.	Dissolved Hexavalent Chromium (Cr ⁶⁺)	0.1	0.1	0.1	0.01
14.	Total Chromium (Cr)	0.5	0.5	0.5	0.1
15.	Dissolved Iron (Fe)	3.5	3.5	3.5	1.0
16.	Total Petroleum Hydrocarbons (TPH)	25	40	80	No release
17.	Total Nickel (Ni)	0.5	0.5	0.5	0.5
18.	Total Copper (Cu)	0.5	0.5	0.5	0.01
19.	Total Zinc (Zn)	2	2	2	0.1
20.	Total Arsenic (As)	0.1	0.1	0.1	0.01
21.	Total Cadmium (Cd)	0.1	0.1	0.1	0.01
22.	Total Mercury (Hg)	0.01	0.01	0.01	0.005
23.	Total Lead (Pb)	0.1	0.1	0.1	0.05
24.	Total Cyanide (as CN ⁻)	0.1	0.1	0.1	0.01
25.	Phenolic Compounds (as phenol)	0.5	0.5	0.5	0.1
26.	Radioactivity	NIAA	NIAA	NIAA	NIAA
Levels or Conditions					
27.	Toxicity	NATE	NATE	NATE	NATE
28.	Faecal Coliforms	400	400	400	100

* all units are in milligrams per litre (mg/L) except for temperature (°C), pH (pH units), faecal coliforms (counts per 100ml), radioactivity (Bq/L) and toxicity (toxic units)

NIAA-no increase above ambient

NATE-no acute toxic effects

NSD-No solid debris

<-less than

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 8: Ambient Water Quality Standards for Freshwater

PHYSICO-CHEMICAL PARAMETERS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
1	Temperature (°C)	≤ 30	≤ 30	≤ 30
2	Dissolved Oxygen (mg/L)	≥ 3.0	≥ 85% saturation	≥ 80% saturation
3	pH (pH Units)	6.5 to 8.5	6.5 to 8.5	6.5 to 8.5
4	Total Alkalinity (mg/L)	≤ 20	≤ 20	≤ 20
5	Nitrate (mg/L)	≤ 10	≤ 10	≤ 10
6	Total Phosphate (mg/L)	≤ 0.5	≤ 0.5	≤ 0.5
7	Sulphate (mg/L)	≤ 250	≤ 400	≤ 400
8	Conductivity (µS)	Not Applicable	≤ 2,500	Not Applicable
9	Total Hardness (mg/L)	Not Applicable	As Ca: 100 to 300; As CaCO ₃ : 200 to 300	Not Applicable
10	Chlorides (mg/L)	120 to 230 (long term); 640 to 860 (short term)	≤ 250	Not Applicable
11	Colour (TCU)	Not Applicable	≤ 15	Not intense to impede visibility for swimming
12	Hydrogen sulphide (mg/L)	Not Applicable	≤ 0.05	Not detectable
13	Odour	Not Applicable	Inoffensive	Inoffensive
14	Total Suspended Solids (mg/L)	During the dry season: ≤ 25 mg/L During periods of heavy rainfall: a maximum increase of 25 mg/L above background levels, where these levels range from 25 to 250 mg/L. Where background levels are ≥ 250 mg/L, increase should not be more than 10% of background levels.	Not Applicable	During the dry season ≤ 65 mg/L. During periods of heavy rainfall, a maximum increase of 100 mg/L above background levels, where these levels range from 65-500 mg/L. Where background levels are > 500 mg/L, the increase should not be more than 10% of background levels

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

PHYSICO-CHEMICAL PARAMETERS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
15	Total dissolved solids (mg/L)	Not Applicable	≤ 600	Not Applicable
16	Turbidity (NTU)	Not Applicable	≤ 5	≤ 50
17	Taste	Not Applicable	Inoffensive	Not Applicable
18	Total Oil and Grease (mg/L)	≤ 1	≤ 1	Not detected as a film, sheen or discolouration, or by odour on water's surface; not detected by sight or odour on shorelines, river banks and sediments
19	Silica (mg/L)	Not Applicable	≤ 80	Not Applicable
20	Sodium (mg/L)	Not Applicable	≤ 200	Not Applicable
21	Ammonia (µg/L)	≤ 320	≤ 500	Not Applicable
METALS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
22	Aluminium (mg/L)	Not Applicable	≤ 0.2	Not Applicable
23	Arsenic (µg/L)	≤ 5	≤ 10	Not Applicable
24	Barium (µg/L)	Not Applicable	≤ 700	Not Applicable
25	Cadmium (µg/L)	≤ 2.0 (short term); ≤ 0.25 (long term)	≤ 2	Not Applicable
26	Chromium (total) (µg/L)	Not Applicable	≤ 50	Not Applicable
27	Chromium III (µg/L)	≤ 570 (short term); ≤ 74 (long term)	Not Applicable	Not Applicable
28	Chromium VI (µg/L)	16 (short term); ≤ 0.01 (long term)	Not Applicable	Not Applicable
29	Copper (µg/L)	≤ 1	≤ 1,000	Not Applicable
30	Iron (µg/L)	≤ 300	≤ 300	Not Applicable
31	Lead (µg/L)	≤ 65 (short term); ≤ 1 (long term)	≤ 10	Not Applicable
32	Manganese (mg/L)	Not Applicable	< 0.5	Not Applicable

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

METALS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
33	Mercury (µg/L)	≤ 1.4 (short term); ≤ 0.026 (long term)	≤ 1	Not Applicable
34	Nickel (µg/L)	≤ 470 (short term); ≤ 25 (long term)	≤ 20	Not Applicable
35	Selenium (µg/L)	≤ 1	≤ 10	Not Applicable
36	Silver (µg/L)	≤ 3.2 (short term); ≤ 0.02 (long term)	≤ 100	Not Applicable
37	Zinc (µg/L)	≤ 120 (short term); ≤ 2.4 (long term)	≤ 5,000	Not Applicable
PESTICIDES/ HERBICIDES		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
38	Aldrin (µg/L)	Not Applicable	≤ 0.03	Not Applicable
39	Chlordane (µg/L)	≤ 2.4 (short term); ≤ 0.0043 (long term)	≤ 0.2	Not Applicable
40	Dieldrin (µg/L)	≤ 0.24 (short term); ≤ 0.056 (long term)	≤ 0.03	Not Applicable
41	DDT (µg/L)	≤ 0.006	≤ 1	Not Applicable
42	Endrin (µg/L)	≤ 0.086 (short term); ≤ 0.01 (long term)	≤ 0.2	Not Applicable
43	Endosulfan (µg/L)	≤ 0.06 (short term); ≤ 0.003 (long term)	≤ 20	Not Applicable
44	α-Endosulfan (µg/L)	≤ 0.22 (short term); ≤ 0.056 (long term)	Not Applicable	Not Applicable
45	β-Endosulfan (µg/L)	≤ 0.22 (short term); ≤ 0.056 (long term)	Not Applicable	Not Applicable
46	Heptachlor (µg/L)	≤ 0.52 (short term); ≤ 0.0038 (long term)	≤ 0.03	Not Applicable
47	Hexachlorobenzene (µg/L)	≤ 0.01 (long term)	≤ 1	Not Applicable
48	Lindane (γ-BHC) (µg/L)	≤ 0.95 (short term); ≤ 0.07 (long term)	≤ 0.2	Not Applicable
49	Mirex (µg/L)	≤ 0.001	Not Applicable	Not Applicable
50	Pentachlorobenzene (µg/L)	≤ 6	Not Applicable	Not Applicable

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

PESTICIDES/ HERBICIDES		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
51	PCBs (µg/L)	≤ 0.014	≤ 0.5	Not Applicable
52	Toxaphene (µg/L)	≤ 0.73 (short term); ≤ 0.0002 (long term)	≤ 3	Not Applicable
53	2,4- Dichlorophenoxy acetic acid/2,4-D (mg/L)	Not Applicable	≤ 0.03	Not Applicable
54	Alachlor (µg/L)	Not Applicable	≤ 2	Not Applicable
55	Atrazine (mg/L)	Not Applicable	≤ 0.003	Not Applicable
56	Bromoxynil (mg/L)	Not Applicable	≤ 0.005	Not Applicable
57	Carbaryl (µg/L)	≤ 2.1	≤ 90	Not Applicable
58	Carbofuran (mg/L)	Not Applicable	≤ 0.007	Not Applicable
59	Dalapon (mg/L)	Not Applicable	≤ 0.2	Not Applicable
60	Diazinon (µg/L)	≤ 0.17	≤ 20	Not Applicable
61	Dicamba (mg/L)	Not Applicable	≤ 0.12	Not Applicable
62	Dimethoate (mg/L)	Not Applicable	≤ 0.006	Not Applicable
63	Glyphosate (µg/L)	≤ 27 (short term); ≤ 0.8 (long term)	≤ 280	Not Applicable
64	Malathion (µg/L)	≤ 0.1	≤ 190	Not Applicable
65	Metolachlor (mg/L)	Not Applicable	≤ 0.01	Not Applicable
66	Metribuzin (mg/L)	Not Applicable	≤ 0.08	Not Applicable
67	Paraquat (mg/L)	Not Applicable	≤ 0.007 (as Paraquat ion)	Not Applicable
68	Picloram (mg/L)	Not Applicable	≤ 0.19	Not Applicable
69	Simazine (mg/L)	Not Applicable	≤ 0.002	Not Applicable
POLYCYCLIC AROMATIC HYDROCARBONS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
70	Acenaphthene (µg/L)	≤ 5.8	Not Applicable	Not Applicable
71	Anthracene (µg/L)	≤ 0.012	Not Applicable	Not Applicable
72	Benzo[a]anthracene (µg/L)	≤ 0.018	Not Applicable	Not Applicable
73	Benzo[a]pyrene (µg/L)	Not Applicable	≤ 0.01	Not Applicable
74	Fluoranthene (µg/L)	≤ 0.04	Not Applicable	Not Applicable

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

POLYCYCLIC AROMATIC HYDROCARBONS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
75	Fluorene (µg/L)	≤ 3	Not Applicable	Not Applicable
76	Naphthalene (µg/L)	≤ 1.1	Not Applicable	Not Applicable
77	Phenanthrene (µg/L)	≤ 0.4	Not Applicable	Not Applicable
78	Pyrene (µg/L)	≤ 0.025	Not Applicable	Not Applicable
79	Total PAHs (µg/L)	Not Applicable	≤ 0.1	Not Applicable
OTHER ORGANIC CHEMICALS				
80	Benzene (µg/L)	≤ 370	≤ 1	Not Applicable
81	Ethylbenzene (µg/L)	≤ 90	≤ 300	Not Applicable
82	Toluene (µg/L)	≤ 2	≤ 700	Not Applicable
83	Xylene (mg/L)	Not Applicable	≤ 0.5	Not Applicable
84	Cyanide (µg/L)	≤ 22 (short term); ≤ 4 (long term)	≤ 50	Not Applicable
85	Heptachlor epoxide (µg/L)	Not Applicable	≤ 0.2	Not Applicable
86	Methyl tertiary-butyl ether (MTBE) (µg/L)	≤ 10,000	Not Applicable	Not Applicable
87	Tributyltins (TBTs) (µg/L)	≤ 0.46 (short term); ≤ 0.072 (long term)		Not Applicable
88	Di (2-ethylhexyl) phthalate (DEHP) (µg/L)		≤ 6	Not Applicable
MICROBIOLOGICAL PARAMETERS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
89	<i>Cryptosporidium</i> (counts/100 ml)	Not Applicable	0	Not Applicable
90	<i>Escherichia coli</i> (counts/100 ml)	≤ 126	0	≤ 200 (geometric mean of at least 5 samples)
91	Faecal coliforms (counts/100 ml)	Not Applicable	0	≤ 200 (geometric mean of at least 5 samples)
92	<i>Enterococci</i> (counts/100 ml)	≤ 33	0	≤ 35 (geometric mean of at least 5 samples)
93	<i>Giardia</i> (counts/100 ml)	Not Applicable	0	Not Applicable
94	<i>Legionella</i> (counts/100 ml)	Not Applicable	0	Not Applicable

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

MICROBIOLOGICAL PARAMETERS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
95	Heterotrophic plate count (colonies/ml)	Not Applicable	≤ 500	Not Applicable
96	Total coliforms (counts/100 ml)	Not Applicable	0	Not Applicable
97	Cyanobacteria (cells/100 ml)	Not Applicable	Not Applicable	$\leq 100,000$

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 9: Ambient Water Quality for Marine Environments

PHYSICO-CHEMICAL PARAMETERS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	RECREATION
1	Temperature (°C)	≤ 32	≤ 32
2	Dissolved Oxygen (mg/L)	≥ 5 mg/L	> 80% saturation
3	pH (pH Units)	6.5 to 8.5	6.5 to 8.5
4	Nitrate (mg/L)	≤ 10	≤ 10
5	Total Phosphate (mg/L)	≤ 0.1	≤ 0.5
6	Total Suspended Solids (mg/L)	Dry season maximum 25 Maximum of 250 during periods of heavy rainfall	during the dry season ≤ 80 mg/L. During periods of heavy rainfall, a maximum increase of 100 mg/L above background levels, where these levels range from 80-500 mg/L. Where background levels are >500 mg/L, the increase should not be more than 10% of background levels
7	Colour (TCU)	Increased colour (in combination with turbidity) should not reduce the depth of the compensation point for photosynthetic activity by more than 10% from the seasonally established norm for aquatic life	should not be so intense or so dark as to impede users in estimating depth, seeing subsurface hazards easily and, for people concerned with their safety, in detecting users in difficulty
8	Total Oil and Grease (mg/L)	≤ 1.0	Not detected as a film, sheen or discolouration, or by odour on water's surface; not detected by sight or odour on shorelines, river banks and sediments
9	Salinity (ppt)	Human activities should not cause the salinity (expressed as parts per thousand [‰]) of marine and estuarine waters to fluctuate by more than 10% of the natural level expected at that time and depth	Not Applicable
10	Ammonia (mg/L)	≤ 0.5	≤ 0.5
11	Odour	Not Applicable	Not detectable
12	Litter	Not Applicable	≤ 3 items of litter per m ²

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

METALS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	RECREATION
13	Arsenic (mg/L)	0.036 (CCC)	Not Applicable
14	Cadmium (mg/L)	0.0079 (CCC)	Not Applicable
15	Chromium VI (mg/L)	1.1 (CMC); 0.05 (CCC)	Not Applicable
16	Copper (mg/L)	0.0048 (CMC); 0.0031 (CCC)	Not Applicable
17	Lead (mg/L)	0.21 (CMC); 0.0081 (CCC)	Not Applicable
18	Mercury (mg/L)	0.0018 (CMC); 0.00094 (CCC)	Not Applicable
19	Nickel (mg/L)	0.074 (CMC); 0.071 (CCC)	Not Applicable
20	Selenium (mg/L)	0.290 (CMC) to 0.071 (CCC)	Not Applicable
21	Silver (mg/L)	0.0019 (CMC); 0.0008 (CCC)	Not Applicable
22	Zinc (mg/L)	0.09 (CMC); 0.081 (CCC)	Not Applicable

PESTICIDES/ HERBICIDES		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	RECREATION
23	Aldrin (µg/L)	0.0013 (CMC)	Not Applicable
24	Chlordane (µg/L)	0.09 (CMC); 0.004 (CCC)	Not Applicable
25	Dieldrin (µg/L)	0.71 (CMC); 0.0019 (long term)	Not Applicable
26	Endrin (µg/L)	0.037 (CMC); 0.0023 to 0.004 (CCC)	Not Applicable
27	Endosulfan (µg/L)	0.09 (CMC); 0.002 to 0.005 (CCC)	Not Applicable
28	α-Endosulfan (µg/L)	0.034 (CMC); 0.0087 (CCC)	Not Applicable
29	β-Endosulfan (µg/L)	0.034 (CMC); 0.0087 (CCC)	Not Applicable
30	Heptachlor (µg/L)	0.053 (CMC); 0.0036 (CCC)	Not Applicable
31	Lindane (γ-BHC) (µg/L)	0.16	Not Applicable
32	Mirex (µg/L)	0.001	Not Applicable
33	PCBs (µg/L)	0.03	Not Applicable
34	Toxaphene (µg/L)	0.21 (CMC); 0.0002 (CCC)	Not Applicable
35	Carbaryl (µg/L)	1.6	Not Applicable
36	Diazinon (µg/L)	0.82	Not Applicable

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

POLYCYCLIC AROMATIC HYDROCARBONS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	RECREATION
37	Naphthalene (µg/L)	1.4 to 50	Not Applicable
OTHER ORGANIC CHEMICALS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	RECREATION
38	Benzene (µg/L)	110 to 500	Not Applicable
39	Ethylbenzene (µg/L)	25	Not Applicable
40	Toluene (µg/L)	215	Not Applicable
41	Cyanide (µg/L)	1 to 2 (CMC); 1 (CCC)	Not Applicable
42	Methyl tertiary-butyl ether (MTBE) (µg/L)	5,000	Not Applicable
43	Tributyltins (TBTs) (µg/L)	0.42 (CMC); 0.0074 (CCC)	Not Applicable
OTHER ORGANIC CHEMICALS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	RECREATION
44	Di (2-ethylhexyl) phthalate (DEHP) (µg/L)	16	Not Applicable
MICROBIOLOGICAL PARAMETERS		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	RECREATION
45	<i>Escherichia coli</i> (counts/100 ml)	Not Applicable	≤ 250 (geometric mean of at least 5 samples)
46	Faecal coliforms (counts/100 ml)	Not Applicable	100 (geometric mean of at least 5 samples)
47	<i>Enterococci</i> (counts/100 ml)	Not Applicable	The geometric mean of at least 5 samples, taken during a period not to exceed 30 days, should not exceed 35 enterococci/100 mL. Resampling should be performed when any sample exceeds 70 enterococci/100ml. However, if it can be demonstrated that <i>E. coli</i> or faecal coliforms can adequately demonstrate the presence of faecal contamination in marine waters, then the <i>E. coli</i> or faecal coliform maximum limit for fresh waters may be used. If there is any doubt, samples should be examined for both sets of indicators for extended periods to determine if a positive relationship exists.

Appendix 10: Code of Conduct

Introduction

The project is committed to ensuring a work environment which minimizes any negative impacts on the local environment, communities, and its workers. The project also strongly commits to creating and maintaining an environment in which Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) have no place, and where they will not be tolerated by any employee, sub-contractor, supplier, associate, or any representative of the company implementing the proposed works.

The purpose of this *Code of Conduct* is to:

1. Create a common understanding of what constitutes acceptable and unacceptable forms of conduct during work and in any interactions with the community and beneficiaries. This includes matters of sexual exploitation and abuse, and sexual harassment including their forms, the reasons behind their prohibition and the sanctions to be deployed.
2. Create a shared commitment to fair, appropriate and socially responsive behaviors and guidelines for company employees as well as contractors/third-party suppliers to prevent, report, and respond to SEA and SH, and
3. Create understanding that breach of this code of conduct will result in disciplinary action.
4. Frequency and content of the training for the prevention of sexual exploitation and abuse.

Definitions

Sexual Exploitation and Abuse (SEA)¹

Is defined as any actual or attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another².

- **Sexual Abuse:** “The actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions.” **Usually between project team members and beneficiaries.**
- **Sexual Harassment:**³ Unwelcome sexual advances, request for sexual favors, and other verbal or physical conduct of sexual nature. **Usually between members of the project team, within WASA and between project team and contractors.**

¹ As defined in the UN Secretary’s bulletin – Special Measures for protection from sexual exploitation and abuse October, 9, 2003 ST/SGB/2003/13

² In the context of World Bank Financed operations exploitation occurs when access to, or benefit from a World Bank Financed good or service is used to extract sexual gain.

³ Inter-Agency Standing Committee *Protection against Sexual Exploitation and Abuse (PSEA): Inter-agency cooperation in community-based complaint mechanism. Global standard Operating Procedures.* May 2016

Sexual Harassment versus SEA⁴

SEA occurs against a beneficiary or member of the community. Sexual harassment occurs between personnel/staff of an organization or company and involves any unwelcome sexual advance or unwanted verbal or physical conduct of a sexual nature. The distinction between the two is important so that agency policies and staff training can include specific instruction on the procedures to report each.

Consent is the choice behind a person's voluntary decision to do something. Consent for any sexual activity must be freely given, ok to withdraw, made with as much knowledge as possible, and specific to the situation. If agreement is obtained using threats, lies, coercion, or exploitation of power imbalance, it is not consent. **Under this Code of Conduct⁵ consent cannot be given by anyone under the age of 18, regardless of the age of majority or age of consent locally. Mistaken belief regarding the age of the child is not a defense.**

There is no consent when agreement is obtained through:

- the use of threats, force or other forms of coercion, abduction, fraud, manipulation, deception, or misrepresentation
- the use of a threat to withhold a benefit to which the person is already entitled, or
- a promise is made to the person to provide a benefit.

While all forms of violence against a community resident or a co-worker are forbidden, this code of conduct is particularly concerned with the prevention and reporting of sexual exploitation and abuse (SEA) and sexual harassment which constitute gross misconduct, is grounds for termination or other consequences related to employment and employment status:

1. **Examples of sexual exploitation and abuse** include, but are not limited to:

- A project worker tells women in the community that he can get them jobs related to the work site (cooking and cleaning) in exchange for sex.
- A worker that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex.
- A project worker gets drunk after being paid and rapes a local woman.
- A project worker denies passage of a woman through the site that he is working on unless she performs a sexual favor.
- A manager tells a woman applying for a job that he will only hire her if she has sex with him.
- A worker begins a friendship with a 16-year-old girl who walks to and from school on the road where project related work is taking place. He gives her moto rides to school. He tells her that he loves her. They have sex. In this case, even though the age of

⁴ Ibid

⁵ In accordance with the United Nations Convention on the Rights of the Child.

consent for the country maybe be 16 this is still illegal for the purposes of the project as the acceptable age of consent in this case is 18 years of age.

2. **Examples of sexual harassment in a work context** include, but are not limited to:

- Male staff comment on female staffs' appearances (both positive and negative) and sexual desirability.
- When a female staff member complains about comments male staff are making about her appearance, they say she is "asking for it" because of how she dresses.
- A male manager touches a female staff members' buttocks when he passes her at work.
- A male staff member tells a female staff member he will get her a raise if she sends him naked photographs of herself.

Individual signed commitment (example):

I, _____, acknowledge that sexual exploitation and abuse (SEA) and sexual harassment, are prohibited. As an (*employee/contractor*) of (*contracted agency / sub-contracted agency*) in (*country*), I acknowledge that SEA and SH activities on the work site, the work site surroundings, at workers' camps, or the surrounding community constitute a violation of this *Code of Conduct*. I understand SEA and SH activities are grounds for sanctions, penalties or potential termination of employment. Prosecution of those who commit SEA and SH may be pursued if appropriate.

I agree that while working on the project I will:

- Treat all persons, including children (persons under the age of 18), with respect regardless of sex, race, color, language, religion, political or other opinion, national, ethnic or social origin, gender identity, sexual orientation, property, disability, birth or other status.
- Commit to creating an environment which prevents SEA and SH and promotes this code of conduct. In particular, I will seek to support the systems which maintain this environment.
- Comply with the laws governing the land with regards to employment and will strive to provide equal opportunities to all, ensure work environments are safe and compensate those employed under me with fair wages.
- **Not** participate in SEA and SH as defined by this *Code of Conduct* and as defined under (*country*) law (*and other local law, where applicable*).
- **Not** use language or behavior towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
- **Not** participate in sexual contact or activity with anyone below the age of 18. Mistaken belief regarding the age of a child is not a defense. Consent from the child is also not a defense. I will not participate in actions intended to build a relationship with a minor that will lead to sexual activity.

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

- **Not** solicit/engage in sexual favors in exchange for anything as described above.
- Unless there is the full consent by all parties involved, recognizing that a child is unable to give consent and a child is anyone under the age of 18, I will not have sexual interactions with members of the surrounding communities. This includes relationships involving the withholding or promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex—such sexual activity is considered “non-consensual” under this Code.

I commit to:

- Adhere to the provisions of this code of conduct both on and off the project site.
- Attend and actively partake in training courses related to preventing SEA and SH as requested by my employer.

If I am aware of or suspect SEA and SH, at the project site or surrounding community, I understand that I am encouraged to report it to the Grievance Reporting Mechanism (GRM) or to my manager. The safety, consent, and consequences for the person who has suffered the abuse will be part of my consideration when reporting. I understand that I will be expected to maintain confidentiality on any matters related to the incident to protect the privacy and security of all those involved.

Sanctions: I understand that if I breach this Individual Code of Conduct, my employer will take disciplinary action which could include:

- Informal warning or formal warning
- Additional training.
- Loss of salary.
- Suspension of employment (with or without payment of salary)
- Termination of employment.
- Report to the police or other authorities as warranted.

I understand that it is my responsibility to adhere to this code of conduct. That I will avoid actions or behaviors that could be construed as SEA and SH. Any such actions will be a breach this Individual Code of Conduct. I acknowledge that I have read the Individual Code of Conduct, do agree to comply with the standards contained in this document, and understand my roles and responsibilities to prevent and potentially report SEA and SH issues. I understand that any action inconsistent with this Individual Code of Conduct or failure to act mandated by this Individual Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 11: Stakeholder Engagement Schedule

STAKEHOLDER GROUP	Information to Be Communicated	Communication Method	Frequency / Trigger	Responsibility
RESIDENTS ALONG PIPELINE CORRIDOR	Construction schedules, road access changes, temporary crossings, water interruptions, reinstatement updates	WhatsApp, door-to-door notices, flyers, community boards, community meetings	Two weeks advance notice with an additional notice 48 hours before disruptions	Contractor CLO; WASA
VULNERABLE GROUPS (ELDERLY, PWDs, WOMEN-HEADED HOUSEHOLDS, ETC.)	Access support, safety measures, personal assistance if needed	Direct outreach; home visits; calls (contingent on the identification of affected vulnerable households)	As required; before high-impact works	Contractor CLO
SCHOOLS AND OTHER SENSITIVE RECEPTORS	Safety briefings, noise/dust schedules	Direct outreach; letters; WhatsApp notification	Bi-weekly; before works near facility	Contractor; WASA
BUSINESS OWNERS AND VENDORS	Access management, delivery disruptions, traffic diversions	Visits; emails; WhatsApp	Weekly	Contractor; CLO
TRANSPORT OPERATORS AND ROAD USERS	Roadwork disruptions, detours, reinstatement timelines	Radio, signage, local WhatsApp groups	Weekly; day prior to changes	Contractor; MOWT; SGRC
LOCAL COMMUNITY GROUPS	Project updates; expected impacts; engagement invitations	Community meetings; WhatsApp	Monthly	WASA; CLO
SGRC	Road reinstatement progress; complaints received	Coordination meetings	Weekly	WASA; Contractor
MOWT	Trenching schedule; reinstatement; road conditions	Technical meetings	Weekly	Contractor; WASA
EMERGENCY SERVICES (POLICE, FIRE,	Access routes; emergency	Email; briefings	Before major works	WASA

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

STAKEHOLDER GROUP	Information to Be Communicated	Communication Method	Frequency / Trigger	Responsibility
HEALTH, SGRC DISASTER UNIT)	coordination protocol			
GENERAL PUBLIC THE MEDIA	Project updates; progress; water service changes	Local radio; posters; social media	Monthly	WASA

DRAFT

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Appendix 12: Grievance Submission Form

Case ID Number: _____

Applicant's Name: _____

Sex: [Male] _____

[Female] _____

[Not stated] _____

Age: _____

☐ I wish to submit complaint anonymously

☐ I demand that my personal details not be disclosed without my consent

Address:

Telephone:

Email:

Description of Complaint:

(Subject of case, when did it occur, location, who is involved, reach, and effects of situation, etc.)

TRINIDAD AND TOBAGO NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

PHASE 2 (TT-L1071)

DISCLOSABLE ESA AND ESMP FOR THE PROPOSED DESIGN AND CONSTRUCTION OF A NEW 12 IMGD
SURFACE WATER TREATMENT PLANT AT MATURA/SALYBIA, INCLUSIVE OF TRANSMISSION PIPELINES

Date of Incident:

☐

One-time incident/complaint

☐

Happened more than once (indicate how many times):

☐

Ongoing (an ongoing problem)

In your view, what measures would provide solution to the problem?

Signature:

Date:

Note: Please Submit your completed form to:

The Community Liaison Officer

[Official Address]/Email/Whatsapp

Trinidad and Tobago