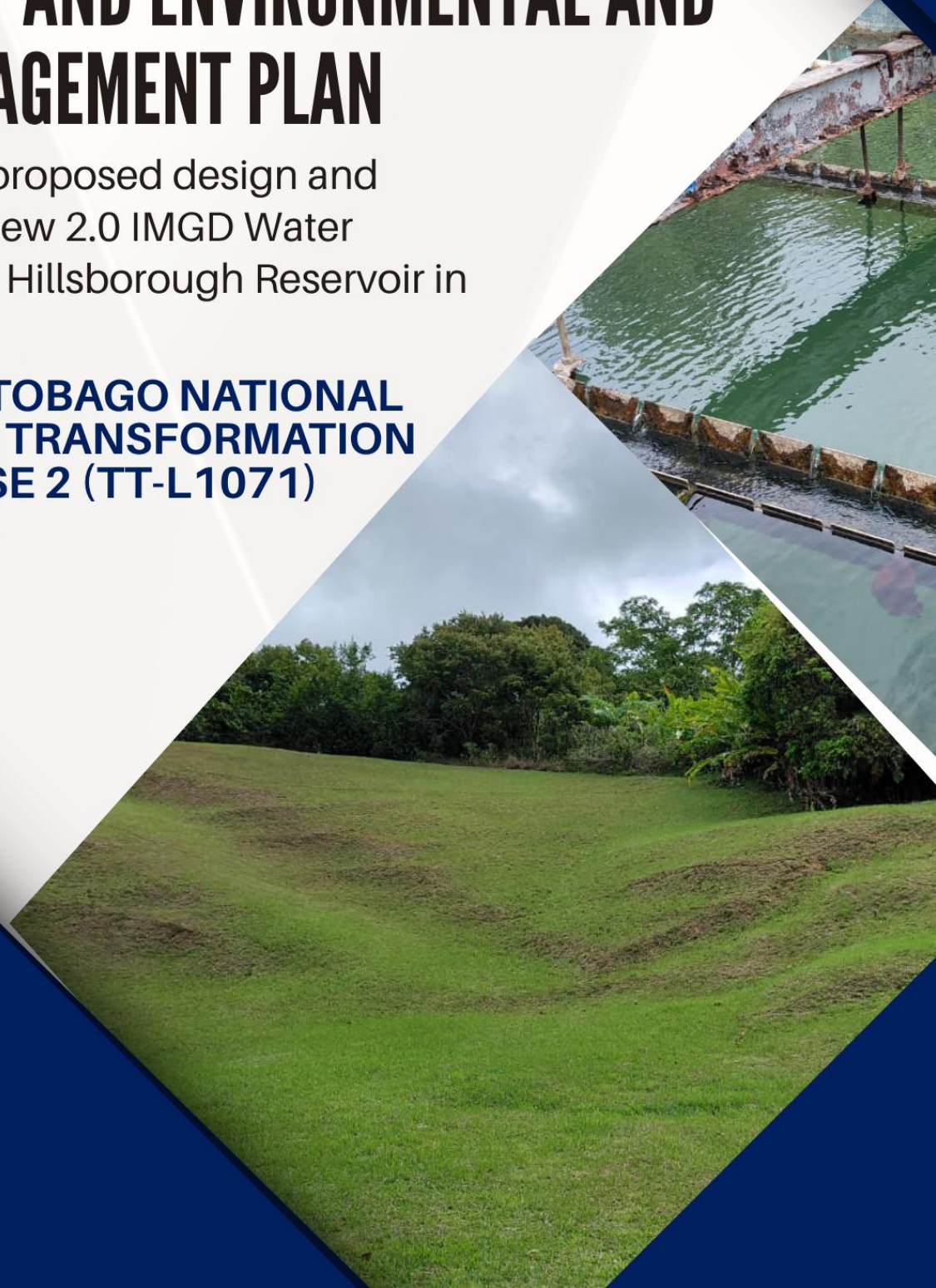




DRAFT ENVIRONMENTAL AND SOCIAL ASSESSMENT AND ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

For the proposed proposed design and
construction of a new 2.0 IMGD Water
Treatment Plant at Hillsborough Reservoir in
Tobago

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



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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
MPU	Ministry of Public Utilities
PLC	Programmable Logic Controller
SCADA	Supervisory Control and Data Acquisition
SESA	Strategic Environmental and Social Assessment
THA	Tobago House of Assembly
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 2.0 million imperial gallons per day (IMGD) Water Treatment Plant (WTP) at Hillsborough Reservoir in Tobago. The project is being implemented by the Ministry of Public Utilities under Phase 2 of the Trinidad and Tobago National Water Sector Transformation Program (TT-L1071), financed by the Inter-American Development Bank (IDB). The ESA provides an analytical framework to identify and assess environmental and social risks and impacts, while the ESMP establishes the measures required to ensure that the project is implemented in accordance with national regulatory requirements and international best practice.

The project forms part of a broader national effort to improve the efficiency, reliability, sustainability, and resilience of potable water supply services. Despite earlier investments under Phase 1 of the Program, significant sector challenges persist, including intermittent supply, high levels of non-revenue water (up to 40–60%), ageing infrastructure, and operational inefficiencies. In Tobago, these challenges are compounded by limited storage capacity, increasing demand, and vulnerability to climate variability. The proposed Hillsborough WTP is therefore a critical intervention aimed at modernizing key infrastructure and ensuring long-term water security for the island.

Project Scope and Description

The project consists primarily of the construction of a new conventional water treatment plant with a capacity of 2.0 IMGD to replace the existing ageing facility, with aspects of dual-train redundancy. The project also includes the replacement of approximately 6.6 kilometers of transmission mains.

The new facility will incorporate the installation of modern treatment processes, including: coagulation, flocculation, clarification, filtration, disinfection, sludge management systems, clear-water storage, chemical dosing and handling facilities, sludge holding tanks with water recovery, administrative/control buildings, and advanced automation through PLC/SCADA systems. To support the WTP the project will also include installation of pumps, blowers, high-voltage transformers, standby generators, associated mechanical/electrical work, stormwater drainage, slope stabilization, fencing, landscaping and comprehensive training programs for WASA staff, including O&M manuals, CMMS, performance testing protocols and monitoring systems to track operational efficiency, compliance, and water quality. The development will be undertaken within the footprint of existing WASA-owned lands, thereby avoiding land acquisition requirements and associated resettlement impacts.

The primary objective of the project is to improve potable water supply reliability, quality, and system efficiency in Tobago. The intervention is expected to directly benefit more than 15,000 customers by enhancing service continuity, stabilizing water pressure, and improving compliance with World

Health Organization (WHO) drinking water standards. In addition, the project will strengthen infrastructure resilience through floodproofing, slope stabilization, standby power systems, and enhanced monitoring and control capabilities, thereby reducing vulnerability to operational disruptions and climate-related events. The new transmission line will reduce non-revenue water, improve operational flexibility through the installation of PRV/PSV, washouts, air valves, and offtakes, ensure compliance with international standards including AWWA, FIDIC, and IDB guidelines. The installation will also be supported by the construction of bridge and river crossings with structural protections (e.g., thrust blocks, anchorage).

The Existing Environment

The existing physical environment is characterized by average temperatures ranging between 29°C and 31°C, with future climate change projections indicating increases of up to 1.5–2°C by the end of the century. The WTP is treating and distributing water from the Hillsborough Reservoir, which is fed by several rivers and streams from the hillsides of the Main Ridge. Mean annual rainfall of approximately 1,900 mm with seasonal variation in water availability. Groundwater resources in Tobago are limited and as such the Hillsborough Reservoir are among Tobago's most important water supply assets and play a critical role in providing potable water across the island.

Some key environmental concerns associated with the reservoir is sedimentation, which has reduced storage capacity over time and required desilting works, which was completed in 2022. Watershed protection, erosion control, and pollution management are therefore essential for maintaining water security. Rainfall varies seasonally, with the Hillsborough area showing an overall increase in annual rainfall between 2016 and 2025.

Ecologically, the proposed Hillsborough Water Treatment Plant will be constructed on approximately 0.65 acres (2,621 m²) of previously cleared and maintained land dominated by grass with sparse shrubs and trees. The site is classified as a modified habitat under IDB ESPS 6, and direct impacts on vegetation are expected to be low and confined to already disturbed areas. However, beyond the project's immediate footprint, the Area of Influence includes surrounding forest habitats, riparian corridors, and the Hillsborough Reservoir catchment, which support diverse tropical forest communities and provide important wildlife movement corridors. These habitats contain several species of conservation concern, including Tobago-endemic plants and fauna, as well as IUCN-listed threatened species such as the Endangered White-tailed Sabrewing (*Campylopterus curvipennis*), Bloody Bay Tree Frog (*Mannophryne olmonae*), Turpin's Frog (*Pristimantis turpinorum*), and the Vulnerable Tobago Coralsnake Mimic (*Erythrolamprus ocellatus*). While no direct impacts on these sensitive habitats are anticipated, construction activities could result in indirect effects, including noise, vibration, dust, lighting, sedimentation, and increased human disturbance. Appropriate mitigation measures should therefore be implemented to minimise disturbance, maintain ecological connectivity, and protect the biodiversity values of the surrounding landscape.

The socioeconomic context is characterized by a mix of rural communities within the direct area of influence and a wider population across Tobago that depends on the Hillsborough system for potable water supply. The project's Direct Area of Influence (S-DAoI) comprises the communities closest to the WTP project and transmission infrastructure, including Mount St. George, Mason Hall, Belmont, Concordia, and Easterfield. In 2011, these communities had a combined population of 5,753 persons, representing approximately 9.5% of Tobago's population.

The broader Indirect Area of Influence (S-IAoI) includes the parishes of St. Andrew, St. David, and St. George, which together contained 33,144 persons in 2011, representing more than half of Tobago's population. Average household size of 3.3 persons, with Mount St. George having the highest proportion of larger households. This is noteworthy because larger households and households with dependents may be more sensitive to temporary disruptions in water supply, access, or community services.

The population is relatively young, with a strong working-age majority. This demographic structure suggests ongoing demand for employment, education, healthcare, and utility services, including reliable potable water infrastructure. Approximately 3.2% of the S-DAoI population reported living with a disability, with mobility limitations being the most common challenge. These groups may be more vulnerable to temporary disruptions associated with construction activities and therefore require targeted communication and support measures.

Community infrastructure and institutional capacity are strongest in Mount St. George and Mason Hall, which contain schools, health facilities, churches, businesses, recreational spaces, and important road connections. Belmont, Concordia, and Easterfield have fewer formal facilities and rely more heavily on nearby communities, churches, local leaders, and informal social networks.

The Hillsborough WTP serves a critical public function, and the project is expected to provide significant long-term benefits through improved water quality, increased reliability of supply, enhanced operational resilience, and greater water security for communities throughout Tobago.

Environmental and Social Impacts and Risks

The ESA identifies a range of environmental and social risks associated with both construction and operation. The Hillsborough WTP system is a critical water supply assets. The project is also subject to a range of natural hazards, including tropical storms, flooding, landslides, and seismic activity. Based on the IDB disaster risk assessment methodology, hazard exposure is assessed as low to moderate, with overall project risk classified as moderate. Physical risk relating to its moderate vulnerability to earthquakes and landslides could result in failure or damage to the treatment plant or associated pipelines resulting in interrupting water service to more than 15,000 customers. Climate change projections indicate increasing temperatures, rainfall variability, and more intense weather events, which may exacerbate risks to water resources and infrastructure. However, the project design incorporates climate resilience measures to mitigate these risks, including drainage systems, slope stabilization, and resilient infrastructure design.

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The site location for the construction of the new plant is located on the existing property owned by WASA on land that is hilly but has well-maintained grass landscape with limited tree cover/shrubs and little to no significant natural vegetation. The area is already largely disturbed and cleared resulting in moderate direct impacts on vegetation. However, the site is bordered by forested habitats and movement corridors for a variety of wildlife species. As a result, construction activities may cause disturbance to fauna inhabiting or traversing the surrounding landscape, necessitating consideration of potential impacts on adjacent habitats and ecological connectivity.

Some potentially negative social risks related to both the WTP and the transmission lines construction-related activities, will potentially impact nearby communities, road users, businesses from noise, dust, traffic disruption, temporary access restrictions, disruption in water delivery, and occupational and community health and safety concerns. These, however, can be mitigated. During construction, one positive impact relates to the opportunity for employment. An important point of note is that the property of the Hillsborough WTP is split by a public road. While the construction of the WTP will not be as socially significant as the pipelines due to the lack of close neighbors, however, the use of the road by public traffic can be significantly inconvenienced by construction vehicles and traffic during the construction phase of the WTP project.

During operation, anticipated social benefits of the WTP include improved water supply reliability, enhanced water treatment capacity, improved public health outcomes, and increased resilience of the water supply system serving communities in western and central Tobago including Green Hill, Belmont, Sandy River, Mason Hall and surrounding areas.

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.

Management Plan	Water Treatment Plant (WTP)	Main Risks/Impacts Addressed
Construction Environmental and Social Management Plan (C-ESMP)	✓	Overall environmental and social management during construction
Air Quality and Dust Control Plan	✓	Dust, vehicle emissions, air quality deterioration
Noise and Vibration Management Plan	✓	Construction noise, vibration impacts on communities
Water Quality Management Plan	✓	Sedimentation, runoff, contamination of watercourses and reservoir
Waste Management Plan	✓	Construction waste, hazardous and non-hazardous waste management
Soil Erosion and Drainage Management Plan	✓	Erosion, sediment transport, slope instability, drainage disruption

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Management Plan	Water Treatment Plant (WTP)	Main Risks/Impacts Addressed
Biodiversity Management Plan	✓	Vegetation clearing, habitat disturbance, wildlife protection
Stakeholder Engagement Plan (SEP)	✓	Community consultation, information disclosure and engagement
Grievance Redress Mechanism (GRM)	✓	Community complaints and dispute resolution
Social Management Plan	✓	Community impacts, vulnerable groups, social benefits
Labour Management Plan	✓	Workforce management, worker welfare, labour compliance
Land Acquisition and Livelihood Protection and Restoration Plan (LALPRP)	Limited	Temporary or permanent land use impacts, livelihood restoration
Worker Health and Safety Management Plan	✓	Occupational health and safety risks
Hazardous Materials and Chemical Management Plan	✓	Storage and handling of treatment chemicals (e.g., chlorine, coagulants, fuels)
Traffic Management and Road Safety Plan	Limited	Traffic congestion, road safety, access restrictions during pipe installation
Road Reinstatement Plan	Limited	Restoration of roads, sidewalks and utilities disturbed by trenching
Utility Relocation and Service Interruption Management Plan	Limited	Damage to utilities, service disruptions during pipeline works
Operations and Maintenance (O&M) Plan	✓	Operational reliability and asset performance
Operational Contingency Plan	✓	Equipment failure, water supply interruptions
Emergency Response and Preparedness Plan	✓	Fires, spills, accidents, natural disasters and emergencies
Emergency Management Plan	✓	Hurricanes, earthquakes, landslides, flooding and disaster response
Climate Resilience Strategy	✓	Climate change adaptation and infrastructure resilience
Capacity Development and Training Plan	✓	Institutional strengthening, operational capacity building
Monitoring and Reporting Plan	✓	Environmental and social performance monitoring and compliance

The ESMP will be implemented through a structured Environmental and Social Management System (ESMS) managed by WASA, with defined roles and responsibilities for contractors, consultants, and regulatory authorities. Compliance will be ensured through ongoing monitoring, reporting, and adaptive management, supported by the Environmental Management Authority (EMA) and aligned with IDB Environmental and Social Performance Standards. Stakeholder engagement is a key

component of the management approach, with provisions for continuous consultation, transparent communication, and an accessible grievance redress mechanism.

Requirements of the IDB Environmental and Social Policy Framework

Regarding additional IDB Environmental and Social Policy Framework requirements, the WTP will not trigger additional requirements given its location on WASA lands.

Conclusion

In conclusion, the proposed Hillsborough Water Treatment Plant project represents a strategically important investment in Tobago's water infrastructure, addressing critical deficiencies in treatment capacity, service reliability, and system resilience. While the project entails moderate environmental and social risks, these are well understood and can be effectively mitigated through the implementation of the ESMP. The anticipated benefits, including improved water quality, enhanced service delivery, strengthened climate resilience, and socio-economic development, are substantial and are expected to significantly outweigh potential adverse impacts. The project is therefore considered environmentally and socially viable and aligned with national priorities for sustainable water sector development.

1 INTRODUCTION

This Environmental and Social Assessment (ESA) has been prepared for the ***proposed design and construction of a new 2.0 IMGD Water Treatment Plant at Hillsborough Reservoir in Tobago*** 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 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 in Hillsborough;
- Identifies and evaluates potential positive and adverse impacts during construction, operation, and decommissioning;
- Establishes mitigation and monitoring measures through the ESMP;
- Provides a framework for institutional capacity, stakeholder engagement, and grievance redress;
- 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 on communities and ecosystems.

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 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; the ageing infrastructure and bottlenecks in the network inhibit the transmission of water from water-rich areas to water-scarce areas.

With the compounding issues and growing population, 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 Stabilisation and Improvement: (US\$44 Million)
- Component 2. Network Optimisation: (US\$31 Million)
- Component 3. Support for Water Sector Transformation Plan: (US\$2.74 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 Ministry of Public Utilities (MPU), 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;

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- 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 Hillsborough WTP 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

The proposed Hillsborough Water Treatment Plant (WTP) is intended to address longstanding deficiencies in potable water production and system resilience in Tobago. The existing Hillsborough WTP infrastructure is ageing and constrained in its operational capacity, limiting its ability to sustain high production rates (2.1-2.5 MGD), consistently meet current and future water demand and effectively utilise available water resources for production above 1.4 MGD while maintaining compliance with international drinking water quality standards¹. The proposed replacement of the existing plant from 1.5 IMGD with a modern, automated 2.0 IMGD conventional treatment facility will significantly improve water quality, operational efficiency, and reliability of service to more than 15,000 customers. The project will introduce advanced treatment processes, integrated PLC/SCADA systems, standby power, flood-proofing measures, and slope stabilisation works to strengthen climate and operational resilience while aligning with the mandate of the Water and Sewerage Authority (WASA) to provide safe, efficient, and sustainable water services.

¹ Imamshah, Z. (2026). Hillsborough Production Infrastructure Reassessment (2016-2025). Water Resources Authority.

2.5 Description of the Project

Phase 2 is a country-wide programme; however, this report focuses on the works to be undertaken in Tobago. As outlined in the project brief prepared by the Water and Sewerage Authority (WASA), the project comprises the design and construction of a new 2.0 IMGD Water Treatment Plant (WTP) (11.223528°N, -60.670197°W) supplied by the Hillsborough Reservoir. The works are intended to modernise potable water production, improve service reliability, reduce water losses, and strengthen the resilience of Tobago's water supply system against climate-related and operational risks.

The specific project scope includes:

- Design-build of a new 2.0 IMGD Water Treatment Plant incorporating dual-train redundancy.
- Installation of treatment processes including screening, coagulation, flocculation, clarification, filtration, disinfection, and sludge management systems.
- Construction of supporting infrastructure including clear-well storage, chemical dosing and handling facilities, sludge holding tanks with water recovery systems, administrative and control buildings, and enhanced security systems.
- Installation of pumps, blowers, high-voltage transformers, standby generators, and associated mechanical and electrical systems.
- Civil works including site grading, stormwater drainage, slope stabilisation, retaining structures where required, fencing, access improvements, and landscaping.
- Comprehensive training programmes for WASA staff, including operation and maintenance manuals, Computerised Maintenance Management System (CMMS) integration, and performance testing protocols.
- Implementation of monitoring and control systems to track operational efficiency, regulatory compliance, and treated water quality.

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;

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- 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 - 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- 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:

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- 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.

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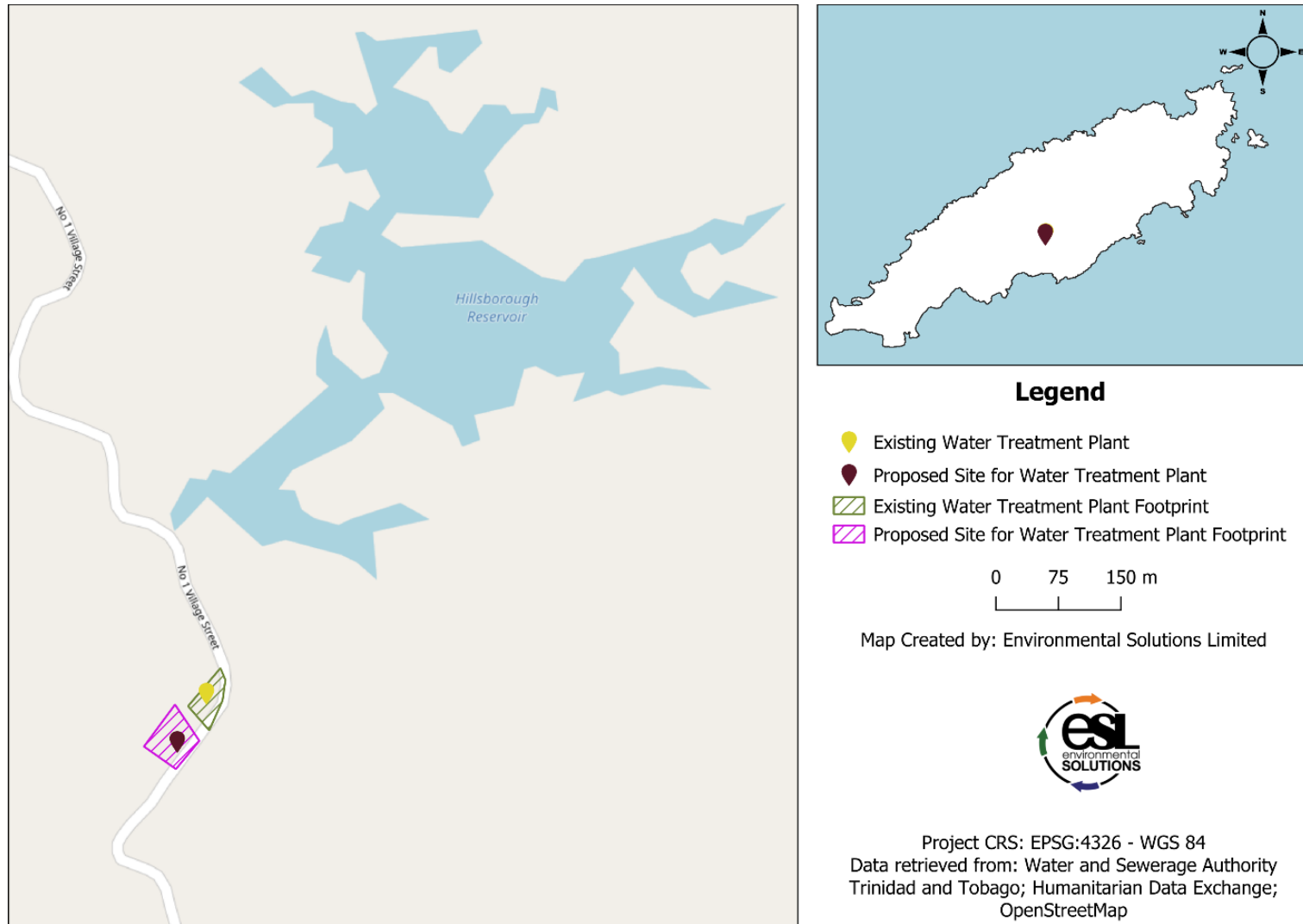


Figure 2-1: Location of the Proposed New Hillsborough Water Treatment Plant relative to the Hillsborough Dam and the existing water treatment facility (Source: WASA)

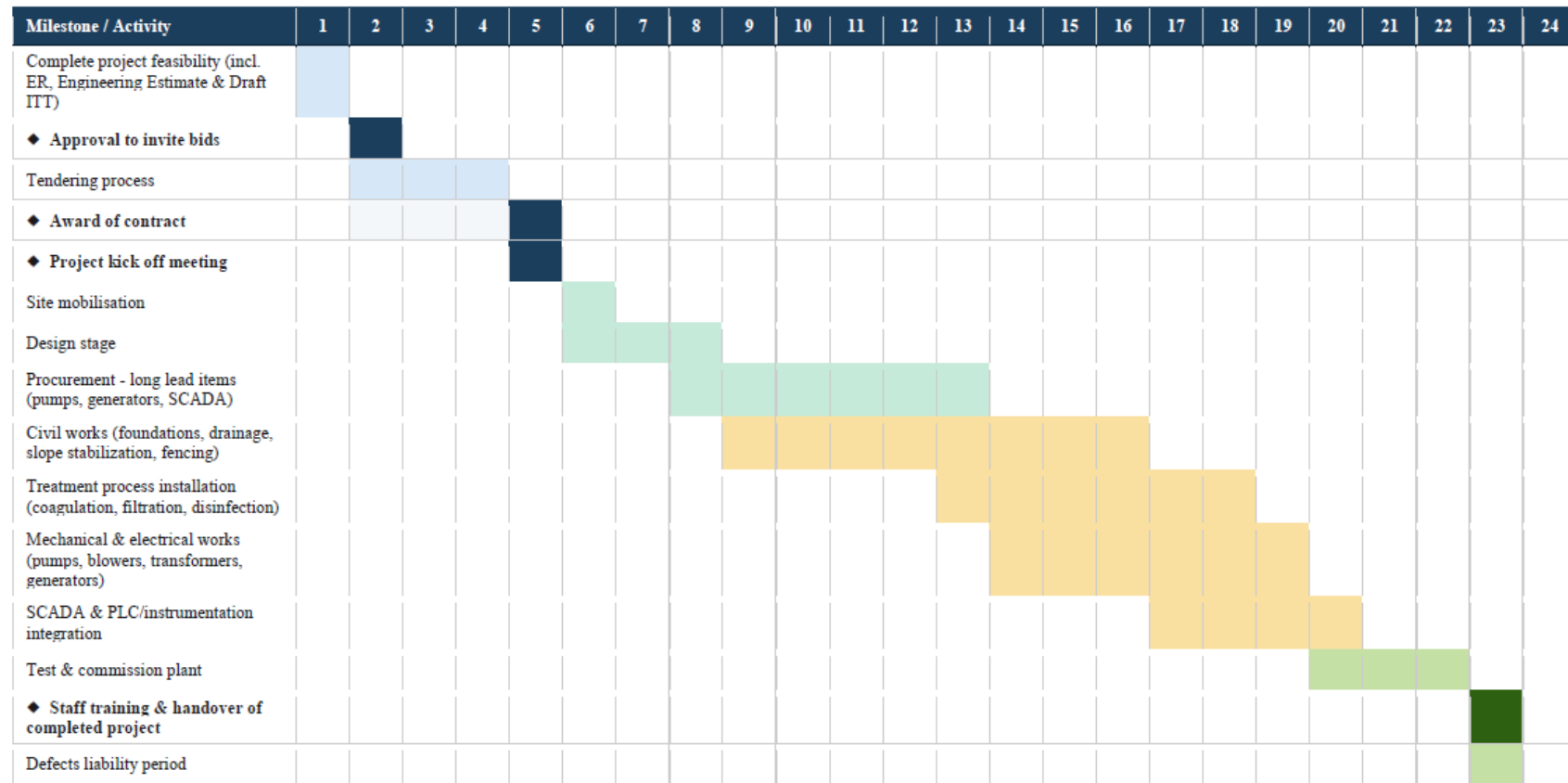
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2.5.1 Project Timelines

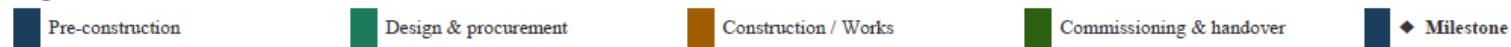
CONSTRUCTION OF THE HILLSBOROUGH WTP (TOBAGO)

Project Programme — Gantt Chart

24-month programme · New 2.0 IMGD conventional WTP with PLC/SCADA · Column numbers denote programme months



Legend



2.6 Expected Benefits

The proposed Hillsborough WTP is expected to generate substantial technical, environmental, social, and economic benefits for Tobago through the modernisation and strengthening of Tobago's potable water infrastructure network. Collectively, the projects will improve water supply reliability, enhance water quality, reduce operational inefficiencies, and increase resilience to climate-related and operational disruptions.

IMPROVED WATER SUPPLY RELIABILITY AND SERVICE DELIVERY

The replacement of the ageing Hillsborough WTP with a modern 2.0 IMGD treatment facility will significantly improve the reliability and continuity of potable water supply across Tobago. The upgraded infrastructure will reduce service interruptions, improve pressure stability, and strengthen emergency supply redundancy within the gravity-fed distribution system. The project is expected to directly benefit more than 15,000 customers across the communities within the area outlined in Figure 2-3 through a more stable and dependable potable water supply system.

ENHANCED WATER QUALITY AND PUBLIC HEALTH PROTECTION

The new WTP will incorporate advanced treatment processes including coagulation, flocculation, clarification, filtration, disinfection, and sludge management systems designed to achieve compliance with World Health Organisation (WHO) drinking water standards. Improved water quality will reduce potential public health risks associated with inadequate treatment and strengthen the safety of potable water supplied to communities throughout Tobago.

INCREASED SYSTEM CAPACITY AND OPERATIONAL EFFICIENCY

The expansion of production capacity from approximately 1.5 IMGD to 2.0 IMGD will improve the system's ability to meet existing and future water demand. The integration of PLC/SCADA systems, automated monitoring, metering infrastructure, and predictive maintenance tools will enhance operational efficiency, optimise chemical dosing and pumping operations, reduce downtime, and improve system-wide monitoring and response capabilities.

SOCIAL AND ECONOMIC BENEFITS

Reliable access to potable water will support improved community health, sanitation, and quality of life while contributing to local economic development and tourism sustainability in Tobago.

CLIMATE RESILIENCE AND INFRASTRUCTURE SUSTAINABILITY

The projects incorporate several resilience measures intended to strengthen Tobago's water infrastructure against climate change and natural hazards. These include flood-proofed facilities, slope stabilisation works, standby power systems, protected river and bridge crossings, thrust blocks, anchorage systems, and erosion and sediment control measures. These interventions will improve the long-term durability and sustainability of the infrastructure while minimising vulnerability to extreme weather events, flooding, and operational disruptions.

INSTITUTIONAL STRENGTHENING AND COMPLIANCE

The project will strengthen WASA's institutional capacity through staff training, operational manuals, GIS integration, SCADA implementation, and enhanced monitoring systems. Additionally, implementation in accordance with IDB safeguards, FIDIC requirements, AWWA standards, and WHO guidelines will promote environmental and social compliance, improved governance, and adherence to international best practices in water infrastructure development and management.

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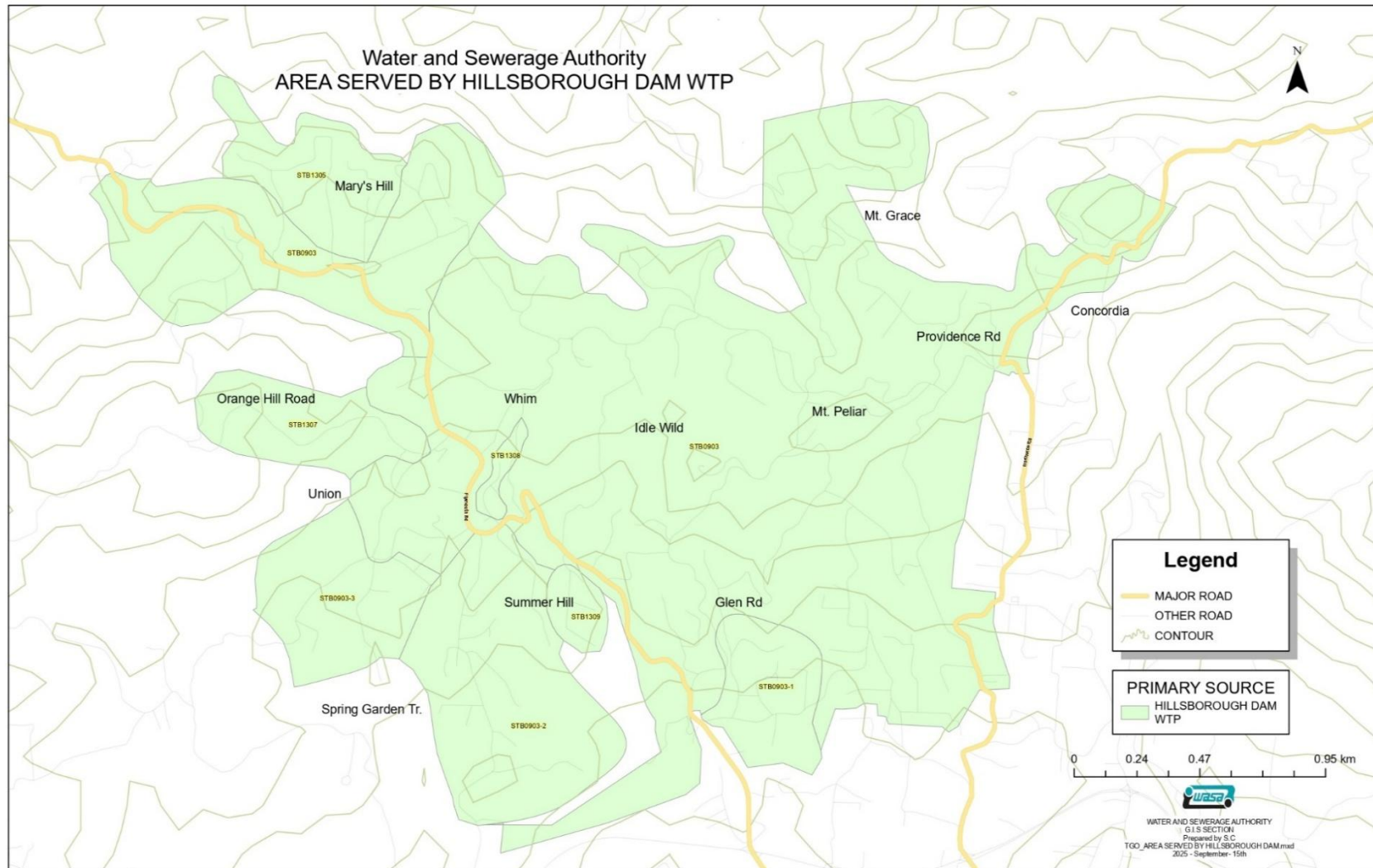


Figure 2-2: Areas that are currently and will continue to be served by the New Hillsborough Water Treatment Plant (Source: WASA)

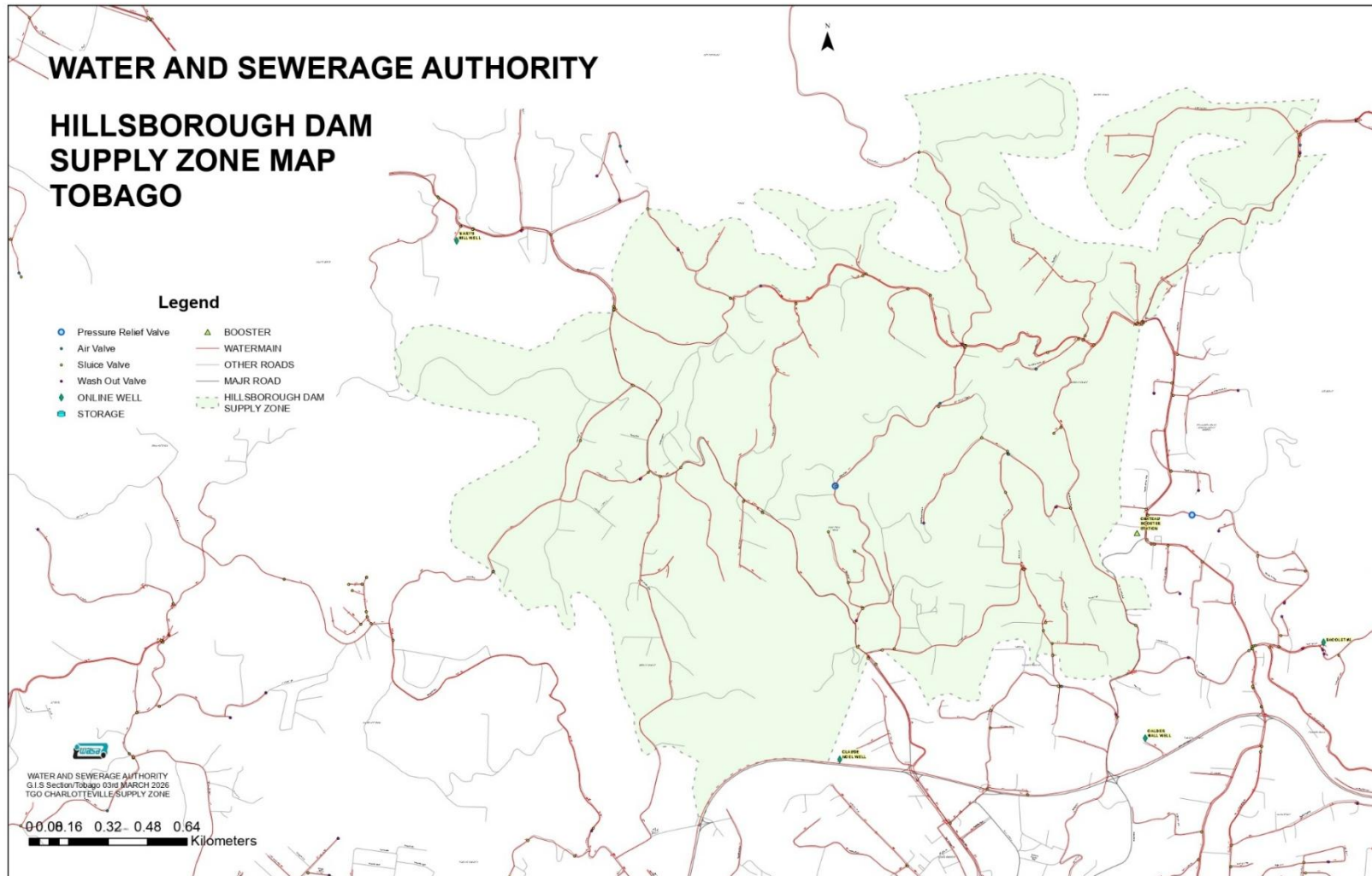


Figure 2-3: Detailed Map of the Proposed Hillsborough Water Treatment Plant Supply Zone (Source: WASA)

3 Legal and Institutional Framework

3.1 Legislative Framework

Laws and Regulations	Relevance
Environmental Management Act (2000)	Establishes the legal framework for environmental management in Trinidad and Tobago. The project requires environmental authorization where applicable and must comply with EMA regulations, environmental standards, and prescribed mitigation measures throughout construction and operation.
Certificate of Environmental Clearance (Designated Activities) Order (2001), as amended	The proposed Water Treatment Plant constitute designated activities requiring a Certificate of Environmental Clearance (CEC) prior to construction.
Environmentally Sensitive Species (ESS) Rules (2001)	Protects listed flora and fauna and their habitats. Construction and operation must avoid disturbance to protected species, implement biodiversity mitigation measures, and follow established procedures for chance encounters with protected species.
Conservation of Wildlife Act (Ch. 67:01)	Regulates the protection of wildlife, including hunting and disturbance of protected species. Relevant to vegetation clearance, habitat disturbance, and fauna management during construction.
Forests Act (Ch. 66:01) and Forests (Prohibited Areas) Order	Protects Forest Reserves and regulates activities within or adjacent to forested lands. Applicable due to the project's proximity to extensive natural forests and associated watershed.
Water and Sewerage Act (Ch. 54:40)	Governs the provision of potable water services by WASA. Relevant to the design, construction, operation, maintenance, and management of the Hillsborough Water Treatment Plant.
Water Works and Water Conservation Act (Ch. 54:41)	Regulates abstraction, conservation, treatment, and distribution of water resources. Applicable to raw water abstraction from Hillsborough Reservoir and long-term sustainable operation of the water supply system.
Water Pollution Rules (2019)	Establishes requirements for preventing water pollution and controlling liquid discharges. Relevant to management of

	concrete wash water, backwash water, sludge supernatant, sanitary wastewater, and construction runoff.
Public Health Ordinance (Ch. 12 No. 4)	Requires the provision of safe potable water and protection of public health. The completed facility must produce water meeting national drinking water standards and WHO Guidelines.
Occupational Safety and Health Act (2004)	Applies to all project phases and requires implementation of occupational health and safety systems, worker training, PPE, hazard management, emergency response, and incident reporting.
Workmen's Compensation Act (Ch. 88:05)	Requires compensation for employees injured during the course of employment and informs contractor obligations regarding workplace injuries and insurance coverage.
Industrial Relations Act (Ch. 88:01)	Governs labour relations, dispute resolution, and trade union matters applicable to contractors and subcontractors engaged during construction and operation.
Minimum Wages Act (Ch. 88:04)	Establishes statutory minimum wages and employment standards applicable to all contractors and subcontractors employed on the project.
Children Act (2012)	Prohibits child labour and protects children from exploitation. Contractors must prohibit employment of underage workers and implement safeguarding measures consistent with IDB labour requirements.
Town and Country Planning Act (Ch. 35:01)	Planning approvals are required for development of the Water Treatment Plant and associated infrastructure where applicable.
Planning and Facilitation of Development Act (2014)	Provides the modern planning framework for land development and facilitates coordination of planning approvals with environmental permitting requirements.
State Lands Act (Ch. 57:01)	Applicable where works traverse State lands or require easements, licences, or permissions for access.
Tobago House of Assembly Act (Ch. 25:03)	Establishes the Tobago House of Assembly and its authority over planning, infrastructure, environmental management, public health, and local government functions. Coordination with relevant THA Divisions will be required during project implementation.

Pesticides and Toxic Chemicals Act (Ch. 30:03)	Regulates the storage, handling, transport, and disposal of hazardous chemicals. Applicable to treatment chemicals, fuels, lubricants, laboratory reagents, cleaning agents, and any pesticides used during vegetation management.
National Trust Act (Ch. 40:53)	Protects archaeological, historical, architectural, and cultural heritage resources. Requires implementation of a Chance Find Procedure should heritage resources be encountered during excavation.
Data Protection Act (Ch. 22:04)	Governs the collection, storage, processing, and protection of personal information. Applicable to stakeholder engagement, grievance management, landowner records, employment records, and monitoring databases.
Noise Pollution Control Rules (2001)	Establishes permissible noise limits and mitigation requirements during construction and operation.
Air Pollution Rules (2014)	Regulates emissions to air and requires implementation of dust suppression and emission control measures during construction.
Waste Management Rules (2014)	Governs storage, handling, transportation, treatment, and disposal of construction, hazardous, and operational wastes, including sludge and spent chemicals.
Fisheries Act (Ch. 67:51)	Protects aquatic ecosystems and fisheries resources. Applicable to maintaining downstream water quality and minimising impacts on aquatic habitats associated with Hillsborough Reservoir and connected watercourses.
National Environmental Policy (2018)	Provides national guidance for integrating environmental sustainability into development planning and decision-making.
National Climate Change Policy (2020)	Supports climate-resilient infrastructure design and adaptation measures to improve resilience to climate variability and extreme weather events.
National Forest Policy (2011)	Establishes principles for sustainable forest management, conservation, and restoration.
National Integrated Water Resources Management (IWRM) Policy (2022)	Promotes integrated planning, protection, and sustainable management of water resources. Supports sustainable abstraction, watershed management, and long-term water security.

Integrated Solid Waste Management Policy (2014)	Provides the national framework for waste minimisation, recycling, resource recovery, and environmentally sound disposal of solid and hazardous wastes generated during construction and operation.
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3.2 International Conventions and Commitments

Agreement	Relevance
Convention on Biological Diversity (CBD)	Obligates conservation of biological diversity, sustainable use of biological resources, and equitable benefit sharing. The project must identify and protect sensitive habitats, minimise impacts on biodiversity, and implement restoration measures where disturbance cannot be avoided.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Relevant where protected flora or fauna may be encountered during vegetation clearance or construction. Any handling, relocation or transfer of listed species must comply with national wildlife legislation and permitting requirements.
Convention on the Conservation of Migratory Species of Wild Animals (CMS/Bonn Convention)	Supports the protection of migratory birds and other migratory fauna that may utilise habitats within or adjacent to the project area. Construction activities should minimise disturbance during sensitive periods where applicable.
Ramsar Convention on Wetlands of International Importance	Although the project is not located within a Ramsar Site, screening should confirm that no designated wetlands or hydrologically connected wetlands of international importance will be adversely affected. Good water quality management and sediment control measures support the Convention's objectives.
United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement	Supports climate adaptation and mitigation. Relevant to incorporation of climate-resilient infrastructure design, efficient energy use, reduction of greenhouse gas emissions where practicable, and consideration of projected climate change impacts on long-term water supply reliability.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	Relevant to the management, storage, transport and disposal of hazardous wastes generated during construction and operation, including waste oils, chemicals, contaminated materials and obsolete equipment. The project should ensure environmentally

	sound waste management consistent with national legislation implementing the Convention.
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	Relevant to the procurement, handling and use of hazardous chemicals. Supports appropriate chemical selection, safety information, storage and compliance with national controls governing restricted substances.
Stockholm Convention on Persistent Organic Pollutants (POPs)	Relevant where contaminated materials or legacy pollutants may be encountered during rehabilitation or decommissioning. Supports proper identification, handling, transport and disposal of POP-containing wastes to prevent environmental contamination.
2030 Agenda for Sustainable Development (United Nations Sustainable Development Goals)	The project contributes primarily to SDG 6 (Clean Water and Sanitation) through improved potable water services; SDG 9 (Industry, Innovation and Infrastructure) through resilient infrastructure development; SDG 11 (Sustainable Cities and Communities) by improving service reliability and resilience; SDG 13 (Climate Action) through climate-resilient design; and SDG 15 (Life on Land) through biodiversity protection and habitat management measures.

3.3 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).

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

This standard is highly relevant as the project involves the construction and operation of major water treatment with potentially significant environmental and social risks. Key issues include vegetation clearance, excavation, erosion and sedimentation, traffic disruption, occupational and community health and safety, waste generation, noise, dust, and impacts on nearby communities and watercourses. The project will therefore require comprehensive environmental and social assessment, impact mitigation, stakeholder engagement, monitoring, and implementation of Environmental and Social Management Plans (ESMPs) throughout all project phases.

3.3.2 ESPS 2 – Labour and Working Conditions

ESPS 2 is applicable due to the engagement of construction workers, contractors, technical personnel, and operational staff during both construction and operational phases. Relevant issues include occupational health and safety, worker accommodation (if applicable), fair labour practices, emergency preparedness, use of personal protective equipment (PPE), trench and confined space safety, electrical hazards, chemical handling, and prevention of discrimination and child or forced labour. The project documentation also references local hiring and workforce training programs.

3.3.3 ESPS 3 – Resource Efficiency and Pollution Prevention

This standard is directly relevant because the project involves water abstraction, treatment processes, fuel usage, chemical handling, sludge management, and construction-related emissions. Potential impacts include air emissions, dust, wastewater generation, runoff, spills, noise pollution, and solid and hazardous waste generation. The project includes measures for efficient water treatment, optimised pumping, sludge management, pollution prevention, spill control, and reduction of non-revenue water losses.

3.3.4 ESPS 4 – Community Health, Safety, and Security

ESPS 4 is highly applicable given the potential risks to surrounding communities during construction and operation. Construction-related impacts may include traffic disruptions, restricted access, noise, dust, excavation hazards, utility interruptions, and public safety concerns. Operational risks may include chemical storage and handling at the WTP. The project documentation specifically identifies stakeholder engagement, traffic management, community safety briefings, emergency response coordination, and secure work zones as key mitigation measures.

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

Although the construction activities may not result in significant vegetation clearing, there may still be habitat disturbance, erosion, sedimentation of nearby watercourses, and impacts on terrestrial and aquatic biodiversity. The project includes erosion and sediment control measures, phased trenching, and environmental monitoring intended to minimise ecological impacts.

3.3.6 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.

3.3.7 ESPS 9 – Gender Equality

This standard is relevant because the project has the potential to generate both positive and adverse gender-differentiated impacts. Improved potable water reliability may particularly benefit women and vulnerable households through improved household sanitation and reduced water insecurity. Construction activities should also ensure equitable employment opportunities, gender-sensitive stakeholder engagement, prevention of gender-based violence (GBV) and sexual harassment, and safe working environments for women.

3.3.8 ESPS 10 – Stakeholder Engagement and Information Disclosure

ESPS 10 is directly applicable due to the project's potential impacts on residents, businesses, road users, workers, and local authorities. The project documentation specifically references community engagement activities, town hall meetings, grievance mechanisms, traffic communication measures, and ongoing consultation with affected communities. The project will require a structured Stakeholder Engagement Plan (SEP), information disclosure processes, and accessible grievance redress mechanisms throughout the project lifecycle.

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 Hillsborough.

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 (AOI) for the proposed Hillsborough Water Treatment Plant (WTP) encompasses all geographic areas and receptors that may experience direct, indirect, induced, or cumulative environmental and social impacts resulting from project construction, operation, maintenance, and associated activities. The AOI includes both the immediate footprint of the proposed infrastructure works and the broader surrounding environments and communities that may be affected by changes in hydrology, traffic, land use, ecosystem function, service delivery, or socio-economic conditions. Given the integrated nature of the project, the AOI extends across

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the Hillsborough WTP site, adjacent communities, associated access routes, downstream receiving environments, and connected potable water supply zones throughout Tobago.

4.1.1.1 Direct Area of Influence

The Direct Area of Influence refers to locations where physical project activities and immediate project-related disturbances will occur. For the WTP component, the direct AOI includes the Hillsborough WTP site and all areas required for plant construction, staging, material storage, excavation, drainage works, slope stabilisation, utility installation, and ancillary infrastructure such as access roads, chemical handling facilities, clear-well storage, sludge management systems, pumping stations, administrative buildings, and standby power systems. Figure 4-1 defines the 1km sphere of influence used to prepare this study.

Immediate receptors within the direct AOI include nearby sensitive receptors that may experience temporary impacts such as noise, dust, traffic disruption, vibration, restricted access, erosion, sedimentation, and occupational or community safety risks during construction activities.

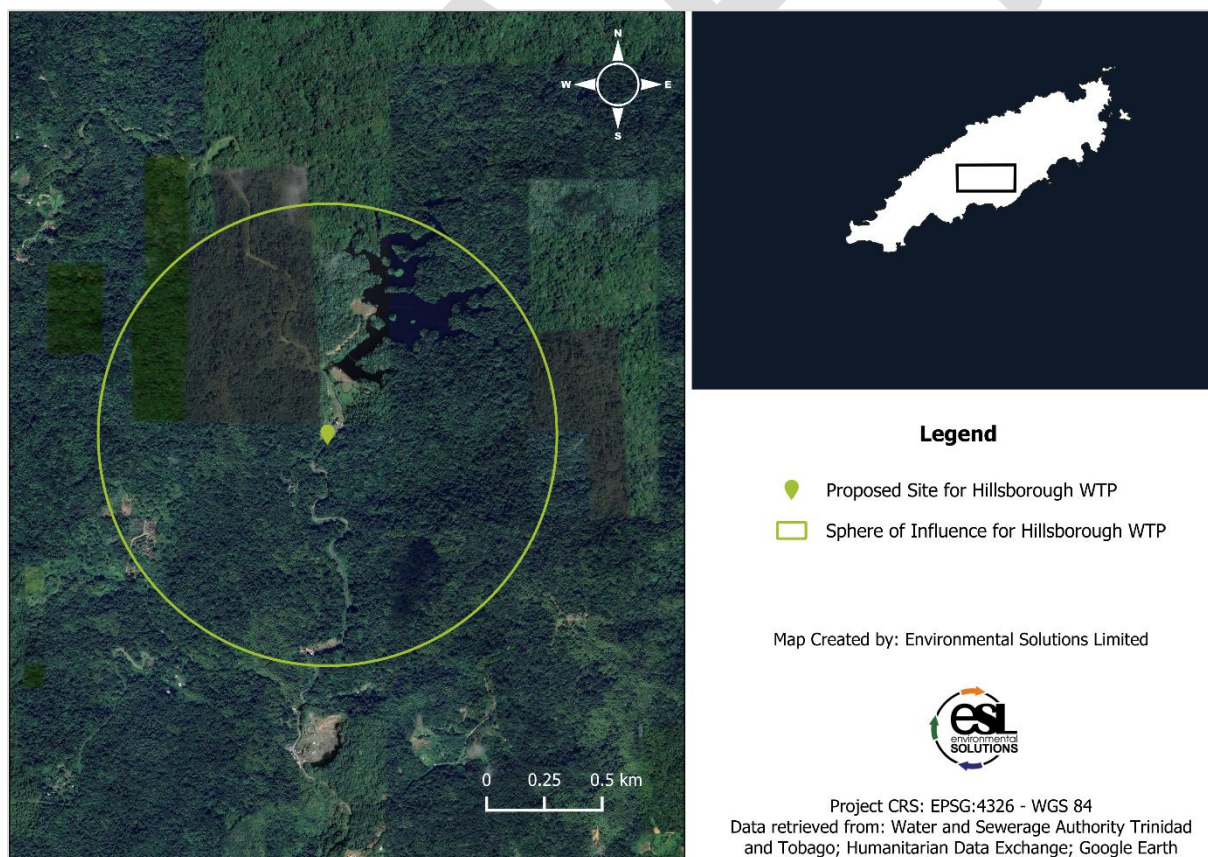


Figure 4-1: 1-km Sphere of Influence study area for the proposed Hillsborough WTP

4.1.1.2 Indirect Area of Influence

The indirect area of influence associated with the construction of the new Hillsborough WTP for the physical and ecological environment are defined using the Watershed boundaries as illustrated in Figure 4-3.

Indirect area of influence for the social environment relate to the beneficiary communities outlined in Section 4.4.1 (Figure 4-15) that will be impacted by supply disruption or supply improvement). During the operation phase, several communities (Figure 2-2) will be influenced by the improved service associated with the new WTP.

4.2 Physical Environment Baseline

4.2.1 Climate

Most of the features which account for the variability of temperature and rainfall in Trinidad and Tobago originate in the tropics, but global features also impact the climatic variability. Phenomena such as El Niño-Southern Oscillation (ENSO) and the North Atlantic Oscillation (NAO) are two of the major drivers of climate variability in Trinidad and Tobago. It has also been shown that the Madden-Julian Oscillation (MJO), the Saharan Air layer (SAL), tracks taken by tropical storms, migratory behaviour of the Inter-tropical Convergence Zone (ITCZ) and behaviour of the North Atlantic Sub-Tropical High (NASH) also influence the climate variability in Trinidad and Tobago (Trinidad and Tobago Meteorological Service, 2025).

Studies have shown that the El Nino phase of the ENSO modifies the annual cycle of rainfall over the Caribbean greatest, with varying results for different areas. The relationship between El Nino and the rainfall cycle starts with a drying trend during the latter half of the wet season which continues into the dry season and ends with a strong wet signal during the earliest period of the new wet season; this relationship was observed in Trinidad and Tobago during the 2009-2010 episode of the most recent El Nino event (Trinidad and Tobago Meteorological Service, 2025).

With regards to La Nina, it has been found that the Southern Caribbean including Trinidad and Tobago exhibits wetter than normal late wet season and dry season; while the early wet season at the end of a La Nina event is drier than normal. The link between the NAO and Caribbean rainfall is found in the relationship between pressure systems and rainfall and temperatures in the region.

A positive index is indicative of anomalously high pressures across the region resulting in a reduction in rainfall since higher pressure introduces stronger winds, more evaporation, cooler Sea Surface Temperatures (SST's), and less ascending motion. When the index is negative, rainfall in the early period of the wet season is enhanced since lower anomalous pressure introduces lighter winds, less evaporation, warmer SSTs, and more ascending motion.

Tobago has a maritime tropical climate influenced by the northeast trade winds. Temperatures range between 20 °C- 34°C and there are two seasons: Dry (January-May) and Wet (June-December) (UWI Seismic Research Centre, 2026).

TEMPERATURE

The average daily temperature in Trinidad and Tobago ranges from 29°C-31°C and is predicted to rise by 1.5°C in the next decade (Meterological Service of Trinidad and Tobago, n.d.) (Davis, 2025). As of this decade, 2020 to 2030 Tobago is expected to experienced temperature highs as much as 34.5°C. (Davis, 2025).

RAINFALL

Trinidad and Tobago's close proximity to the equator enables the country to have two climate types producing two opposing seasons. These seasons are differentiated by distinct dry and wet season regimes.

The dry season which occurs during January to May is symbolized by a tropical maritime climate that is characterized by moderate to strong low level winds, warm days and cool nights, with rainfall mostly in the form of showers due to daytime convection (Trinidad and Tobago Meteorological Service, 2025).

The periods late May and December are considered as transitional periods to the wet and dry seasons respectively. Variations in these two climatic seasons between the islands of Trinidad and Tobago are primarily as a result of difference in land size, orography, elevation, orientation in terms of the trade winds and geographical location. Within the wet season is the hurricane season which runs from June to November, peaking between August and October. Trinidad's geographical location puts it on the southern periphery of the North Atlantic hurricane basin. As such, Trinidad is not affected directly by storms as frequent as Tobago; however, peripheral weather associated with the passage of tropical storm systems impacts Trinidad and Tobago similarly (Trinidad and Tobago Meteorological Service, 2025).

In Figure 4-2, Hillsborough recorded a net increase in total annual rainfall across the 9 year period with the highest total being recorded in 2022.

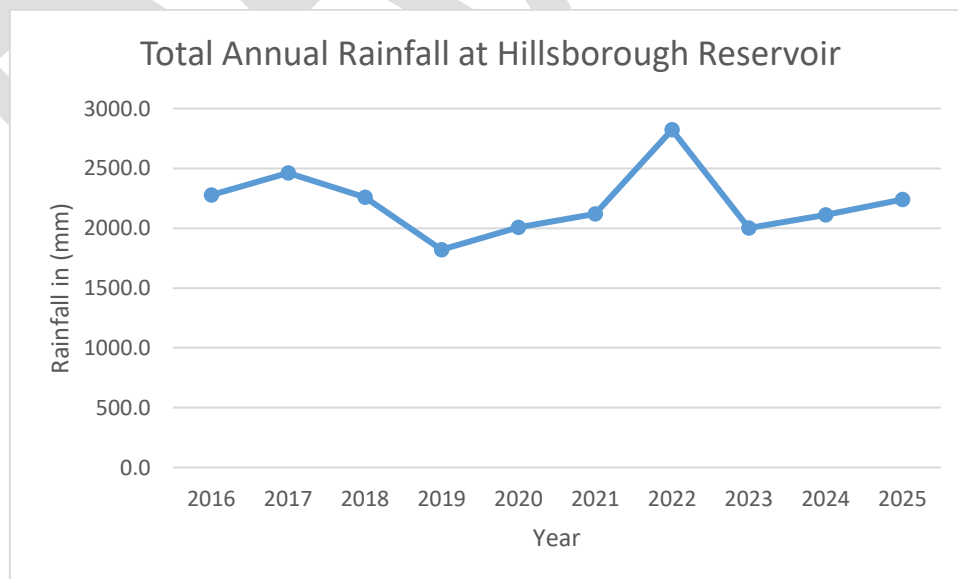


Figure 4-2 Total Annual Rainfall at Hillsborough Reservoir (2016-2025)

CLIMATE CHANGE PROJECTIONS

Statistical downscaling of global climate model (GCM) HadCM3 using the A2 and B2 emission scenarios project a rise in temperature of between 1.5 - 2.0 Celsius in the Caribbean region including Trinidad and Tobago by the 2080's compared to the 1980 to 1999 period. This amounts to a projection of 0.29 Celsius per decade. If these projections are realized it is possible that an approximate 8% increase in the length of the dry season by 2050 and consequently a shorter wet season could result. Projected trends in rainfall for Trinidad and Tobago remain unclear with large uncertainties. Model consensus among 21 GCM models project annual rainfall decreases in the range of 15% for Trinidad and Tobago by the 2080's, however 3-4 of these models projected increase in annual rainfall. If the over drying trend projections are realized, then it is likely that there will be intensification of dry spells and droughts in the vicinity of Trinidad and Tobago towards the 2080's.

Results from HadCM3 model downscaled for the A2 and B2 emission scenarios using the Statistical Downscale Modelling (SDSM) also project increases in the early rainy season (June – August) rainfall in Trinidad and Tobago compared to decreases in other countries in the region apart from Barbados. The drying trend projected in annual rainfall towards the 2080's is linked to a consensus in the models showing a shift to a more positive phase of the North Atlantic Oscillation (NAO) and El Nino like pattern in the Pacific with higher temperatures (Trinidad and Tobago Meteorological Service, 2025).

Based on the projections local water resources can be expected to be impacted. Increase intense rainfall events over shorter periods will result in lower surface water quality, reduction in the recharge of ground water as run off would be at a maximum; while Increase in longer dry spells and drought events coupled with warmer temperatures would increase agricultural irrigation demands, affect crop scheduling, increase heat related health impacts, coral bleaching and saline intrusion.

Recent modelling of the current and future water resource availability on several small islands in the Caribbean including Trinidad and Tobago, using a macro-scale hydrological model and the SRES scenarios (Arnell, 2004), found that many of these islands would be exposed to severe water stress under all SRES scenarios, and especially so under A2 and B25. Also, recent variations in sea level on the western Trinidad coast indicate that sea level in the north is rising at a rate of about 1 mm/yr, while in the south the rate is about 4 mm/yr; the difference being a response to tectonic movements.

According to IPCC AR4 global Sea level is projected to rise between the present (1980-1999) and the end of this century (2090-2099) by 0.35 m (0.23 to 0.47 m) for the A1B scenario. Based on research evidence published over most recently, mean global sea level rise is projected to increase above that of IPCC AR4 projections by the end of the century. Furthermore, recent studies also suggest that because of the close proximity of the Caribbean including Trinidad and Tobago to the equator, sea level rise may be more outstanding than some other regions. This suggests that, in the future, if projections materialize, coastal inundation, inland flooding,

storm surge damage, and coastal erosion are likely to increase in the vicinity of Trinidad and Tobago, however uncertainty remains high.

4.2.2 Topography

The dominant topographic feature in Tobago is the Main Ridge. It is a 29-kilometre chain of hills running from southwest to northeast, bounded to the south by the Southern Tobago fault system, and reaches a maximum height of 572 metres (1,877 feet).

4.2.3 Geology and Soils

Tobago forms part of the southeastern margin of the Caribbean Plate and represents the eastern extension of the Caribbean Mountain System of northern South America. The island's geology is characterized by three principal geological provinces: metamorphosed Cretaceous volcanic rocks in the northeast, un-metamorphosed Cretaceous volcanic and intrusive rocks in the central region, and younger sedimentary and carbonate deposits in the southwest (Kumar, 2013).

The southwestern portion of the island is dominated by the Rockly Bay Formation, which comprises friable sandstones and sandy mudrocks of Pliocene age, overlain in places by uplifted Pleistocene coral limestone deposits. These limestone formations represent former reef systems that were subsequently elevated above present sea level through tectonic activity (Kumar, 2013).

Tobago's geological evolution reflects multiple phases of volcanic arc development, regional metamorphism, tectonic uplift, faulting, and erosion. Subsequent fault movements, changes in sea level, and localized subsidence facilitated the deposition of younger sedimentary units, while continued tectonic activity contributed to the uplift and tilting of coral limestone deposits, particularly within the southwestern part of the island. These geological processes have shaped the island's present-day topography, drainage patterns, and subsurface conditions (Maxwell, 1948).

4.2.4 Hydrology

The proposed new Hillsborough WTP is situated within the northern section of the Hillsborough East watershed, one of Tobago's fifteen watersheds, which forms part of the Windward Hydrometric Area on the southern flank of the island's central watershed divide (Figure 4-3). Tobago is hydrologically controlled by a steep, volcanic Main Ridge and a flatter coral-limestone southwest, which creates strong spatial differences in runoff and recharge. The Hillsborough East watershed reflects a highly dissected drainage network characteristic of Tobago's upland terrain. The island's mean annual rainfall is about 1,900 mm, but this varies sharply from roughly 3,800 mm on the Main Ridge to less than 1,250 mm in the southwest lowlands. Rainfall is concentrated in the wet season, and evapotranspiration is high enough to remove a substantial share of rainfall in some areas. Supplementary watershed reporting also notes that Tobago's rainfall is routed through a network of watersheds and that groundwater is mainly sourced from bedrock aquifers (Food and Agriculture Organization of the United Nations, 2015). The Main Ridge Forest Reserve plays a critical role in regulating streamflow, sustaining baseflows during the dry season, reducing erosion, and maintaining water quality through natural filtration and sediment retention.

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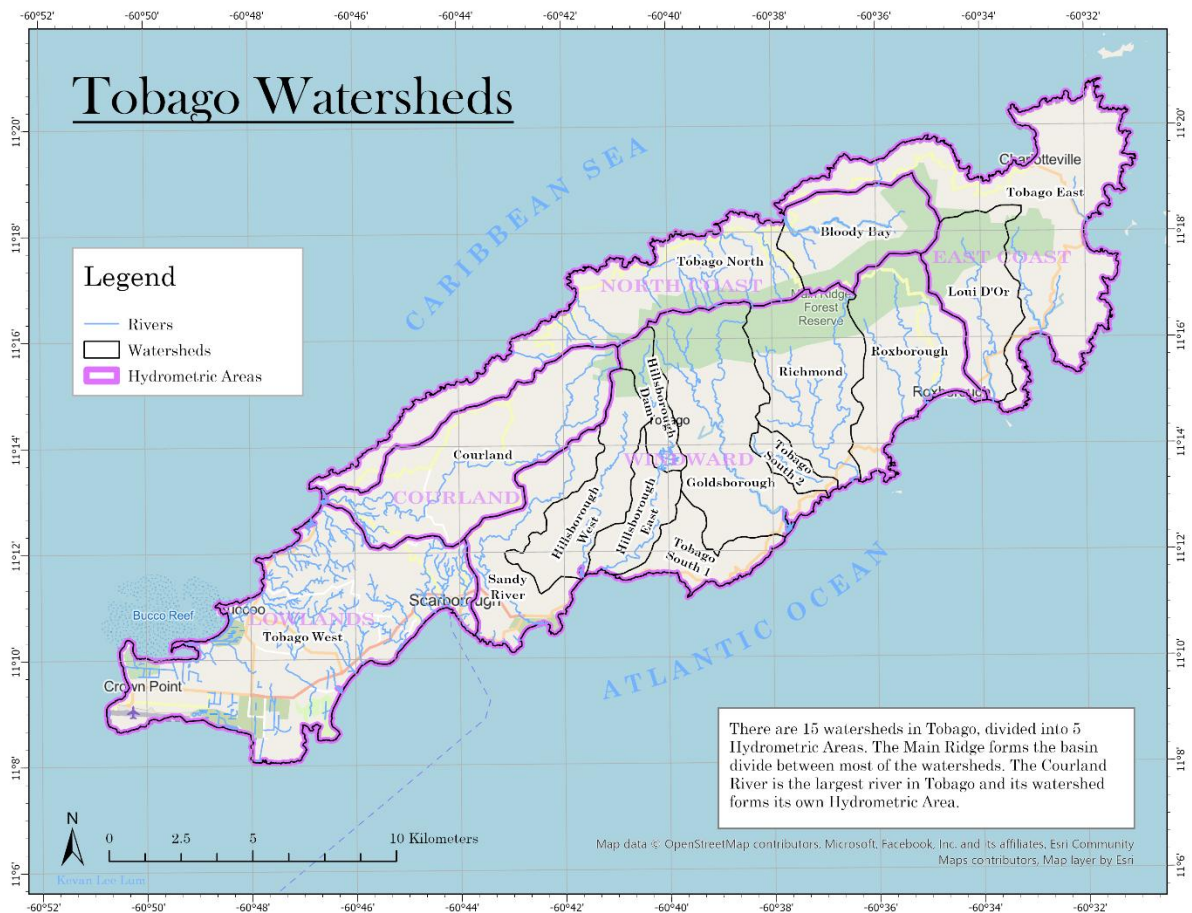


Figure 4-3: Watersheds in Tobago (Source: ESRI)

Tobago has a relatively limited surface-water resource base compared to Trinidad. The OAS watershed report places Tobago's surface-water availability at about 140 MCM/year and conventional groundwater at about 0.66 MCM/year, with an additional 65.3 MCM/year associated with newly identified bedrock aquifers; actual abstraction is much lower, but the figures show that Tobago's supply is sensitive to seasonal variation and catchment conditions. Within this system, the Hillsborough River and Hillsborough Reservoir are the island's key strategic assets (The Water Resources Agency, 2001).

The main hydrologic constraint associated with Hillsborough is sedimentation. The reservoir case study reports that its storage volume had been declining because of silt deposition, prompting desilting works and longer-term catchment management recommendations. Taken together, the sources indicate that Tobago's water security depends not only on the reservoir itself, but also on erosion control, watershed protection, and management of runoff and pollution from the surrounding catchment. Some additional priority problems in watershed areas include - proximity to Scarborough and pressure on land for residences and buildings, improved vehicular access to forest and watershed areas.

4.2.5 Disaster Risk

The following analysis is guided by the IDB's Disaster and Climate Change Risk Assessment Methodology with particular focus on water treatment systems. 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 6.5.5 to guide the application of mitigative measures for the project.

4.2.5.1 Step 1: Hazard Exposure

TROPICAL CYCLONES AND HURRICANES

Storms and hurricanes are defined by the wind speed sustained by the systems. Tropical storms can sustain winds within the range of 63-118 km/h, and a hurricane sustains winds of over 118 km/h at its centre. Wind damage to buildings and infrastructure, and flooding from intense downpours, are the main hazards potential drivers of impact to the construction and operation of the new water treatment plant.

Table 4-1 Total Number of Historical Simulated Tropical Cyclones per Year for Each Category 1951-2014 (World Bank Climate Change Portal)

Cyclone Classification	Global	North Atlantic Ocean	Trinidad and Tobago Exclusive Economic Zone	Trinidad and Tobago (landfalls)
Category 5	4.14	0.24	0.002	0.001
Category 4	10.27	0.74	0.008	0.003
Category 3	11.13	0.99	0.013	0.005
Category 2	10.06	1.05	0.022	0.01
Category 1	18.1	2.18	0.065	0.03
Tropical Storm	47.95	6.76	0.284	0.174
Total	101.65	11.96	0.395	0.223

The table above shows the number of historical simulated cyclones per year that make landfall in Trinidad and Tobago between 1951-2014. The most commonly occurring cyclone event that impacts Trinidad and Tobago is tropical storms. When considering major cyclone events (category 3 or higher), the number is significantly lower.

This is further observed in the graph displayed in Figure 4-4 below which shows the percentage frequency of cyclone events that have affected Trinidad and Tobago in comparison to the global percentage and the North Atlantic percentage. Tropical storms account for 77.85% of the cyclones that made landfall in Trinidad and Tobago while major cyclones accounts for less than 9%. This is indicative of low exposure to major cyclone activity.

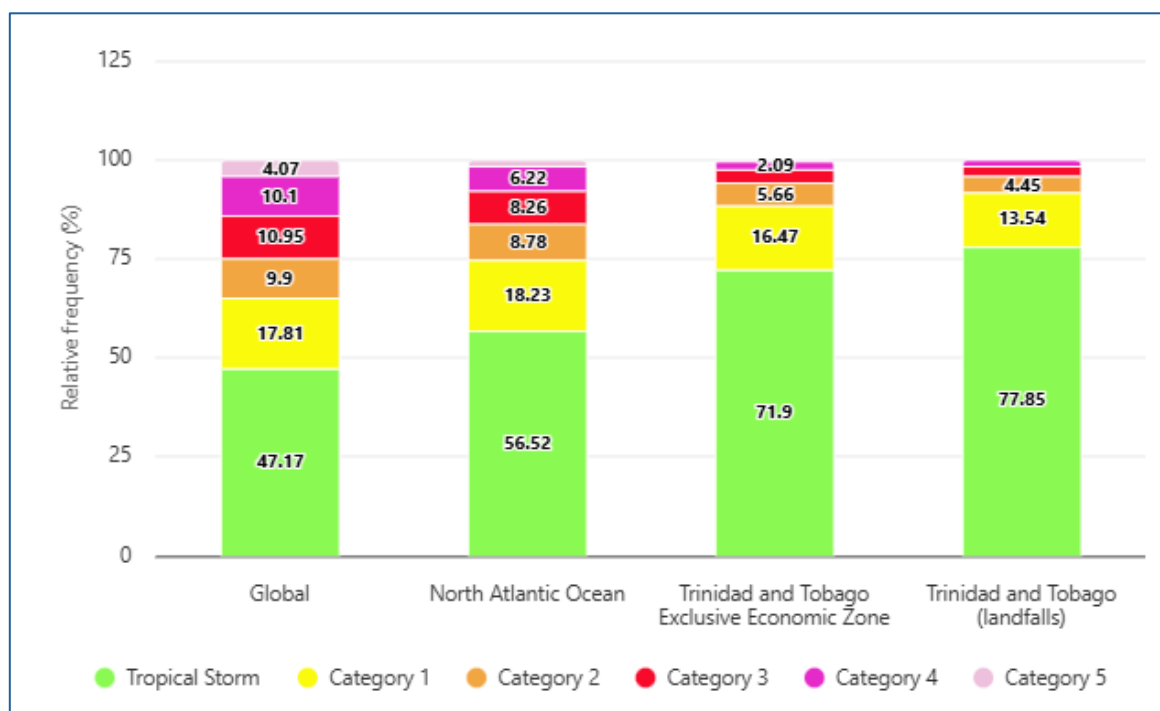


Figure 4-4 Simulated Historical Relative Frequency (Percent) of Cyclone Types 1951-2014 (source: World Bank Climate Change Portal)

In the context of Tobago, during cyclone impact, the areas that record the most significant impact is recorded in the low lying areas along south coast of the island (World Data, 2026). This is further expressed in Table 4-2 below which speaks to the cyclone events that have impacted Trinidad and Tobago between 2019 and 2025 and highlights the most affected cities/areas. According to the table, the community of Scarborough (southern Tobago) is the area most frequently and most significantly impacted by cyclone events.

Table 4-2 Hurricane Impact History and Most affected Areas in Trinidad and Tobago 2019-2025

Cyclone Information	Date of Impact	Most Affected Cities/Areas
Melissa (Tropical Storm) - Max Wind Speed: 40 mph - Max Wind Speed on Land: 35 mph - Diameter: 345 miles - Minimum Pressure: <896 mbar	17–31 October 2025	Scarborough, Petit Valley
Jerry (Tropical Storm) - Max Wind Speed: 63 mph - Diameter: 207 miles - Minimum Pressure: <999 mbar - Closest Approach to Trinidad and Tobago: 385 km NE of Scarborough	4–11 October 2025	No direct landfall. Closest to Scarborough
Beryl (Category 5 Hurricane)	26 June–11 July 2024	Scarborough, Petit Valley

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Cyclone Information	Date of Impact	Most Affected Cities/Areas
• Max Wind Speed: 167 mph • Max Wind Speed on Land: 150 mph • Diameter: 226 miles • Eye Diameter: 23 miles • Minimum Pressure: <934 mbar		
Tammy (Category 1 Hurricane) • Max Wind Speed: 86 mph • Diameter: 191 miles • Minimum Pressure: <965 mbar • Closest Approach: 227 km NE of Scarborough	20–31 October 2023	No direct landfall. Closest to Scarborough
Philippe (Tropical Storm) • Max Wind Speed: 58 mph • Diameter: 180 miles • • Minimum Pressure: <998 mbar • Closest Approach: 477 km N of Scarborough	23 September–5 October 2023	No direct landfall. Closest to Scarborough
Franklin (Tropical Storm) • Max Wind Speed: 46 mph • Max Wind Speed on Land: 35 mph • Diameter: 368 miles • Minimum Pressure: <926 mbar	19–29 August 2023	Scarborough, Petit Valley
Gert (Tropical Depression) • Max Wind Speed: 23 mph • Diameter: 276 miles • Minimum Pressure: <1005 mbar • Closest Approach: 328 km N of Scarborough	19–27 August 2023	No direct landfall. Closest to Scarborough
Bret (Tropical Storm) • Max Wind Speed: 69 mph • Max Wind Speed on Land: 60 mph • Diameter: 230 miles • Minimum Pressure: <996 mbar	16–24 June 2023	Scarborough
Julia (Tropical Depression) • Max Wind Speed: 35 mph • Diameter: 276 miles • Minimum Pressure: <982 mbar • Closest Approach: 322 km W of Point Fortin	6–10 October 2022	No direct landfall. Closest to Point Fortin
Fiona (Tropical Storm) • Max Wind Speed: 58 mph • Diameter: 92 miles • Minimum Pressure: <931 mbar • Closest Approach: 481 km N of Scarborough	14–27 September 2022	No direct landfall. Closest to Scarborough
Grace (Tropical Storm) • Max Wind Speed: 40 mph • Diameter: 276 miles	13–21 August 2021	No direct landfall. Closest to Scarborough

Cyclone Information	Date of Impact	Most Affected Cities/Areas
- Minimum Pressure: <967 mbar - Closest Approach: 511 km NE of Scarborough		
Elsa (Category 1 Hurricane) - Max Wind Speed: 86 mph - Max Wind Speed on Land: 81 mph - Diameter: 219 miles - Minimum Pressure: <991 mbar	30 June–10 July 2021	Scarborough
Isaias (Tropical Storm) - Max Wind Speed: 52 mph - Max Wind Speed on Land: 46 mph - Diameter: 483 miles - Minimum Pressure: <986 mbar	28 July–5 August 2020	Scarborough
Gonzalo (Tropical Storm) - Max Wind Speed: 40 mph - Diameter: 230 miles - Minimum Pressure: <997 mbar	20–25 July 2020	Scarborough, Sangre Grande, Petit Valley
Dorian (Tropical Storm) - Max Wind Speed: 60 mph - Diameter: 69 miles - Minimum Pressure: <910 mbar - Closest Approach: 209 km NE of Scarborough	24 August–5 September 2019	No direct landfall. Closest to Scarborough

The Hillsborough WTP and supporting works are being conducted further inland along the hilly interior of the island which significantly reduces the exposure of the site location to the impact of cyclone events. While the likelihood of a storm affecting Trinidad and Tobago is a relevant one, the consequences and overall risk of the hazard can be reduced by employing appropriate design criteria in the construction phase. Given the topographical location of the Hillsborough treatment plant and the hazard history analyzed from World Data, 2026, hurricane impact is more concentrated along the flat southern region of the island, the development is deemed to have low exposure to impact from cyclonic events.

EARTHQUAKE AND LANDSLIDES

The Trinidad and Tobago area is one of the more seismically active zones in the Eastern Caribbean, with an annual average output of about 260 earthquakes of magnitude greater than 2.0. However, the activity rate is not uniform across the area. The rate in the Tobago area has picked up since 1990 and whereas in the past the rate was on par with that seen on land Trinidad, it is now closer to that seen north of Trinidad (UWI Seismic Research Centre, 2025). Following are details of the significant magnitude events observed in the zones making up the area:

1. *West of Tobago* – The largest in the instrumental period occurred on 1997/04/02 Mt=5.6 and 2016/12/06 Mt=6.1. There was some damage in south-west Tobago for the 1997 event.

2. *South of Tobago* – The largest known occurred on 1997/04/22 Mt=6.1. There was significant damage in south-west Tobago, with flooding in some areas from large-scale groundwater discharge.

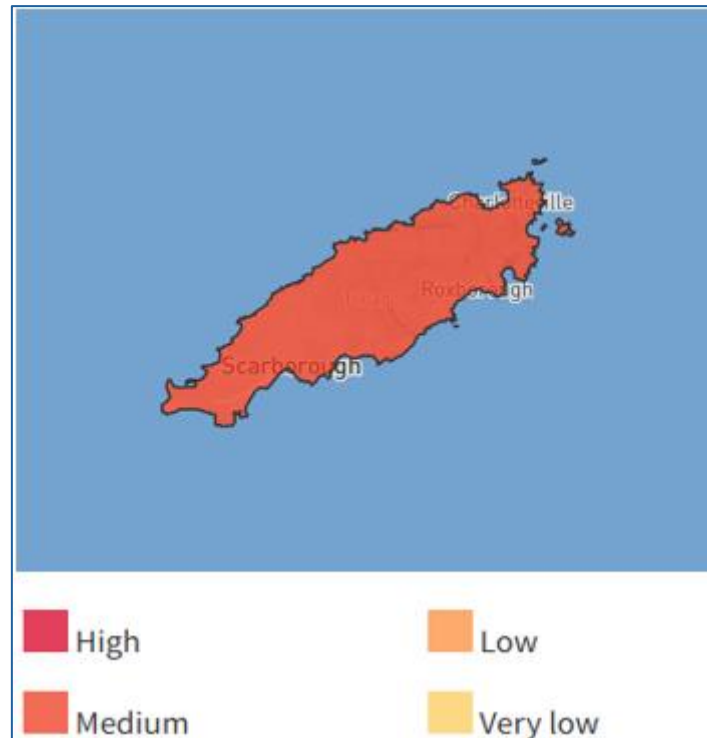


Figure 4-5 Earthquake Exposure Map of Tobago (Source: World Bank ThinkHazard Portal)

According to (World Bank ThinkHazard Portal, 2026) Tobago is regarded as having moderate exposure to earthquake related hazards (Figure 4-5). This means that there is a 10% chance of potentially damaging earthquake shaking in your project area in the next 50 years. Given that earthquake activity is likely, overall risk associated with the event can be minimized by the reduction of the consequences associated with the hazard. The new infrastructure and supporting systems will be constructed/installed to withstand earthquakes. Hazards associated with earthquake activity include damage to plant walls, cracks in lines that carry raw water, sludge etc. leading to leakages across the plant and its supporting network as well as potential land disturbance. In such an event, isolation and repairs to the necessary infrastructure effected in the shortest possible time. With this in mind, the project is deemed to have a moderate exposure to the potential impact of seismic disaster.

Landslides represent a significant natural hazard within the Hillsborough catchment due to the area's steep topography, mountainous terrain, and exposure to intense rainfall events. The Hillsborough Water Treatment Plant are located within the interior of Tobago, where slope instability can be triggered by prolonged rainfall, saturated soil conditions, erosion, and seismic activity. Potential impacts include damage to access roads, disruption of plant operations, increased sediment loads in watercourses, and deterioration of raw water quality.

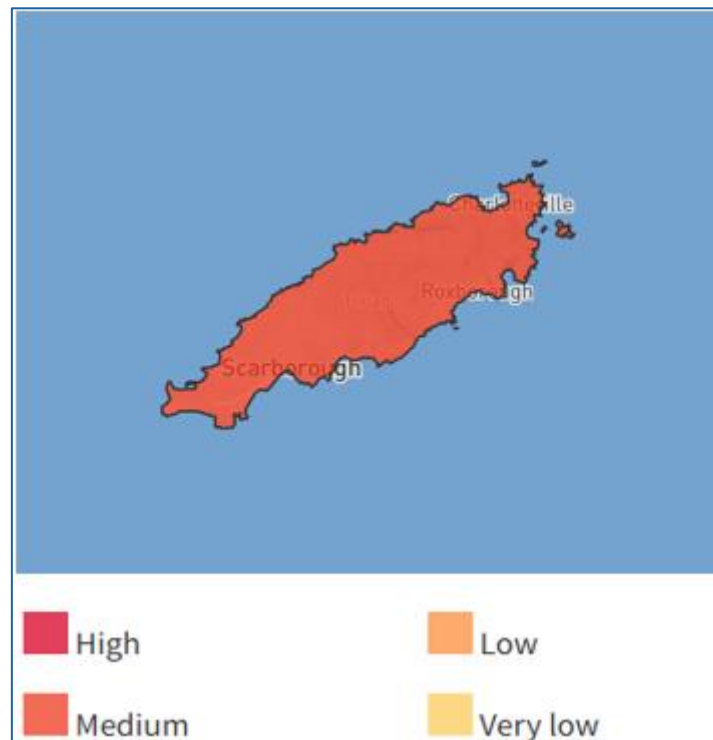


Figure 4-6 Landslide Exposure Map of Tobago (World Bank ThinkHazard Portal)

According to the hazard exposure map presented in Figure 4-6, Tobago has a medium/moderate exposure to the impact of landslides. Additional research on landslide susceptibility in Tobago indicates that the island's landslide risk increases from the southwest toward the Main Ridge and northeastern regions, where steep slopes, geology, and terrain characteristics create greater susceptibility to slope failure (Baban & Sant, 2005). Areas associated with the Main Ridge have been identified as having high to severe landslide susceptibility, particularly along steep northeast-facing slopes.

The principal landslide hazards relevant to the project include rainfall-induced slope failures, erosion of cut slopes and embankments, and localized failures associated with excavation activities. Seismic events may also trigger slope instability (Baban & Sant, 2005) in susceptible areas. These hazards have the potential to affect access routes, and other linear infrastructure associated with the water supply system. As such, the project area is deemed to have a moderate exposure to earthquake hazards.

EXPOSURE

Based on topographical situation, the natural hazards considered to have the potential to negatively impact the project are hurricanes/storm activity and earthquake activity. Both of which, in extreme events, have the potential to cause significant damage to the plant and supporting infrastructure. However, based on the long return period of these hazards, as well as the fact that the plant is being constructed within the footprint of the existing water treatment plant, the project is deemed to have low exposure to the identified natural hazards.

Table 4-3 Project Exposure Summary

Hazard	Level of Exposure	Justification
Tropical Cyclones and Hurricanes	Low	Major hurricanes rarely affect Trinidad and Tobago, and the Hillsborough Water Treatment Plant is located inland within Tobago's hilly interior, reducing exposure to coastal and wind-related impacts.
Earthquakes	Moderate	Although Tobago is located within a seismically active region, the proposed infrastructure will be designed to withstand seismic activity, limiting potential impacts to localized damage and temporary service disruptions.
Landslides	Moderate	The project area is located within steep, mountainous terrain where intense rainfall and unstable slopes increase the likelihood of landslides that could affect access roads, and plant operations.

SENSITIVITY

Sensitivity speaks to how much a water system's performance changes under stress. A highly sensitive system might experience large drops in output or quality from moderate hazards. For example, a treatment plant with limited filtration might be *highly sensitive* to storm-driven turbidity spikes. A distribution network with thin pipes might be sensitive to pressure surges. In general, sensitivity depends on design margins and exposure (e.g. a low intake level is sensitive to moderate floods).

Based on the determined moderate level of exposure, the project is rated at a Moderate sensitivity to natural hazard impact.

4.2.5.2 Step 2: Criticality and Vulnerability

The IDB Disaster and Climate Change Risk Assessment (DCCRC) Methodology assesses infrastructure criticality using three complementary dimensions: (i) the physical characteristics of the infrastructure, (ii) the potential adverse consequences of infrastructure failure on the delivery of essential services, and (iii) the potential impacts of infrastructure failure on the surrounding population and environment. Together, these dimensions provide a structured approach for evaluating the relative importance of infrastructure assets and the consequences associated with their disruption. The resulting criticality assessment forms the basis for the subsequent evaluation of vulnerability and climate risk by identifying assets for which failure would have the greatest operational, social, and environmental implications.

To facilitate this assessment, the DCCRC Methodology presents a three-dimensional criticality framework (Figure 4-7), in which each axis represents one of the three assessment dimensions. Each dimension is independently classified as Low (1), Moderate (2), or High (3) using predefined criteria. The intersection of these classifications within the three-dimensional cube provides an overall indication of infrastructure criticality. Assets that score highly across all three dimensions occupy the outer (red) region of the cube and are considered highly critical because their failure would result in significant service disruption, widespread social or environmental consequences, and substantial operational impacts. Conversely, assets with predominantly low scores are represented within the inner (green) region of the cube and are considered to have relatively low criticality, while intermediate combinations correspond to moderate criticality. This criticality classification subsequently informs the level of detail required for the vulnerability assessment and the prioritisation of adaptation and resilience measures.

For drainage, water supply, and wastewater infrastructure, the DCCRC Methodology evaluates the physical characteristics dimension using criteria originally developed for dams and water-retaining structures, where structural height and retained volume are appropriate indicators of the potential consequences of structural failure. As these parameters are not representative of the operational characteristics or functional importance of water treatment plants, the physical characteristics criteria have been modified for the purposes of this assessment while preserving the overall DCCRC framework. Rather than structural dimensions, the adapted criteria evaluate the characteristics that most directly influence the operational significance and resilience of a water treatment facility. These include treatment capacity, process complexity, the presence of critical infrastructure such as intake works, pumping stations, storage reservoirs, and control systems, the storage and handling of treatment chemicals, and the anticipated effort and duration required to restore operations following a disruptive event. This modification maintains the intent of the DCCRC methodology by assessing the relative physical significance of the infrastructure using parameters that are appropriate for water treatment plants, thereby ensuring that the resulting criticality classification accurately reflects the nature and function of the proposed development.

The adapted physical characteristics criteria applied in this assessment are presented in the table below.

Table 4-4 Adapted Physical Characteristics Criteria for Water Treatment Plants

Criticality Level	Physical Characteristics (Water Treatment Plants)
Low	Treatment capacity generally < 2 IMGD . Small water treatment plant with a simple treatment process, limited pumping and storage infrastructure, minimal chemical storage, and serving a single community or limited-service area. Operational recovery following disruption is expected to be relatively straightforward.
Moderate	Treatment capacity generally 2–10 IMGD . Medium-sized water treatment plant incorporating multiple treatment processes, pumping stations, storage reservoirs, and chemical handling systems. Typically serves several communities or a municipality and requires more complex operation, maintenance, and restoration following disruption.
High	Treatment capacity generally > 10 IMGD . Large regional water treatment plant serving multiple municipalities or a significant population. Characterised by complex treatment processes, extensive pumping and storage infrastructure, significant chemical storage facilities, redundant mechanical and electrical systems, and advanced operational control systems (e.g., SCADA). Failure would result in prolonged service disruption and require substantial resources and time to restore operations.

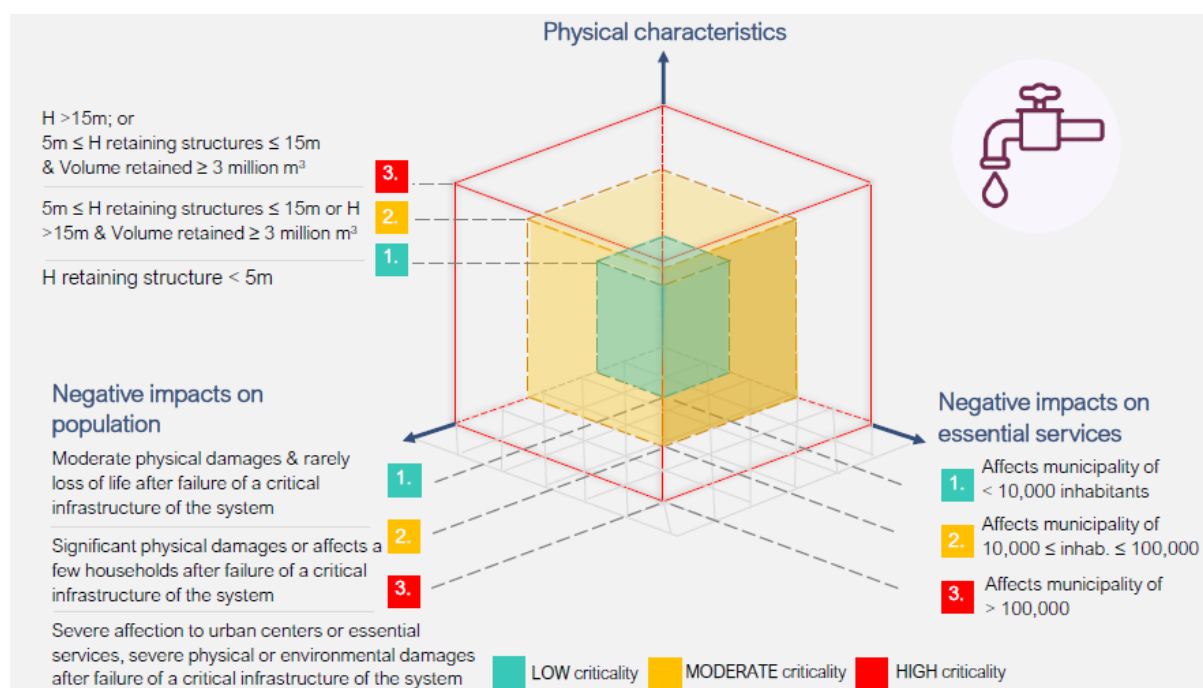


Figure 4-7 Criticality Cube

Table 4-5 Criticality Classification

KEY COMPONENT	LOW	MODERATE	HIGH
DIMENSION 1: LOSS OF ESSENTIAL SERVICES			
IMPACTS ON THE SERVICE FUNCTIONALITY		Moderate: The Hillsborough reservoir is one of Tobago's largest supplies of potable water. Failure at the plant being replaced has the potential to negatively impact on over 15,000 customers (directly and indirectly)	
DIMENSION 2: IMPACT ON POPULATION			
IMPACT ON POPULATION	Low: In the event of failure at the Hillsborough plant, there is no foreseeable loss of life due to failure at the plant. This is mainly due to the isolated location and size of the plant.		

KEY COMPONENT	LOW	MODERATE	HIGH
	Additionally, the proposed works for decommission and construction of the new water treatment plant will take place within the existing footprint of the plant. All the associated risks will be discussed and managed through the utilization of the relevant management plans		
DIMENSION 3: PHYSICAL CHARACTERISTICS			
PHYSICAL CHARACTERISTICS OF WATER TREATMENT PLANT SYSTEM		Moderate: Medium-sized treatment plant with treatment units; moderate storage capacity; extensive distribution network serving several communities; moderate operating pressures; presence of critical components such as clear-well storage and, sludge holding tanks	

4.2.5.3 Step 3: Diagnostic Narrative

The project area has notable exposure to the following hazards:

- Tropical Cyclones and Hurricanes
- Earthquakes
- Landslides

For this operation, Tropical Cyclones and Hurricanes are classified as Low, while Landslides and Earthquakes are classified as Moderate. The criticality and vulnerability of the infrastructure component of the project is classified as **Moderate**, following the criteria shown in the criticality chart: (i) physical characteristics are **Moderate** (ii) the level of Impact on Population is **Low**; and (iii) the level of Impact on Service Functionality is **Moderate**. Therefore, the overall criticality is rated as **Moderate**.

The proposed construction of the Hillsborough Water Treatment Plant are not expected to increase the current conditions of natural hazards or vulnerability to surrounding communities or the environment. The proposed interventions are intended to replace and modernize aging water supply infrastructure through the construction of a new climate-resilient treatment facility, installation of automated treatment and monitoring systems, as well as the incorporation of redundancy measures to improve operational reliability. The project does not involve the construction of dams, reservoirs, flood control structures, or other infrastructure that would significantly alter existing hazard conditions or increase disaster risks to nearby populations.

Considering the hazard levels identified, the criticality and vulnerability estimated for the infrastructure interventions, and the negligible level of risk exacerbation associated with the proposed works, a **Moderate** Risk classification has been determined.

Climate change has been considered as follows: climate projections for Trinidad and Tobago indicate increasing temperatures, greater rainfall variability, and an increase in the frequency and intensity of extreme rainfall events. These changes may increase the likelihood of slope instability, erosion, localized flooding, and sediment loading within the Hillsborough watershed. The project incorporates climate resilience measures, including stormwater drainage systems, slope stabilization works, flood-proofed facilities, standby power generation, and infrastructure designed to withstand future climatic stresses.

The following design considerations aimed at managing the risks were identified: construction of climate-resilient treatment facilities; implementation of slope stabilization and erosion control measures; installation of stormwater drainage infrastructure; provision of standby generators and equipment redundancy; installation of pressure management, monitoring, and control systems; incorporation of bridge and river crossing protection measures; and implementation of operational monitoring through PLC/SCADA integration.

The narrative concludes 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

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measures have been identified and documented in a DRMP, and it is possible to attain a tolerable risk level from these.

DRAFT

4.3 Biological Environment Baseline

The proposed site for the new Hillsborough Water Treatment Plant (WTP) is currently characterised by a hilly landscape that has been cleared and maintained with mainly grass and limited tree cover/shrubs (Figure 4-9). The WTP is proposed to be constructed on 0.65 acres (2,621 m²) of the property, which will have to be excavated to facilitate the proposed work. Based on the nature of the land within the defined footprint, it may be classified as a **modified habitat** under ESPS 6. Consequently, direct impacts on vegetation are expected to be low and largely confined to already disturbed habitats. However, the area of influence for the site includes extensive forests and movement corridors for a variety of wildlife species. As a result, construction activities may cause disturbance to fauna inhabiting or traversing the surrounding landscape, necessitating consideration of potential impacts on adjacent habitats and ecological connectivity. Importantly, no removal of trees is anticipated based on the proposed plans.

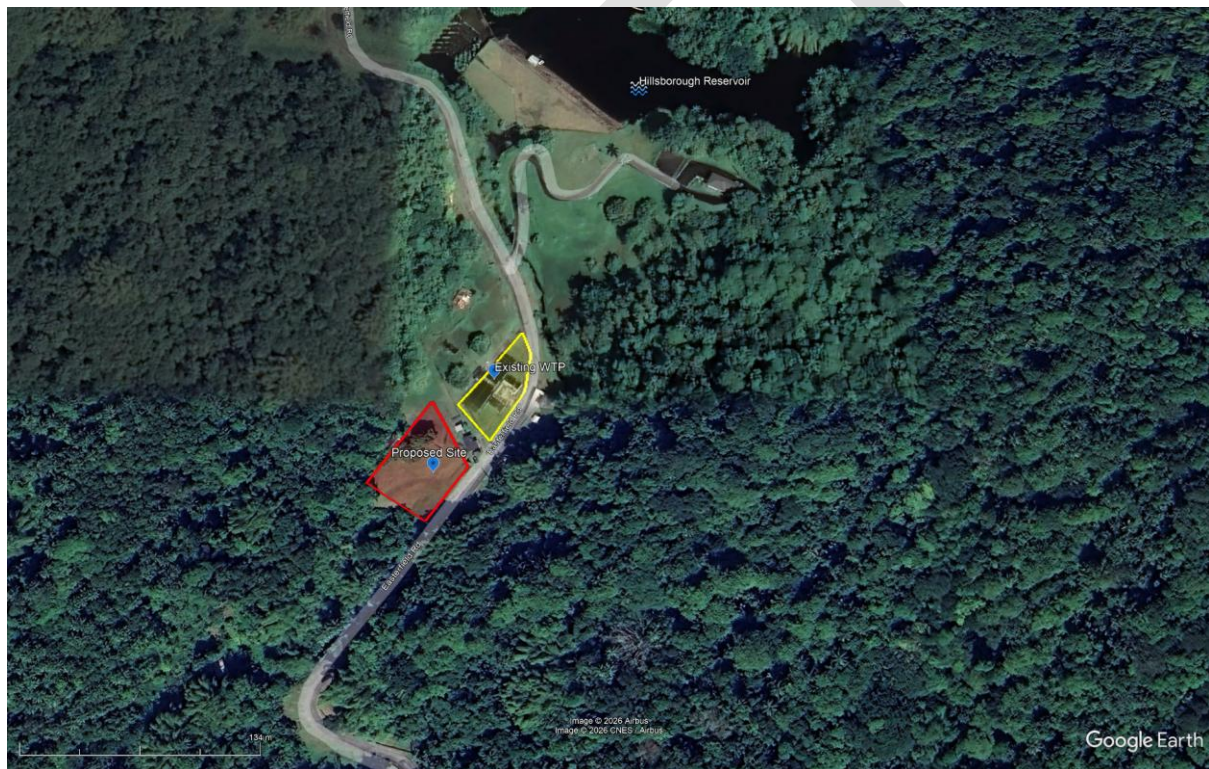


Figure 4-8: Proposed location of the new Hillsborough Water Treatment Plant alongside the existing plant.

While the immediate project footprint is already cleared and actively maintained, an understanding of the broader ecological context is important for assessing potential project-related impacts. Accordingly, the flora and fauna characteristics of the lands surrounding the project site are presented below to characterise the more biodiversity-rich habitats adjacent to the proposed development area.



Figure 4-9: Proposed site for the new Hillsborough WTP and its surroundings.

4.3.1 Flora

The site is located approximately 3.5km south of the Main Ridge Forest Reserve (Figure 4-10). The Reserve encompasses 4,046.86 hectares of tropical rainforest, specifically lower montane, lowland and xerophytic rainforest and occurs up to approximately 240–360 m above sea level on the lower slopes of the Main Ridge (Key Biodiversity Areas, 2024). The canopy typically closes at 35 m with two poorly defined lower strata. Dominant and co-dominant tree species characteristic of this formation include:

- Crabwood / Crappo (*Carapa guianensis*) – important for seed oil and cavity-nesting fauna
- Angelin (*Andira inermis*)
- Roseflesh (*Hieronyma caribaea*)
- Devilwood (*Eschweilera decolorans*)
- Mora (*Mora excelsa*) – forming near-monodominant stands in riparian lowlands
- Rosewood (*Byrsonima spicata*)
- Wild Cocoa (*Licania biglandulosa*)
- Redwood (*Ternstroemia oligostemon*)
- Lionwood (*Sloanea trinitensis*)

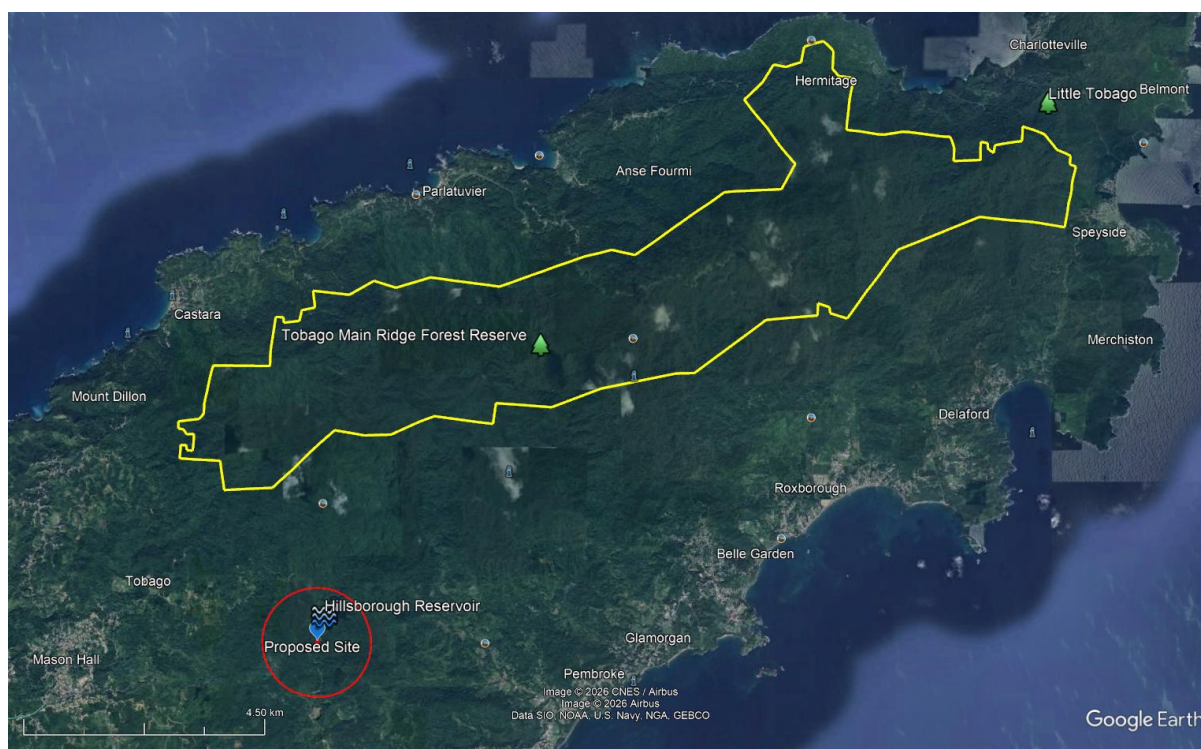


Figure 4-10: Location of the Proposed New Hillsborough WTP site and project SOI relative to the Tobago Main Ridge Forest Reserve

Beyond the Reserve, the forested lands within the project's area of influence demonstrates a similar flora composition. *Mora excelsa* is of particular ecological significance as a monodominant species, forming dense stands (Tropical Plants Database, 2024). Research by Brookshire et al. (2012) demonstrated that Mora-dominated forest systems significantly modify nitrogen cycling in watersheds, reducing nitrate losses and contributing to water quality protection, a function directly relevant to the Hillsborough Reservoir catchment.



Figure 4-11: Hillsborough Reservoir and Surrounding Vegetation

Riparian corridors along the various tributaries leading to the Hillsborough Reservoir support dense gallery forest dominated by large-leaved *Heliconia* species, *Calathea* spp., tree ferns (*Cyathea* spp.), and palms (*Euterpe oleracea*, *Roystonea oleracea*) (Figure 4-11). These corridors form critical wildlife movement pathways connecting the Main Ridge Forest Reserve to lowland habitats and provide essential refuge for aquatic and semi-aquatic species.

The Hillsborough Reservoir is the primary freshwater body within the area of influence. It supports littoral aquatic vegetation and is the principal drinking water source for Tobago, but also provides a spawning habitat for diadromous fish species.

Table 4-6 presents the principal flora species documented or expected within the Hillsborough project area based on vegetation survey literature and analogous habitat assessments in Tobago. Species of conservation importance are noted.



Figure 4-12: Vegetation Observed Surrounding within the Sphere of Influence

Table 4-6: Flora Species Recorded in the Hillsborough Project Area, Tobago

Species (Scientific Name)	Common Name	Family	Habitat	IUCN	Status / Notes
<i>Mora excelsa</i>	Mora tree	Caesalpinioideae	Riparian / Lowland Forest	Least Concern	Ecologically significant; Native
<i>Carapa guianensis</i>	Crabwood / Crappo	Meliaceae	Lowland Moist Forest	Least Concern	Commercially valuable timber; Native
<i>Andira inermis</i>	Angelin	Fabaceae	Lowland Forest	Least Concern	Used for timber and traditional medicine
<i>Hieronyma caribaea</i>	Roseflesh	Phyllanthaceae	Lowland Forest	Least Concern	Native
<i>Eschweilera decolorans</i>	Devilwood	Lecythidaceae	Forest understorey	Least Concern	-
<i>Manilkara bidentata</i>	Balata / Bulletwood	Sapotaceae	Moist Forest	Least Concern	Commercially valuable; evergreen

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Species (Scientific Name)	Common Name	Family	Habitat	IUCN	Status / Notes
<i>Byrsonima spicata</i>	Rosewood	Malpighiaceae	Lower Montane Forest	Least Concern	Native
<i>Licania biglandulosa</i>	Wild Cocoa	Chrysobalanaceae	Montane Forest	Least Concern	Native
<i>Ternstroemia oligostemon</i>	Tobago Redwood	Pentaphylacaceae	Lower Montane Forest	Not Evaluated	Native to Tobago
<i>Euterpe broadwayi</i>	Manicole Palm	Arecaceae	Riparian / Lowland	Vulnerable	Critical food source for frugivorous birds
<i>Roystonea oleracea</i>	Caribbean Royal Palm	Arecaceae	Lowland / Riparian	Least Concern	Caribbean native
<i>Heliconia caribaea</i>	Wild Plantain / Balisier	Heliconiaceae	Riparian / Stream margins	Least Concern	Nectar source for hummingbirds
<i>Cyathea spp.</i>	Tree Ferns	Cyatheaceae	Moist Ravines	Least Concern	-
<i>Calathea spp.</i>	Prayer Plants	Marantaceae	Forest floor / Riparian	Least Concern	Understorey species
<i>Tabebuia heterophylla</i>	Pink Poui	Bignoniaceae	Secondary / Disturbed	Least Concern	Common secondary forest tree; Caribbean native
<i>Cecropia peltata</i>	Trumpet Tree	Urticaceae	Secondary Forest	Least Concern	Pioneer; bat and bird food source
<i>Bambusa vulgaris</i>	Bamboo	Poaceae	Riparian / Disturbed	Not Evaluated	Invasive; used locally but degrades waterways
<i>Duguetia tobagensis</i>	Tobago Annona	Annonaceae	Montane Forest	Endangered	Endemic; species of great concern
<i>Justicia tobagensis</i>	Tobago Justicia	Acanthaceae	Forest	Endangered	Endemic; Restricted Range

Species (Scientific Name)	Common Name	Family	Habitat	IUCN	Status / Notes
<i>Odontonema brevipes</i>	Tobago Odontonema	Acanthaceae	Forest	Endangered	Endemic
<i>Pilea tobagensis</i>	Tobago Pilea	Urticaceae	Montane Forest	Endangered	Endemic; rare

4.3.2 Fauna

BIRDS

Tobago supports 210 bird species (National Trust of Trinidad and Tobago, 2022), and the island ranks fifth in the world for bird diversity per square kilometre (Discover Wildlife, 2023). The Main Ridge Forest Reserve is designated as an Important Bird Area (IBA) (Devenish et al., 2009). Over a quarter of resident bird species are of endemic subspecies (BirdLife International, 2020). Table 4-7 lists key bird species that have been recorded or expected in the Hillsborough area.



Figure 4-13: Photos of Fauna observed at the Hillsborough Reservoir in the SOI

Table 4-7: Key Bird Species of the Hillsborough Study Area, Tobago

Species (Scientific Name)	Common Name	IUCN	Notes
<i>Campylopterus ensipennis</i>	White-tailed Sabrewing Hummingbird	Endangered (EN)	Endemic and environmentally protected hummingbird found in Tobago since 2005
<i>Ortalis ruficauda</i>	Rufous-vented Chachalaca (Cocrico)	Least Concern (LC)	Loud, conspicuous; forest edge and secondary scrub; National Bird of Tobago

Species (Scientific Name)	Common Name	IUCN	Notes
<i>Galbula ruficauda</i>	Rufous-tailed jacamar	Least Concern (LC)	Insectivore that flits through the trees in forested habitats in Tobago
<i>Momotus bahamensis</i>	Trinidad motmot	Least Concern (LC)	National endemic is more commonly spotted in Tobago
<i>Amazona amazonica</i>	Orange-winged Amazon Parrot	Least Concern (LC)	Cavity nester; threatened by cage-bird trade; Common resident
<i>Aratinga pertinax</i>	Brown-throated Parakeet	Least Concern (LC)	Forest and edge habitats; Occasional visitor
<i>Chloroceryle americana</i>	Green Kingfisher	Least Concern (LC)	Riparian specialist; streams and reservoir margins; Common resident
<i>Pandion haliaetus</i>	Osprey	Least Concern (LC)	Forages on Hillsborough Reservoir; Resident and migrant
<i>Ardea herodias</i>	Great Blue Heron	Least Concern (LC)	Reservoir and stream margins; Occasional resident
<i>Butorides virescens</i>	Green Heron	Least Concern (LC)	Riparian and reservoir
<i>Pitangus sulphuratus</i>	Great Kiskadee	Least Concern (LC)	Disturbed areas and forest edge; Common resident

MAMMALS

An estimated 12 to 16 mammal species thrive in the Main Ridge Forest Reserve and adjacent lowland habitats (National Trust of Trinidad and Tobago, 2022; CNW Network, 2023). Bats constitute a dominant proportion of the mammalian fauna of Trinidad and Tobago (MEASTT, 2009). Table 4-8 presents the key mammals that have been recorded or expected in the Hillsborough area.

Table 4-8: Mammal Species likely found in the Hillsborough Study Area, Tobago

Species (Scientific Name)	Common Name	IUCN	Notes
<i>Dasyus novemcinctus</i>	Nine-banded Armadillo (Tattoo)	Least Concern (LC)	Burrowing; sensitive to vibration disturbance; Game species
<i>Dasyprocta leporina</i>	Red-rumped Agouti	Least Concern (LC)	Seed disperser; important for forest regeneration; Native; Game species

Species (Scientific Name)	Common Name	IUCN	Notes
<i>Agouti paca</i>	Lowland Paca (Lappe)	Least Concern (LC)	Nocturnal; riparian areas; Game species
<i>Procyon cancrivorus</i>	Crab-eating Raccoon	Least Concern (LC)	Riparian habitats; omnivore; Native; Common resident
<i>Sus scrofa</i>	Feral Hog (Wild Hog)	Least Concern (LC)	Soil disturbance; invasive alien species; Invasive
<i>Artibeus jamaicensis</i>	Jamaican Fruit Bat	Least Concern (LC)	Key pollinator and seed disperser; Common resident
<i>Carollia perspicillata</i>	Seba's Short-tailed Bat	Least Concern (LC)	Frugivore; forest and forest edge; Common resident
<i>Glossophaga soricina</i>	Pallas's Long-tongued Bat	Least Concern (LC)	Primary pollinator of Heliconia and bromeliads; Common resident
<i>Noctilio leporinus</i>	Greater Bulldog Bat (Fishing Bat)	Least Concern (LC)	Forages over Hillsborough Reservoir; Common resident

REPTILES AND AMPHIBIANS

The Main Ridge Forest Reserve and surrounding lowlands support 24 non-venomous snake species, 16 lizard species, and two endemic amphibian species restricted to northeastern Tobago (LAC Geo, 2024; Protected Areas TT, 2024). Table 4-9 lists key herpetofauna of the study area.

Table 4-9: Key Reptile and Amphibian Species of the Hillsborough Study Area, Tobago

Species (Scientific Name)	Common Name	Status	Notes
<i>Mannophryne olmonae</i>	Bloody Bay Tree Frog / Poison Frog	Endangered (EN)	Endemic to Tobago; critically threatened; stream-dependent
<i>Pristimantis turpinorum</i>	Turpin's Frog	Endangered (EN)	Endemic to northeastern Tobago; forest-floor specialist
<i>Sphaerodactylus argus</i>	Ocellated Gecko	Least Concern (LC)	Introduced; habitat specialist
<i>Erythrolamprus ocellatus</i>	Tobago Coralsnake Mimic	Vulnerable (VU)	Colubrid; non-venomous; forest specialist; Endemic to Tobago
<i>Iguana iguana</i>	Common Green Iguana	Least Concern (LC)	Riparian and forest edge; herbivore; Native; CITES II

Species (Scientific Name)	Common Name	Status	Notes
<i>Boa constrictor</i>	Macajuel (Trinidad), Jumbo Jocko (Tobago)	Least Concern (LC)	Arboreal and terrestrial; controls rodents; Native
<i>Gonatodes vittatus</i>	Striped Lizard	Least Concern (LC)	Forest floor and secondary habitat; Common resident

4.3.3 Potential Impacts

The secondary biological information reviewed indicates that the proposed Hillsborough Water Treatment Plant (WTP) will be constructed on approximately 0.65 acres (2,621 m²) of previously disturbed land that is characterized by maintained grass, scattered shrubs, and limited tree cover. Based on the existing condition of the site, the project footprint can reasonably be classified as a **modified habitat** under the Inter-American Development Bank (IDB) Environmental and Social Performance Standard 6 (ESPS 6), as the vegetation has been substantially altered through historical land management and does not represent an area of high ecological integrity. Consequently, direct habitat loss associated with the construction of the WTP is expected to be low and largely confined to modified vegetation, with limited impacts on native plant communities.

Notwithstanding the modified nature of the project footprint, ecological considerations extend beyond the immediate footprint to encompass the project's Area of Influence (AOI), including adjacent forest habitats that may be indirectly affected by project activities. Although these habitats will not be directly cleared, they are sufficiently close to the project footprint that indirect impacts arising from construction activities, including noise, vibration, artificial lighting, dust, sedimentation, increased human presence, and edge effects, could cause short-term impacts that must be mitigated as stated in Section 5 below.

The indirect Area of Influence (Aoi) for the proposed Hillsborough Water Treatment Plant (WTP) extends beyond the physical project footprint to include wider areas within the watershed that may experience secondary or induced environmental effects resulting from project construction and operation. Construction of the new plant and decommissioning activities of the existing plant may result in changes in runoff, sediment transport, or accidental releases due to excavation, material storage, and transportation of construction materials and equipment in downstream sections of the receiving watershed.

The indirect Aoi also encompasses ecologically connected areas along transportation routes located within the watershed, including adjacent terrestrial habitats and nearby watercourses, where project-related noise, dust, vibration, or increased human activity may occur.

4.4 Socioeconomic Environment Baseline

4.4.1 Social Area of Influence

The social area of influence (SAoI) for the Hillsborough Water Treatment Plant (WTP) is defined by the project footprint, route options, construction access requirements, and the wider water-supply service area. The SAoI captures receptors that may experience direct construction-related effects, as well as broader communities that may benefit indirectly from improvements in potable water production, water quality, pressure management, and operational resilience.

The project includes the construction of a new 2.0 IMGD conventional and automated WTP at Hillsborough to replace the ageing facility. The works include treatment units for screening, coagulation, flocculation, clarification, filtration, disinfection and sludge management; clearwell storage; chemical dosing and handling facilities; sludge holding tanks; administrative and control buildings; mechanical and electrical works; stormwater drainage; slope stabilisation; fencing; landscaping; SCADA integration; staff training; and operational monitoring systems. The project is intended to improve service reliability, meet WHO drinking water standards, expand production capacity, and strengthen climate and operational resilience.

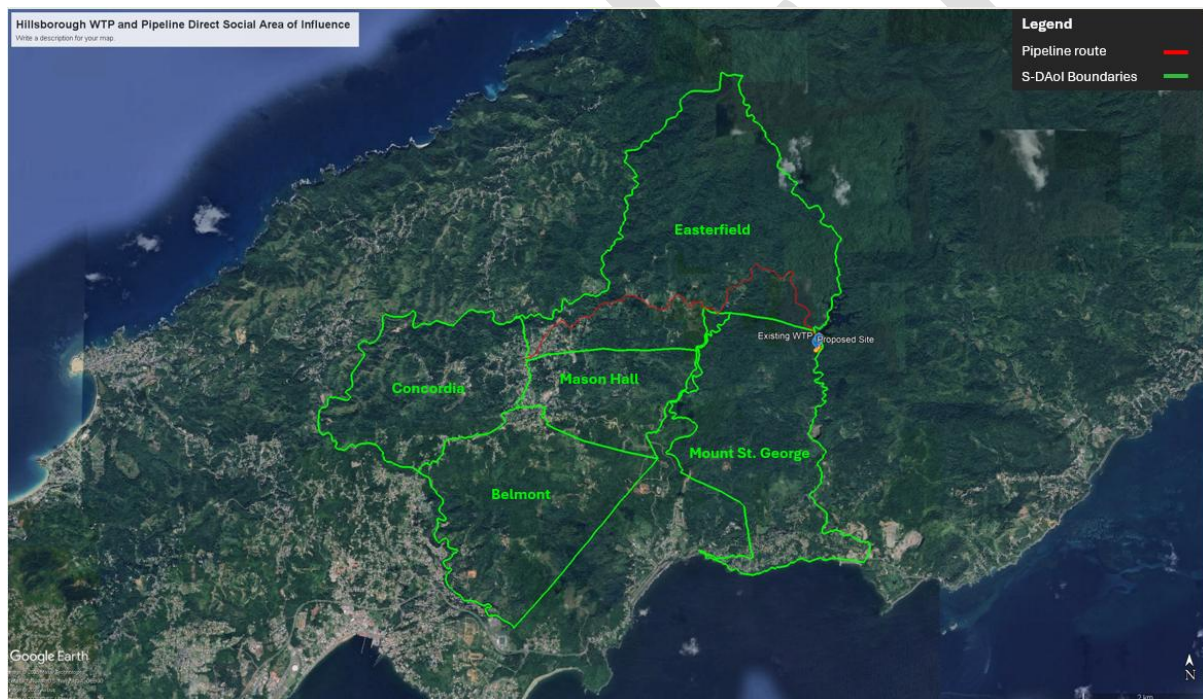


Figure 4-14: Hillsborough WTP Direct Social AOI

The Social Direct Area of Influence (S-DAoI) is expected to experience mainly short-term construction-related effects. These may include noise, dust, vibration, construction traffic, temporary access disruption, road reinstatement impacts, worker-community interaction, and occupational and community health and safety risks.

The spatial distribution of population within the S-DAoI suggests that exposure to construction effects will vary across the project area. Settlement is most concentrated around Mason Hall and

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Concordia, with additional dispersed settlement in Belmont and along parts of the western road network. These areas are likely to be more sensitive to construction traffic, access constraints, trenching, dust, noise, and road reinstatement.

Mt. St. George remains within the S-DAoI even though the visible settlement pattern shows a limited population close to the assessed route options. Construction trucks and delivery vehicles are likely to access the Hillsborough WTP site via the road network in Mt. St. George. Direct effects in this community are therefore expected to relate mainly to construction traffic, road safety, nuisance impacts, and access management rather than fixed works near dense settlement.

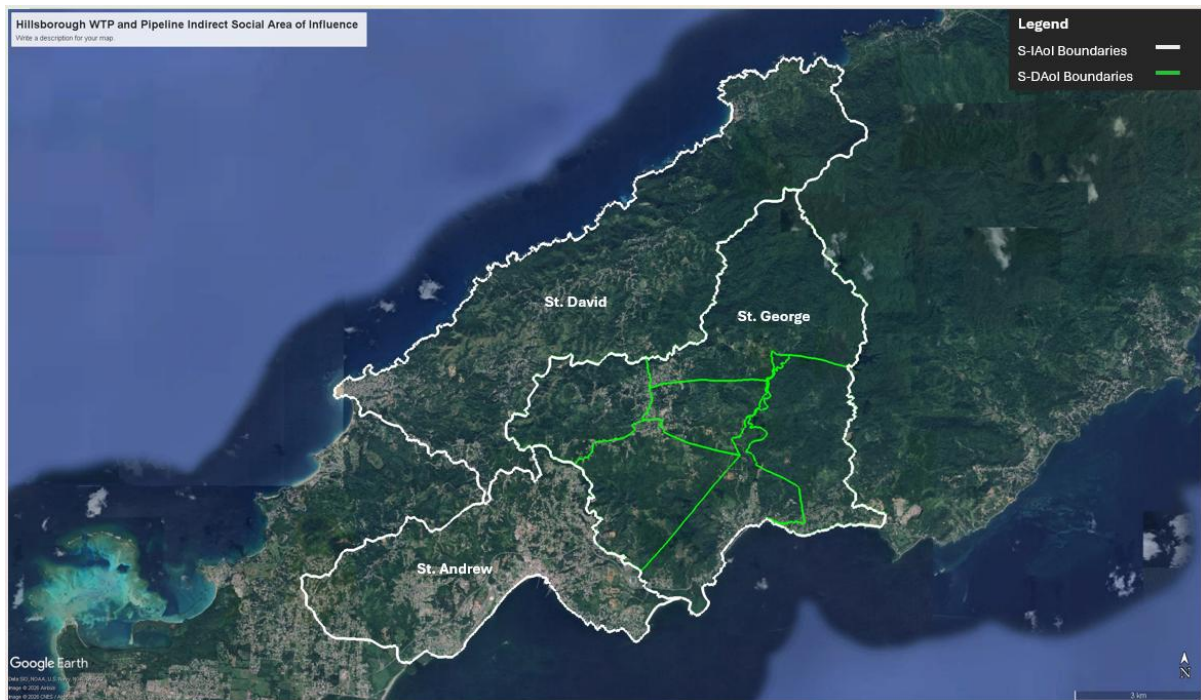


Figure 4-15: Hillsborough WTP and pipeline indirect social AOI

The Social Indirect Area of Influence (S-IAoI) covers the broader parishes of St George, St David, and St Andrew, reflecting the wider service and beneficiary area of the Hillsborough system. The existing transmission system conveys treated water south towards Green Hill, through forested areas, past Belmont Road, and onto North Side Road, where side streets connect to the transmission main. The Green Hill Offtake supplements the Green Hill Reservoir when intake levels are low, while the system serves parts of Sandy River, Belmont, and Mason Hall.

Indirect benefits are expected to include more reliable potable water service, improved water quality, reduced leakage and non-revenue water, better pressure and flow monitoring, faster operational response, and greater resilience during climate or operational disruptions. Implementation will require coordination among WASA, Tobago House of Assembly agencies, local communities, emergency services, road and traffic authorities, environmental regulators, and other stakeholders on matters such as access management, service disruption notices, road reinstatement, drainage, erosion control, public communication, community health and safety, stakeholder engagement, and grievance management.

4.4.2 Demographic and Social Structure

4.4.2.1 Population and Household Characteristics

The S-AoI contains more than half of Tobago's population, while the S-DAoI represents a smaller but socially varied settlement area along the Hillsborough WTP context. In 2011, Tobago recorded 60,874 persons, of whom 33,144, or 54.4 percent, lived in the S-IAoI parishes of St Andrew, St David and St George (Central Statistical Office of Trinidad and Tobago, 2012a). St Andrew was the largest parish, with 17,536 persons, followed by St David with 8,733 and St George with 6,875. The S-IAoI population was overwhelmingly non-institutional, indicating that most residents lived in private households (Table 4-10).

Table 4-10: Key S-AoI Population Indicators, 2011

Administrative Area	Total Population	Population Density
Trinidad and Tobago	1,328,019	259.0
Tobago	60,874	202.9
S-IAoI	33,144	324.9
St Andrew	17,536	835.0
St David	8,733	229.8
St George	6,875	159.9
S-DAoI	5,753	117.1
Mount St. George	1,609	106.7
Mason Hall	1,378	171.6
Belmont	945	562.8
Concordia	944	532.4
Easterfield	877	38.9

Source: Central Statistical Office of Trinidad and Tobago. (2012). *Trinidad and Tobago 2011 Population and Housing Census: Demographic Report*.

The S-DAoI recorded 5,753 persons in 2011, representing 17.4 percent of the S-IAoI and 9.5 percent of Tobago's population. Mount St. George was the largest directly affected community, with 1,609 persons, followed by Mason Hall with 1,378 persons. Belmont, Concordia and Easterfield were smaller but similar in population size, ranging from 877 to 945 persons. Settlement density varied considerably across the S-DAoI. Belmont and Concordia were compact communities, with densities above 500 persons per square kilometre, while Easterfield was much more dispersed, at 38.9 persons per square kilometre. Mount St. George and Mason Hall occupied an intermediate position, with densities of 106.7 and 171.6 persons per square kilometre, respectively. These differences may influence how construction disturbance, access changes and communication needs are experienced across communities.

The S-DAoI contained 1,756 households in 2011, or 16.1 percent of S-IAoI households. Mount St. George and Mason Hall accounted for the largest shares, with 450 and 446 households, respectively, while Belmont, Concordia and Easterfield each recorded fewer than 300 households. The average household size in the S-DAoI was 3.3 persons, higher than the S-IAoI and Tobago averages of 3.0 persons and equal to the national average. Mount St. George recorded the largest average household size, at 3.6 persons (Table 4-11).

Table 4-11: Key S-AoI Household Indicators, 2011

Administrative Area	Household Count	Average Household Size
Trinidad and Tobago	401,373	3.3
Tobago	20,124	3.0
S-IAoI	10,931	3.0
St Andrew	6,038	2.9
St David	2,771	3.2
St George	2,122	3.2
S-DAoI	1,756	3.3
Mount St. George	450	3.6
Mason Hall	446	3.1
Belmont	297	3.2
Concordia	286	3.3
Easterfield	277	3.1

Source: Central Statistical Office of Trinidad and Tobago. (2012). *Trinidad and Tobago 2011 Population and Housing Census: Demographic Report*.

Household composition was mixed but largely centred on small and medium-sized households. In the S-DAoI, single-person households accounted for 23.7 percent of households, small households of two to three persons for 36.1 percent, medium households of four to six persons for 33.5 percent, and large households of more than six persons for 6.7 percent. Mount St. George had the highest share of large households, while Concordia had the highest share of single-person households. Household sensitivity is likely to vary across the S-DAoI, particularly where temporary works, service interruptions, access constraints or consultation activities affect compact settlements or larger household units.

4.4.2.2 Age and Gender Composition

The S-DAoI has a slightly younger age profile than Tobago and the wider S-IAoI, with a working-age majority and moderate dependency levels. In 2011, children under 15 accounted for 23.2 percent of the S-DAoI population, compared with 22.4 percent in the S-IAoI and 22.2 percent in Tobago (Central Statistical Office of Trinidad and Tobago, 2012a). The working-age population accounted for 68.4 percent of the S-DAoI, broadly consistent with the S-IAoI, while older adults aged 65 years and over accounted for 8.4 percent, slightly below the S-IAoI and Tobago shares of 9.2 percent. The median age in the S-DAoI was 30.6 years, below the S-IAoI and Tobago medians of 32.0 years (Table 4-12).

Table 4-12: Key Age and Sex Composition Indicators, 2011

Administrative Area	Age Group (%)			Total Age Dependency Ratio	Median Age (Years)	Sex Ratio
	Children <15	Working Age 15–64	Older Adults 65+			
Trinidad and Tobago	20.6	70.5	8.9	41.9	32.6	100.3
Tobago	22.2	68.6	9.2	45.7	32.0	99.5
S-IAoI	22.4	68.4	9.2	46.2	32.0	98.4
St Andrew	21.7	68.5	9.8	46.1	33.0	94.8
St David	23.5	68.1	8.5	46.9	30.6	106.1
St George	22.9	68.6	8.5	45.7	31.1	98.5

S-DAol	23.2	68.4	8.4	46.1	30.6	99.6
Mount St. George	23.1	68.5	8.4	46.0	30.1	106.9
Mason Hall	23.2	68.1	8.7	46.9	31.6	94.0
Belmont	23.4	68.7	7.9	45.5	29.9	105.2
Concordia	24.8	67.0	8.3	49.3	29.9	92.5
Easterfield	21.2	70.1	8.7	42.6	31.3	97.4

Source: Central Statistical Office of Trinidad and Tobago. (2012). *Trinidad and Tobago 2011 Population and Housing Census: Demographic Report*.

Community-level differences were modest but relevant. Concordia had the youngest profile, with the highest share of children under 15 at 24.8 percent, the highest total age dependency ratio at 49.3, and a median age of 29.9 years. Belmont also had a relatively young profile, with a median age of 29.9 years and the lowest older-adult share in the S-DAol, at 7.9 percent. Easterfield had the highest working-age share, at 70.1 percent, and the lowest total dependency ratio, at 42.6. Mount St. George and Mason Hall were closer to the overall S-DAol profile.

The sex composition of the S-DAol was broadly balanced, with a sex ratio of 99.6 males per 100 females. This was similar to Tobago and the S-IAol. However, differences were evident at the community level. Mount St. George and Belmont recorded male-skewed populations, with sex ratios of 106.9 and 105.2, respectively, while Mason Hall and Concordia recorded female-skewed populations, with sex ratios of 94.0 and 92.5. Older-adult groups were generally more female-skewed, particularly in Mount St. George, Mason Hall and Belmont, reflecting the common pattern of higher female representation at older ages.

4.4.2.3 Vulnerable Groups

Vulnerability within the S-Aol is shaped by overlapping demographic, health, disability, household, access and socio-economic conditions. As described in Sections 4.1.2.1 and 4.1.2.22, the S-DAol includes family-sized households, single-person households, children, older persons, and community-level differences in dependency and household structure. These characteristics point to household-specific sensitivities rather than a single concentrated vulnerability profile across the direct area.

Children and caregiving households are relevant because daily routines may depend on school attendance, childcare, work schedules, transport and household water-use demands. Tobago-level child living-arrangement data provide additional context, although they are not disaggregated to the S-DAol. In 2022, 41.1 percent of children in Tobago lived with both parents, while 47.9 percent lived with their mother only, 4.7 percent with their father only, and 6.0 percent with neither parent (Central Statistical Office, 2023). Single-parent and non-parental care arrangements may reduce flexibility where caregivers have to manage school routines, water storage, alternative supply arrangements or participation in consultation activities.

Older persons may be more sensitive where age intersects with chronic illness, disability, limited mobility, living alone or dependence on others for transport, communication and household water management. Although the S-DAol does not have an unusually old age profile, Tobago-level health data showed that chronic illness affected 20.3 percent of the general population in 2011 and 53.7 percent of persons aged 60 years and over (Central Statistical Office of Trinidad and

Tobago, 2012a). Among older persons, the most common reported conditions were hypertension, diabetes and arthritis, which may heighten sensitivity to disruptions affecting water availability, hygiene, food preparation, medication routines, mobility or access to health services.

Persons with disabilities represented 3.2 percent of the S-DAoI non-institutional population in 2011, broadly consistent with Tobago and the S-IAoI but below the national figure of 4.3 percent (Central Statistical Office of Trinidad and Tobago, 2012a). The S-DAoI accounted for 181 persons with disabilities, or 17.1 percent of persons with disabilities in the S-IAoI. Mason Hall recorded both the highest number and the highest prevalence of persons with disabilities, while Belmont recorded the lowest prevalence. Walking was the most common functional limitation, followed by seeing and speaking, pointing to mobility, physical access and accessible communication as important baseline considerations where works occur near homes, roads, community facilities or service routes.

Disability-related participation restrictions also varied across the direct area. In the S-DAoI, 41.1 percent of persons with disabilities reported no effect on participation, meaning that a majority experienced some form of restriction. The most common restrictions related to social activities, movement within and outside the home, work or business, self-care and education. These limitations may affect how residents receive information, attend meetings, move through affected areas and maintain daily routines during temporary disruption.

Socio-economic and infrastructure conditions add further layers of vulnerability. Tobago-level resilience data identified economic constraints and information-access vulnerability as key contributors to overall vulnerability, including poverty, low educational attainment, limited vehicle access, households without internet access, unmet housing need, inadequate toilet facilities, and exposure to drainage and flooding issues (Pacific Disaster Center (PDC Global), 2020). These indicators are not disaggregated to the S-DAoI but provide useful context for understanding how low-income households, households without reliable transport or internet access, and households affected by water, sanitation, drainage, flooding or housing constraints may experience temporary service changes or construction-related disturbance. These issues are addressed further in the socio-economic, infrastructure and institutional stakeholder sections.

The main vulnerable groups evident from the available baseline are children and caregiving households, older persons with chronic illness, persons with disabilities, single-person households, larger dependent households, low-income households, households with limited transport or digital access, and households affected by water, sanitation, drainage, flooding or housing constraints. Sensitivity across the S-DAoI is likely to vary by household circumstances, community density, proximity to works, available support networks and the capacity of local institutions to communicate during temporary disruption.

4.4.3 Socio-cultural Context

4.4.3.1 Ethnic Composition

The ethnic composition of the S-Aol broadly reflects Tobago's demographic profile, with the population overwhelmingly identifying as African and only small shares identifying with other ethnic groups. In 2011, persons identifying as African accounted for 87.3 percent of the S-IAol population and 89.5 percent of the S-DAol population, closely aligned with Tobago's 87.6 percent but substantially higher than the national figure of 36.5 percent (Central Statistical Office of Trinidad and Tobago, 2012a). By contrast, East Indian identification was low across Tobago and the S-Aol, accounting for 2.4 percent of the S-IAol and 1.7 percent of the S-DAol, compared with 37.8 percent nationally.

Community-level variation within the S-DAol was limited. Belmont recorded the highest African share, while all directly affected communities recorded African shares above 88 percent. Mixed ethnic groups formed the second largest broad category in the S-DAol, with Mixed Other accounting for 4.2 percent and Mixed African/East Indian accounting for 3.9 percent. Concordia recorded the highest Mixed African/East Indian share, while Easterfield recorded the highest Mixed Other share. Other ethnic groups, including Caucasian, Chinese, Indigenous, Portuguese, Syrian/Lebanese and other categories, accounted for very small proportions of the S-DAol population.

The ethnic profile points to a relatively homogeneous direct-area population in census terms, but not a uniform socio-cultural setting. Local identity, kinship networks, village histories, churches, community organisations and settlement-specific relationships are likely to be more important than broad ethnic categories in shaping consultation dynamics and community interaction across Mount St. George, Mason Hall, Belmont, Concordia and Easterfield.

4.4.3.2 Religion

Religious composition in the S-Aol is predominantly Christian, with Protestant denominations constituting the largest religious group. In 2011, Christians accounted for 83.5 percent of the S-IAol population and 86.1 percent of the S-DAol population, compared with 84.7 percent in Tobago and 66.1 percent nationally (Central Statistical Office of Trinidad and Tobago, 2012a). The Protestant share was also high, accounting for 74.0 percent of the S-IAol and 76.7 percent of the S-DAol, compared with 40.2 percent nationally.

Within the S-DAol, the main Christian denominations were Methodist (24.2%), Seventh-day Adventist (19.1%), Pentecostal/Evangelical/Full Gospel (12.8%), Anglican (9.5%), Spiritual Shouter Baptist (8.7%), and Roman Catholic (6.8%). Community-level differences were more pronounced than the overall Christian share suggests. Mount St. George had a particularly strong Methodist presence, at 28.8 percent; Belmont recorded the highest Pentecostal/Evangelical/Full Gospel share, at 36.7 percent; and Concordia recorded the highest Seventh-day Adventist share, at 35.7 percent. Mason Hall had a comparatively lower Protestant share and a higher Roman Catholic share, at 13.0 percent, together with a comparatively higher Orisha presence than the other directly affected communities. Easterfield had a more evenly distributed religious profile

across Methodist, Seventh-day Adventist, Pentecostal/Evangelical/Full Gospel, Anglican, Spiritual Shouter Baptist, Roman Catholic and other affiliations.

Non-Christian religions and no-religion responses accounted for small shares of the S-DAol population. Churches and faith-based networks are therefore likely to remain important local institutions for communication, mobilisation and social support, with denominational differences across Mount St. George, Mason Hall, Belmont, Concordia and Easterfield shaping community entry points and participation patterns during later engagement.

4.4.3.3 Safety and Security

Safety and security conditions in the S-Aol are best understood using Tobago Division police data, as the available reported-crime data are not disaggregated to the parish or S-DAol community level. Between January 2015 and December 2025, the Tobago Division recorded 8,529 reported offences, accounting for 6.9 percent of all offences reported across police divisions. Reported offences in Tobago were lower than in the larger Trinidad divisions and were broadly comparable to those in the Eastern, South Western and Western divisions.

The Tobago crime profile was dominated by property-related offences. Property crime accounted for more than half of reported offences over the period, with burglaries and break-ins and general larceny forming the largest categories. This pattern is relevant to community perceptions of safety, household security, construction-site security, storage of equipment and materials, and the movement of workers or contractors through residential areas.

Violent crime formed a smaller but important component of the reported-crime profile. Violence and violent crime accounted for 16.5 percent of reported offences in Tobago, while robberies accounted for 10.3 percent. Sexual offences accounted for 11.9 percent of Tobago's reported offences over the period, a higher proportional share than several other divisions. These data do not identify risks within the S-DAol specifically, but they provide context for assessing perceived safety, gender-sensitive engagement needs, worker conduct, and community concerns during later assessment.

Reported offences varied over time. Annual totals were highest in 2017, declined between 2019 and 2021, and then increased again from 2022 to 2024 before easing in 2025. The decline during 2020 and 2021 should be interpreted with caution because the COVID-19 pandemic may have affected mobility, reporting patterns, police operations, and the opportunity for certain types of offences. The more recent increase after 2021 suggests that current perceptions of safety may be influenced by both longer-term property-crime patterns and post-pandemic changes in reported offences.

Safety and security conditions in the S-Aol are shaped mainly by property crime, with additional sensitivity around violent crime, sexual offences and perceptions of community safety. These conditions provide baseline context for examining construction disturbance, site security, worker-community interaction, access changes and stakeholder engagement in Mount St. George, Mason Hall, Belmont, Concordia and Easterfield.

4.4.4 Socio-economic Conditions

4.4.4.1 Educational Landscape

Educational attainment in the S-AoI points to broad participation in formal schooling, but with lower progression beyond the secondary level than the national pattern. In 2011, the S-IAoI recorded a slightly higher share of persons with primary education as their highest level of attainment than the national average, while the share attaining at least secondary education was lower than the national average (Central Statistical Office of Trinidad and Tobago, 2012a). At the S-IAoI level, 58.5 percent of persons with schooling had attained at least secondary education, compared with 62.9 percent nationally and 58.3 percent in Tobago. Tertiary attainment was also lower than the national figure, at 14.2 percent in the S-IAoI compared with 15.8 percent nationally, but broadly consistent with Tobago at 14.0 percent.

The S-DAoI broadly mirrored the patterns of Tobago and S-IAoI. Primary and secondary education were the dominant attainment levels, while tertiary attainment stood at 13.1 percent. Community-level variation was modest, although Concordia recorded the highest tertiary attainment, at 17.8 percent, and Mount St. George the lowest, at 9.1 percent. Easterfield and Mason Hall had slightly higher shares of persons whose highest attainment was primary education, whereas Mount St. George recorded the highest proportion of individuals whose highest attainment was secondary education.

Gender differences were more pronounced than community differences. In the S-DAoI, females recorded higher attainment than males at the secondary-and-above and tertiary levels. Female tertiary attainment was 18.7 percent, compared with 7.4 percent among males.

While participation in formal schooling was widespread, attainment of formal educational qualifications was more limited. In the S-DAoI, more than half of the applicable educated population recorded no formal educational qualification, broadly consistent with Tobago and national patterns. The most common formal qualification was GCE O'Level/CXC General/School Certificate, while smaller shares held diplomas, associate degrees, bachelor's degrees or postgraduate qualifications. The education profile suggests a population with broad basic and secondary schooling, but a smaller pool with higher-level or specialised credentials. This may shape local labour availability, training needs, communication approaches and expectations around employment linked to the Hillsborough WTP.

4.4.4.2 Local Economy and Livelihoods

The S-AoI is situated within a Tobago economy that remains service-led, tourism-linked and strongly influenced by public-sector activity. Recent economic data from Tobago indicate that GDP at constant prices increased marginally from TT\$1.65 billion in 2022 to TT\$1.66 billion in 2023. In 2023, the state sector accounted for 45 percent of Tobago's GDP, followed by finance, insurance, real estate and business services at approximately 27 percent, tourism at 13 percent, transport, storage and communication and construction and quarrying at about 4 percent each, and agriculture and manufacturing at about 2 percent combined (Augustine, 2024). While these economic indicators are reported at the island-wide level and are not disaggregated for the S-DAoI, they provide valuable context for understanding the broader economic environment and

livelihood characteristics of communities within Mount St. George, Mason Hall, Belmont, Concordia and Easterfield.

Labour market conditions also point to a high dependence on public-sector employment. In 2023, Tobago's unemployment rate was approximately 3 percent, while about 60 percent of the labour force was employed in the state sector and 40 percent in the private sector. This differs markedly from the national labour market, where approximately 24 percent of the labour force was employed in the state sector and 76 percent in the private sector (Augustine, 2024). Within the S-DAoI, household income is therefore likely to be linked to public employment, services, construction-related work, small enterprise, commuting, farming, and informal or part-time livelihood activity, although community-level livelihood patterns would require field verification.

Tourism remains an important economic driver for Tobago, but its influence on the S-DAoI is likely to be indirect rather than centred on accommodation or visitor facilities. Recent fiscal planning continues to prioritise airlift, tourism infrastructure, community tourism, sport tourism, and the cultural and creative industries, reflecting the sector's role in island-wide employment, enterprise activity and demand for transport, food, retail, events and services (Augustine, 2024). These tourism-related linkages may affect households in the S-DAoI through employment, contracting, transport, small-business demand, and wider public revenues, rather than through direct dependence on tourism assets within the communities themselves.

Agriculture and food-related livelihoods are also relevant to the S-DAoI, particularly in and around Mason Hall and other rural settlement areas. Although agriculture accounts for a small share of Tobago's measured GDP, recent budget priorities identify food security, agro-processing, agricultural technology, value-added production and improved marketing infrastructure as important areas of economic focus. The proposed food hub at Mason Hall, together with planned agro-processing facilities, alternative flour production and support for agricultural value chains, places part of the S-DAoI within Tobago's wider food security and agricultural marketing agenda (Augustine, 2023, 2024). These initiatives provide useful context for understanding farming, small-scale production, food vending and related livelihood activities in the project area.

The local livelihood profile therefore points to a mixed but relatively small-island economy in which public employment, services, construction, tourism linkages, farming, agro-processing and small enterprise overlap. For the Hillsborough WTP, these conditions provide baseline context for examining how temporary works, traffic and access changes, service reliability, local employment expectations, procurement opportunities and stakeholder engagement may interact with household routines and livelihood patterns across Mount St. George, Mason Hall, Belmont, Concordia and Easterfield.

4.4.4.3 Business Profile

The S-AoI business environment is best understood within Tobago's wider enterprise profile, supported by a proxy estimate of S-DAoI business activity using the spatial distribution of business places in the 2011 Census Community Register. In 2018, Tobago recorded 2,283 business establishments in the Business Surveys Establishment Register, representing

approximately 8.8 percent of the national total of 26,046 establishments (Central Statistics Office Trinidad and Tobago, 2018).

Using the enterprise-size definition based on employment thresholds, and recognising that the CSO employment bands do not align exactly with the thresholds for micro and small enterprises, Tobago's business base was strongly concentrated in mini-micro, micro and small establishments. Among establishments with available employment size, the zero-to-one employee band, used as a proxy for mini-micro establishments, accounted for 58.7 percent. Establishments in the two-to-four employee band accounted for 16.2 percent, while establishments in the five-to-24 employee band accounted for 15.9 percent. Together, establishments within the mini-micro to small-enterprise range that can be captured from the CSO bands accounted for 90.8 percent of Tobago establishments. Establishments with 25 or more employees accounted for only 31 establishments, while no Tobago establishments were recorded in the 501-and-over employment-size category.

The 2011 Census Community Register recorded 3,107 business places across Tobago (Central Statistics Office Trinidad and Tobago, 2012). The S-IAol parishes of St Andrew, St David and St George accounted for 1,575 business places, or approximately 50.7 percent of Tobago's total. Within this wider parish context, the S-DAol communities accounted for 126 business places, or 8.0 percent of S-IAol business places and approximately 4.1 percent of Tobago's total. The distribution suggests that business activity in the S-DAol is modest in island-wide terms but locally relevant, with Mason Hall, Mount St. George and Concordia accounting for the largest shares of business places among the directly affected communities. The pattern is consistent with a local enterprise base likely to include small shops, service providers, transport operators, contractors, food vendors, farming-related enterprises, home-based businesses and other small-scale livelihood activities, although community-level verification would be required.

Available Tobago-level evidence also points to a private sector shaped by small enterprise activity. Business support data show demand for financing and grant assistance across services, retail, food and beverage, manufacturing, farming and other small business activities, while recent fiscal planning identifies business financing, loan guarantees, technical support, logistics, packaging, agro-processing and light manufacturing as continuing areas of focus for enterprise development (Augustine, 2024; Economic Management Research Unit, n.d.). The COVID-19 pandemic also exposed constraints on business resilience, including revenue loss, cash-flow shortages, difficulty meeting payroll, rent, and other financial obligations, and supply disruptions.

4.4.4.4 Labour Market Conditions

Labour market conditions in the S-Aol are best described using Tobago-level labour force data, as recent employment data are not disaggregated at the S-IAol or S-DAol levels. The available data point to a labour market with low recorded unemployment, moderate labour force participation, and strong dependence on public-sector, service, construction and small-enterprise activity. In 2023, Tobago's labour force participation rate was 63.7 percent, while the unemployment rate was 2.2 percent (Central Statistical Office of Trinidad and Tobago, n.d.) (Table 4-13). However, annual averages should be interpreted with caution because the underlying

estimates are rounded and may mask seasonal, community-level and informal livelihood differences.

Table 4-13: Selected Tobago Labour Market Indicators, 2019–2023

Indicator	2019	2020	2021	2022	2023
Labour force	32,300	34,300	31,100	31,900	31,200
Persons with jobs	31,300	33,100	29,900	31,200	30,500
Unemployed persons	1,000	1,200	1,200	800	700
Labour force participation rate (%)	66.7	67.6	64.4	65.0	63.7
Unemployment rate (%)	3.2	3.5	3.8	2.4	2.2

Source: Central Statistical Office of Trinidad and Tobago. Continuous Sample Survey of Population: Labour Force Report for Tobago, 2019–2023.

Employment in Tobago remains concentrated in a small number of sectors. In 2023, community, social and personal services accounted for the largest share of employed persons at 47.9 percent, reflecting the continued importance of government and public-service employment. Construction accounted for 18.7 percent, while wholesale and retail trade, restaurants and hotels accounted for 15.7 percent. Finance, insurance, real estate and business services accounted for 7.5 percent, transport, storage and communication for 4.3 percent, and agriculture, forestry, hunting and fishing for 3.6 percent. The sector profile is consistent with the wider economic pattern described in Section 4.4.2, in which public-sector activity, services, construction, tourism-linked demand and small-scale production form the main livelihood base.

The type-of-worker profile further confirms the importance of paid and public-sector employment. In 2023, paid employees accounted for 81.3 percent of persons with jobs, while own-account workers accounted for 16.7 percent and employers for 1.6 percent. Government public service and statutory board employment accounted for 54.1 percent of employed persons, with government state enterprises accounting for a further 2.0 percent. Non-government paid employment accounted for 25.2 percent. The labour market structure suggests that S-DAol households are likely to draw on a mix of salaried employment, public-sector work, self-employment, contracting, commuting and small-enterprise activity, with the balance varying by community and household circumstance.

The labour force has a broad secondary-level base, but a smaller tertiary-qualified segment. In 2023, secondary-level categories accounted for approximately 63 percent of Tobago's labour force, while persons with a university degree, diploma or certificate accounted for 16.3 percent. Primary-level categories accounted for about 21 percent. Among employed persons, the pattern was similar: approximately 64 percent had secondary-level education, 16.7 percent had a university degree, diploma or certificate, and about 21 percent had primary-level education. Training-linked categories were also important, accounting for more than one-third of both the labour force and employed persons. The workforce profile points to a strong base of secondary-

level and practical training, but a smaller pool of tertiary-qualified professionals for specialised technical, professional and managerial roles.

The occupational profile points to a strong base of routine, service and trade-related work. In 2023, elementary occupations accounted for the largest share of employed persons at 33.1 percent, followed by service and shop sales workers at 14.8 percent, craft and related workers at 14.8 percent, clerks at 12.1 percent, technicians and associate professionals at 8.2 percent, and managers at 7.5 percent. Professionals accounted for 4.3 percent, while plant and machine operators and assemblers accounted for 3.0 percent.

Labour force participation varied strongly by age. In 2023, participation was highest among adults aged 35 to 59 years, with rates generally above 87 percent across these groups, while participation was much lower among persons aged 15 to 19 years and persons aged 60 years and over. Youth unemployment was proportionally higher in the youngest age group, although the absolute number of unemployed persons was small.

4.4.4.5 Incidence of Poverty

Poverty in the S-AoI appears moderate in national comparative terms, although household-level economic vulnerability remains relevant where low income intersects with limited savings, transport constraints, health needs, caregiving responsibilities or dependence on small-scale livelihoods. The available data include both income-based and multidimensional poverty indicators, which capture different aspects of deprivation and together provide a more comprehensive understanding of poverty conditions in Tobago and the S-DAoI. It should be noted that these datasets are derived from different periods and methodologies. The income-based poverty indicators are drawn from the *2005 Analysis of the Trinidad and Tobago Survey of Living Conditions*, while the multidimensional poverty indicators are based on data from the 2011 Population and Housing Census and were published in the *Trinidad and Tobago Human Development Atlas 2012*.

Income-based poverty indicators suggest that poverty is present in Tobago but is not disproportionately concentrated relative to other regions. Tobago accounted for 5.2 percent of the national poor population, while 19.0 percent of its regional population was classified as poor, placing it in the middle of the regional ranking (Kairi Consultants Limited, 2007). A disparity ratio of 1.1 indicates that Tobago's share of the national poor population was broadly consistent with its share of the national population, suggesting a notable but not exceptional level of income deprivation.

Income measures alone, however, do not fully capture the range of factors that influence household well-being. Multidimensional poverty indicators expand the analysis by considering deprivations across health, education and living conditions. At the island level, Tobago recorded a Multidimensional Poverty Index (MPI) of 0.009, below the national MPI of 0.017 (Central Statistical Office of Trinidad and Tobago, 2012b). The multidimensional poverty headcount ratio was also lower in Tobago, at 3.7 percent, compared with 6.2 percent nationally. Similarly, the intensity of poverty among the multidimensionally poor was 24.4 percent in Tobago, below the national figure of 26.9 percent. Tobago recorded lower health-dimension intensity than the

national average, while education-dimension intensity was broadly similar. However, standard-of-living deprivation was slightly higher in Tobago than nationally, suggesting that material living conditions and access-related constraints remain relevant despite Tobago's comparatively favourable multidimensional poverty profile.

At the community level, poverty is assessed using a basic needs index, a multidimensional measure of deprivation rather than income poverty. The index incorporates housing conditions, household amenities, educational attainment of the household head, overcrowding and household employment rates, providing a broad measure of household welfare and living standards. Although reported in the *2005 Analysis of the Trinidad and Tobago Survey of Living Conditions*, the community poverty scores were derived from the 2000 Population and Housing Census.

Community-level poverty scores indicate that the S-DAol communities were clustered around the national median rather than concentrated among the most deprived communities nationally (Kairi Consultants Limited, 2007). Mount St. George and Belmont each recorded a poverty score of 47, equal to the national median, and ranked 238th-poorest out of 585 communities. Concordia recorded a score of 49 and ranked 337th poorest, while Mason Hall and Easterfield each recorded a score of 50 and ranked 379th poorest. All five communities recorded scores below the third quartile score of 52. The narrow range of scores suggests broadly similar multidimensional poverty conditions across the S-DAol, with no directly affected community standing out as an extreme poverty outlier in the national ranking.

Taken together, the income-based and multidimensional indicators indicate moderate yet relevant economic vulnerability across the S-Aol. Tobago generally performs better than national averages on several multidimensional poverty measures and does not show unusually high income poverty, but living-standard indicators and community-level basic needs scores still point to pockets of deprivation. Because the datasets use different reference years and methods, they are best treated as complementary measures rather than directly comparable estimates. Within the S-DAol, poverty-related sensitivity is likely to vary more by household circumstance than by community-wide deprivation alone, particularly among low-income households, casual workers, small-enterprise households, households without reliable transport, and households already managing health, caregiving or housing constraints.

4.4.5 Cultural Heritage and Archaeological Resources

The S-DAol contains recorded heritage resources associated with Tobago's water infrastructure, estate settlement, sugar production, historic residential architecture, and natural and coastal heritage. National Trust listings identify six sites in or near the directly affected communities: Hillsborough Dam, Alma House, the Old Sugar Works at Mount St. George, Studley Park Estate Ruins, Lime Kiln Beach Site, and the House on St. Cecelia Street. These assets show that heritage sensitivity in the S-DAol extends beyond individual buildings to include historic infrastructure, former estate landscapes, coastal and natural resources, settlement areas, and community landmarks.

The recorded sites reflect several heritage themes. Hillsborough Dam is particularly relevant because it forms part of Tobago's water-supply landscape while also being recorded as a mixed heritage site. Alma House, the Old Sugar Works and Studley Park Estate Ruins reflect the historical importance of estate settlement and sugar production, while the House on St. Cecelia Street adds a smaller-scale built heritage element within Concordia. Lime Kiln Beach Site broadens the heritage profile to natural and coastal resources.

Broader heritage assessments for the North-East Tobago UNESCO Man and the Biosphere Reserve provide useful context, although they do not replace project-specific field assessment. Identified risks to Tobago's heritage assets include dispersed archival information, unclear ownership, restricted or unsafe access, vegetation overgrowth, deterioration of stone and brickwork, structural instability, theft of archaeological or architectural material, inappropriate repairs, and limited site interpretation (Environmental Research Institute Charlotteville, 2023). These issues may be relevant to former estate, sugar works and historic infrastructure sites in the S-DAol, subject to site-level verification.

Archaeological sensitivity is likely to be associated with former sugar works, estate houses, estate ruins, old access routes, drainage lines, historic water infrastructure and coastal heritage features. Ground disturbance near these areas may encounter built remains, former industrial features, buried structural elements, artefacts or other subsurface materials. No project-specific archaeological survey data have been provided; therefore, the presence, extent and condition of archaeological resources within or near the works footprint would require field verification.

Heritage resources in the S-Aol also have socio-cultural and livelihood dimensions. Tobago's cultural heritage is expressed through physical sites as well as festivals, foodways, performance, music, dance, craft, oral traditions and community celebrations. The purple economy context identifies festivals and events, including the Tobago Heritage Festival, village harvest celebrations, Blue Food Festival, Carnival and music festivals, as recurring features of social life that support cultural continuity and create seasonal opportunities for vendors, performers, artisans and other cultural entrepreneurs (Environmental Research Institute Charlotteville, 2022). Within the S-DAol, recorded heritage assets may therefore function as physical sites, community reference points and potential links to local identity, interpretation, education and cultural-economic activity.

The heritage profile provides baseline context for examining construction disturbance, ground disturbance, access changes, visual setting, site security, chance finds, stakeholder concerns and community perceptions where works intersect with or occur near recorded heritage resources. This is particularly relevant around Hillsborough Dam, former estate and sugar works sites, and historic settlement areas in Mount St. George, Mason Hall, Concordia, Easterfield and the wider Hillsborough water-supply landscape.

4.4.6 Natural and Built Resources and Use

4.4.6.1 Land Ownership and Tenure

Land ownership and tenure within the S-Aol reflect Tobago's wider mix of public infrastructure lands, private and family-held lands, government leasehold areas, former estate landscapes,

agricultural or semi-rural holdings, road reserves and informal tenure arrangements. Community-level cadastral data have not been provided; therefore, this baseline draws on the project setting, Tobago-wide land-use context, census data on residential land tenure, heritage sources, and recent planning and budget information.

Tobago's land-use context remains strongly shaped by forested and rural landscapes, with settlement and built development concentrated along road corridors and community centres. Forest remained the dominant land-cover class in 2010, while built-up land increased between 1991 and 2010 (Environmental Research Institute Charlotteville, 2023). This pattern is reflected in the S-DAoI, where Mount St. George, Mason Hall, Belmont, Concordia and Easterfield combine residential settlement, road-based access, agricultural or semi-rural land use, former estate landscapes and public water infrastructure. Recorded heritage assets, including Alma House, the Old Sugar Works and Studley Park Estate Ruins, also point to older land-use layers that may still shape local identity, property boundaries and access arrangements.

State and public land interests are relevant because the project is linked to the Hillsborough WTP, Hillsborough reservoir landscape, and road-based access corridors. These areas may involve public utility lands, road reserves, easements, drainage areas and access roads. Recent Tobago budget statements also identify the Easterfield Road from Mason Hall to Studley Park as a priority road project to improve access to the Hillsborough Water Treatment facility and support surrounding commercial and residential investment (Augustine, 2024). The precise ownership, lease, easement and access status of the WTP site, laydown areas and work fronts would require project-specific verification.

Residential tenure data show that owned or family land was the dominant tenure category among S-DAoI owner-occupier households, although less so than across Tobago as a whole. In 2011, 74.6 percent of S-DAoI owner-occupier households occupied owned or family land, compared with 90.5 percent in Tobago (Central Statistical Office of Trinidad and Tobago, 2012a). Easterfield, Mount St. George and Mason Hall had the strongest owned or family land profiles, at 96.8 percent, 88.1 percent and 84.2 percent, respectively. These data describe the land tenure of owner-occupied dwellings and should not be interpreted as parcel-level confirmation of legal title, project-site ownership, easements or access rights.

Belmont and Concordia had more mixed tenure profiles. Government-leased land accounted for 60.3 percent of owner-occupier households in Belmont and 20.4 percent in Concordia, compared with 15.6 percent across the S-DAoI and 3.8 percent in Tobago. Concordia also recorded a comparatively high "other" tenure share, at 9.2 percent. Leasehold and non-standard tenure arrangements therefore appear more relevant in Belmont and Concordia, while family and owner-held land is more prominent in Easterfield, Mount St. George and Mason Hall. Squatting was limited across the S-DAoI, at 0.8 percent overall, and was recorded mainly in Mount St. George.

The wider Tobago tenure context is also relevant. Long-standing family land and informal tenure arrangements, fragmented public and private land management, unclear or outdated regulatory arrangements, and limited enforcement have been identified as recurring land and natural-resource management challenges (Caribbean Local Economic Development Project, 2014;

Environmental Research Institute Charlotteville, 2022, 2023). These island-wide conditions do not confirm tenure status for any specific S-DAoI parcel, but they help explain why proof of ownership, inheritance, leasehold status, customary claims and land access may be sensitive.

The land ownership and tenure profile points to a mixed land-use setting in which public infrastructure, road corridors, private residential frontages, family lands, leasehold areas, agricultural or semi-rural holdings and heritage landscapes may overlap. These conditions provide baseline context for understanding access to work areas, temporary land use, disturbance near property frontages, and engagement with residents whose legal, customary, inherited, leasehold or family-based interests may not be fully captured in formal project records.

4.4.6.2 Access to Infrastructure

4.4.6.2.1 Education

Education access in the S-AoI is supported by a relatively well-established Tobago school network, with early childhood, primary, secondary and tertiary/training facilities located within or near the S-DAoI. Facility lists indicate that access is strongest around Mount St. George and Mason Hall, while Belmont, Concordia and Easterfield appear more dependent on nearby communities for some levels of schooling.

At the early childhood level, Mount St. George ECCE is located within the S-DAoI, while Belmont Sunbeam Early Childhood Centre is located on Belmont Road in the Mason Hall area. Other ECCE centres in nearby settlements, including Mt. Grace, Moriah and Signal Hill, provide wider service options outside the immediate S-DAoI. This distribution suggests that early childhood access is available within the broader local area, although travel requirements may vary by community, household transport arrangements and enrolment choices.

At the primary level, the S-DAoI includes or is directly served by Mount St. George Methodist Primary School, Mason Hall Government Primary School and North Regional SDA Primary School on Belmont Road, Sandy River, Mason Hall. These facilities provide a local primary education base for Mount St. George, Mason Hall and nearby communities. No dedicated primary school was identified in the available facility lists for Concordia or Easterfield, suggesting that children in these communities are likely to travel to nearby schools within the S-DAoI or wider Scarborough/Mason Hall/Mount St. George area.

Secondary education access is anchored by Mason Hall Secondary School, which is located within the S-DAoI and forms the most directly relevant secondary facility for the project area. Other secondary schools, including Signal Hill Secondary, Scarborough Secondary and Bishop's High School, provide wider island-level options, but require travel outside the immediate direct area. The presence of Mason Hall Secondary is therefore important for local education access, youth routines and peak travel movements along community and road corridors.

The S-DAoI also benefits from proximity to tertiary and technical training institutions. The Tobago Hospitality and Tourism Institute and the University of Trinidad and Tobago Tobago Campus are located in Hope/Blenheim, immediately west of Mount St. George. Their location near the direct area is relevant to local skills development, hospitality and technical training pathways, youth

mobility, and potential links between education, employment and the wider Tobago service economy.

The S-DAol has a functional but unevenly distributed education base. Facilities are concentrated in Mount St. George and Mason Hall, while Belmont, Concordia and Easterfield are more dependent on travel to nearby communities. These conditions are relevant to school commuting, peak traffic periods, household routines, child safety and the sensitivity of access routes during temporary works or service disruption.

4.4.6.2.2 Health

Public health services accessed by residents of the S-Aol are provided by the Tobago Regional Health Authority (TRHA), which is responsible for the delivery and management of public health services across Tobago. Health access in the S-Aol is supported by local primary care facilities within the S-DAol and a wider network of secondary and specialist services concentrated in the Scarborough area. The Tobago Regional Health Authority facility listings identify 19 primary care facilities across Tobago and 18 secondary care service categories, indicating that basic health services are geographically distributed across the island, while more specialised services require travel to central facilities.

Within the S-DAol, Mount St. George Health Centre, located at #1 Village Street, Mount St. George, and Mason Hall Health Centre, located on Northside Road, Mason Hall, provide the most directly relevant primary care facilities. Nearby facilities, including Les Coteaux Health Centre and Moriah Health Centre, also form part of the broader primary care network serving communities around the S-DAol. This distribution suggests that Mount St. George and Mason Hall have the strongest direct access to primary care, while Belmont, Concordia and Easterfield are likely to depend on travel to nearby health centres or to Scarborough for some services.

Secondary and specialist care is concentrated outside the S-DAol. Listed secondary care services include Accident and Emergency, Dental, Laboratory, Maternity, Medical Imaging, Medicine, Out-Patient, Paediatrics, Palliative Care, Pharmacy, Physiotherapy, Psychology and Surgery. Access to these services, therefore, depends on travel from the S-DAol to Scarborough or other central health facilities. This is particularly relevant for older persons, persons with disabilities, persons with chronic illness, pregnant women, children, and households without reliable transport.

The health infrastructure profile suggests that the S-DAol has a local primary care base but remains dependent on wider Tobago facilities for hospital, emergency and specialist services. These conditions provide baseline context for understanding health-seeking patterns, emergency access, travel requirements, and the sensitivity of road access or service disruption for households with higher health-care needs.

4.4.6.2.3 Community and Recreational Facilities

Community centres are important social infrastructure for local meetings, recreation, training, information sharing and cultural activity. The national community-centre framework describes these facilities as meeting places intended to support connected and well-networked communities, including recreational activities, social gatherings, community and group

meetings, leadership training, community education programmes, public fora, information dissemination, and the development and exposure of indigenous cultural art forms. In Tobago, community facilities are also treated as spaces for community empowerment, skills development, social cohesion, youth activity and local access to government and social programmes.

Access to community facilities in Tobago is administered through the Tobago House of Assembly (THA), currently via the Division of Community Development, Youth Development and Sport. THA guidance indicates that centres may be managed directly by the THA or through community-based arrangements, within an established policy framework. For baseline purposes, access is therefore understood to be managed through the THA community development system, with facility-specific arrangements varying by centre.

Community centres are distributed across Tobago as part of an island-wide network, but no community centre is located within the S-DAoI communities of Mount St. George, Mason Hall, Belmont, Concordia or Easterfield. The nearest relevant facilities are located in surrounding communities and include Hope Community Centre, Les Coteaux Community Centre, Mt. Grace Community Centre and John Dial Community Centre. These facilities provide nearby spaces for meetings, public information sessions, training, community activities and cultural or social events for communities that do not have a centre within their own boundaries.

With no community centre located within the S-DAoI, residents are likely to rely on nearby community centres, schools, churches, playing fields, private spaces and other local venues for meetings and organised activities. Mount St. George and Mason Hall have stronger access to nearby facilities and service infrastructure, while Belmont, Concordia and Easterfield may depend more on travel to adjacent communities. These conditions are relevant to local gathering points, information-sharing channels, consultation logistics, youth and cultural activities, and road-access sensitivity during temporary works.

4.4.6.2.4 Water and Sanitation

Water access in the S-DAoI is closely tied to the public piped water system, underscoring the direct relevance of the Hillsborough WTP to local household service conditions. In 2011, 92.4 percent of S-DAoI households received water through public piped supply to the dwelling or yard, slightly above the Tobago figure of 91.8 percent (Central Statistical Office of Trinidad and Tobago, 2012a). Public piped supply to the dwelling was the dominant source across all five S-DAoI communities, ranging from 80.3 percent in Belmont to 88.4 percent in Concordia. Public piped yard connections were also present across the direct area, with the highest share in Easterfield at 10.8 percent.

Alternative sources were limited but not absent. Private catchment accounted for 2.3 percent of S-DAoI households, compared with 1.8 percent in Tobago, and was most common in Mount St. George, Concordia and Easterfield. Public standpipes, truck-borne supply, springs, rivers, wells or ponds accounted for small shares overall. Belmont recorded a comparatively high “other” water-source share of 9.7 percent, which may reflect local reporting differences or non-standard access arrangements and would require field verification.

Public water-supply frequency varied more than the access source did. The S-DAoI recorded a higher share of households receiving water every day than Tobago as a whole, at 65.8 percent compared with 60.0 percent. Mount St. George had the most reliable reported supply, with 83.7 percent of households receiving water daily, followed by Concordia at 74.7 percent. Mason Hall, Belmont and Easterfield had lower daily supply levels, with a greater share of households receiving water three or more times weekly. Belmont recorded the highest share of households receiving water only once or twice weekly, at 13.7 percent, suggesting more constrained service reliability in that community.

The Hillsborough WTP 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 Hillsborough WTP was 15,000 persons in 2011 and is projected to increase to approximately 30,462 persons by 2025 and 30,659 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 only modest 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 Hillsborough WTP service area is projected to increase from 1,997 in 2011 to 4,127, with WASA anticipating approximately 2,130 new connections as a result of the project. Overall, while population growth within the service area is expected to remain modest, demand for water services is likely to increase as additional households and buildings are connected to the network and benefit from expanded coverage and improvements to the Hillsborough water-supply system.

Sanitation in the S-DAoI is dominated by on-site wastewater systems rather than sewer infrastructure. In 2011, 84.6 percent of households used a WC linked to a septic tank, compared with 79.6 percent in Tobago. Sewer-linked WCs were limited in the S-DAoI, at 2.6 percent, while pit or latrine use accounted for 12.8 percent. Pit or latrine use was highest in Mount St. George and Mason Hall, at 18.4 percent and 15.3 percent, respectively, and lowest in Easterfield and Concordia. No households in the S-DAoI reported having no toilet facility.

4.4.6.2.5 Electricity

Electricity access in the S-DAoI is near universal and broadly consistent with Tobago-wide conditions. In 2011, electricity was the main household light source for 98.7 percent of S-DAoI households, compared with 98.9 percent across Tobago. Coverage was highest in Mason Hall and Concordia, at 99.7 percent and 99.6 percent, respectively, and remained above 97 percent in Mount St. George, Belmont and Easterfield (Central Statistical Office of Trinidad and Tobago, 2012a).

Reliance on non-electric lighting sources was minimal across the S-DAoI. Kerosene, solar energy and other sources together accounted for only 1.4 percent of households. The data confirm that household electrification is not a major infrastructure deficit, although the high dependence on electricity means that households, schools, small businesses, health facilities and community spaces may be sensitive to temporary outages or construction activity near utility corridors.

4.4.6.2.6 Information and Communication Technologies

ICT access in the S-AoI appears relatively strong, although digital inclusion varies between parishes and communities. The National Digital Inclusion Survey 2021 recorded an ICT Development Index (IDI) of 7.94 for Tobago, slightly above the national score of 7.86 (Kairi Consultants Limited, 2022). Within the S-IAoI, St. George recorded the strongest IDI score of 8.28, followed by St. Andrew at 8.00. David recorded a lower score of 7.67 and was classified as underserved relative to the national IDI benchmark. This suggests that core ICT access and use conditions are generally favourable in the S-IAoI, but not uniform across parishes.

At the S-DAoI level, all five directly affected communities recorded IDI scores above the national benchmark. Belmont, Concordia and Mason Hall each recorded an IDI score of 8.45, followed by Mount St. George at 8.23 and Easterfield at 7.97. The community-level pattern suggests that the direct area is not among the digitally underserved areas in terms of ICT development. However, digital inclusion scores were more moderate. Mount St. George recorded the highest DII score among the S-DAoI communities at 4.29, while Easterfield, Belmont, Concordia and Mason Hall recorded scores between 3.90 and 3.93. These values suggest that physical ICT access is stronger than broader digital inclusion, which also depends on use of online services, trust, confidence and digital readiness.

The national survey also points to important population-level differences that may be relevant to communication and engagement. Internet use was high among younger and working-age groups, but declined among older persons, and persons with disabilities reported substantially lower ICT adoption and use. Nationally, 84 percent of the population reported owning a mobile phone, while 79 percent of persons five years and over used the Internet. Mobile network coverage was reported as universal for at least 3G service, while 75 percent of the population was covered by at least 4G service.

The ICT profile indicates that digital and mobile communication channels are likely to be useful across the S-DAoI, particularly for working-age residents, students, businesses and institutions. However, reliance on digital communication alone may not reach all residents equally, especially older persons, persons with disabilities, households with limited digital skills, and residents who are less comfortable using online services.

4.4.6.2.7 Transportation

Transportation access across the S-AoI is primarily road-based and shaped by Tobago's inland and upland settlement pattern, road conditions, drainage constraints, distance to Scarborough and other service centres, and the availability of private, public and informal transport. Mason Hall and Mount St. George serve as the main service nodes within and near the S-DAoI, providing access to schools, health facilities, churches, businesses, and tertiary and technical training institutions in nearby Hope/Blenheim, as well as connections to Scarborough and the wider island road network. Belmont, Concordia and Easterfield are smaller communities and are more dependent on local connector roads and nearby service centres for routine services.

The main road infrastructure serving the S-DAoI includes the Northside Road, Windward Road, Belmont Road, Mount St. George Road, Easterfield Road, Mason Hall Road and other local roads

linking Mount St. George, Mason Hall, Belmont, Concordia, Easterfield, Studley Park, Hope/Blenheim and Scarborough. The Hillsborough WTP context is particularly linked to the Hillsborough reservoir landscape and the corridor between Hillsborough, Easterfield, Studley Park and Mason Hall. Recent Tobago infrastructure planning identifies the Easterfield Road from Mason Hall to Studley Park as a priority road project intended to improve access to the Hillsborough Water Treatment facility and support safer and more efficient movement in the surrounding area (Augustine, 2024).

Household and community access is supported by private vehicles, taxis, maxi-taxis or buses where available, school transport, private hire or informal transport, and walking for short trips within settlements. Public and informal transport are likely to be especially important for students, older persons, persons with disabilities, persons with chronic illnesses, low-income households, workers commuting to Scarborough or other employment centres, and households without regular access to a private vehicle. Mason Hall and Mount St. George are likely to have stronger transport access due to their settlement size and service functions, while Belmont, Concordia and Easterfield may be more sensitive to changes affecting local roads, transport availability, travel costs and travel times.

Road condition, slope, drainage and maintenance are important transport considerations in the S-AoI. Tobago planning sources identify ongoing investment needs for road reconstruction, resurfacing, secondary road upgrades, bridges, drains, and retaining structures, reflecting the importance of road maintenance and drainage management for community access and public safety (Kairi Consultants Limited, 2012). These issues are relevant to the S-DAoI because the road network supports household movement, access to schools and health services, small business activity, construction access, utility maintenance, and access to the Hillsborough WTP. Where construction traffic overlaps with residential roads, school travel, pedestrian movement and local business activity, road safety and travel reliability may become more visible community concerns.

The transportation profile therefore reflects a road-based access environment with reasonable connectivity to nearby service centres, but with localised sensitivities related to road conditions, drainage, slopes, narrow roads, transport availability, and dependence on key connector routes.

4.4.7 Institutional Stakeholder Landscape

The institutional stakeholder landscape for the Hillsborough WTP is shaped by national agencies, statutory authorities, the Tobago House of Assembly, public utilities, community-based organisations, faith-based institutions, schools, livelihood actors, local businesses and informal resident networks operating within the S-DAoI and wider S-IAoI. These institutions form part of the governance, service delivery, regulatory, community representation and participation context within which the project will be planned and implemented.

The institutional landscape is also shaped by the S-DAoI's inland and upland settlement pattern, road-based access, public water infrastructure, former estate landscapes, agricultural and semi-rural land uses, schools, churches and local service nodes. Mason Hall and Mount St. George have the strongest institutional presence within the direct area, while Belmont, Concordia and

Easterfield have smaller local networks and may rely more on nearby facilities, local leaders and informal communication channels. The current activity level and representativeness of specific organisations would require confirmation through field engagement.

4.4.7.1 Government

At the national and statutory level, the Water and Sewerage Authority (WASA) is the principal institutional stakeholder because the project concerns potable water treatment, and distribution infrastructure. WASA's role is central to existing water-supply operations, customer communication, service-disruption reporting, technical coordination and public concerns related to water reliability.

The Tobago House of Assembly is the main subnational governance institution relevant to the S-Aol. Within the THA system, the most relevant functions relate to public utilities, infrastructure and roads, settlements and land administration, environment and natural resources, community development, youth and sport, education, skills and innovation, health and social protection, and emergency management. These functions are relevant because the S-DAol includes water-supply infrastructure, local roads, schools, health facilities, community and recreational assets, residential areas, agricultural or semi-rural lands and heritage resources. The THA Division of Education, Skills and Innovation is the relevant education-sector stakeholder for Tobago, given its responsibility for pre-school, primary, and secondary facilities; student support systems; ICT in schools; skills development; and education service delivery.

Other national and statutory stakeholders have more specialised regulatory, technical or service-delivery roles. These include the Environmental Management Authority, Town and Country Planning Division, Commissioner of State Lands, relevant land administration agencies, T&TEC, telecommunications providers, Tobago Regional Health Authority, Tobago Emergency Management Agency, Office of Disaster Preparedness and Management, Trinidad and Tobago Police Service, Trinidad and Tobago Fire Service, and the National Trust of Trinidad and Tobago. Their relevance to the Project includes environmental permitting, land and easement verification, utility coordination, health and emergency access, road safety, heritage asset management, public safety and public communication.

4.4.7.2 Civil Society

Civil society stakeholders in the S-Aol include community and village organisations, faith-based institutions, school communities, parent groups, youth and sports groups, cultural organisations, farmers, small businesses, transport operators, tourism and hospitality-linked actors, heritage interests, residents' networks and informal local leaders. These actors contribute to information sharing, social support, local advocacy, meeting mobilisation and household-level communication.

Mason Hall and Mount St. George have the most visible local institutional base because they contain or are near schools, health centres, churches, businesses, recreational spaces and road connections to Scarborough, Hope/Blenheim and surrounding communities. Belmont, Concordia and Easterfield have smaller formal institutional footprints and may depend more on churches, schools in nearby communities, resident networks, local leaders and household-level

communication. The strong Christian and Protestant profile identified in the socio-cultural baseline also suggests that churches may serve as important social and information-sharing institutions across the S-DAol.

Livelihood and service-dependent groups are also part of the stakeholder landscape, even where they are not formally organised. These include older persons, persons with disabilities, persons with chronic illness, caregivers, students, low-income households, households without private transport, small business operators, households with leasehold or family-land interests, and residents dependent on public water supply or local road access. Their participation may depend on trusted intermediaries and locally appropriate communication channels.

4.4.7.3 Participation and Consultation

Community participation and consultation in the S-Aol are likely to occur through a mix of formal and informal channels. Formal channels include WASA communication systems, THA divisions, elected representatives, public notices, schools, health centres, community facilities near the S-DAol, churches, emergency management structures and statutory agency engagement. Informal channels include WhatsApp groups, resident networks, transport operators, business contacts, church networks, word of mouth and local leaders.

Digital communication is likely to be useful across the S-DAol because ICT access is relatively strong, although digital inclusion varies by parish, age, disability status and digital confidence. Online notices, email, social media and messaging platforms may therefore support engagement, but are unlikely to reach all households equally. In-person meetings, printed notices, school and church channels, direct calls, local leaders and household-level outreach remain important, particularly for older persons, persons with disabilities, households with limited digital skills and residents in smaller communities.

The institutional stakeholder landscape is therefore broad but uneven. Government and statutory stakeholders are primarily linked to water-sector governance, infrastructure, utilities, land, environment, health, education, public safety, heritage and emergency management. Civil society stakeholders are linked to community representation, faith and cultural life, education, livelihoods, small-business activity, transport, recreation, and informal support. These conditions provide baseline context for understanding stakeholder identification, consultation reach, information flows and participation across Mount St. George, Mason Hall, Belmont, Concordia and Easterfield.

5 Environmental and Social Impacts and Risks

5.1 Assessment of Impacts and Risks

The main goal of the Impacts and Risk Assessment is to identify the environmental and social impacts associated with the Project at 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 marine biodiversity;
- Effects on existing or proposed protected areas or other sites of conservation or special management interest;
- 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).

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.
Probability	• Low – The impact is unlikely to occur. • Medium – The impact is likely to occur under most conditions. • High – 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

The construction of the proposed Water Treatment Plant (WTP) in Hillsborough, Tobago, has the potential to generate a range of temporary environmental and social impacts that are typical of infrastructure development projects. The significance of these impacts will depend on the scale of the facility, the sensitivity of the surrounding environment, the duration of construction activities, and the effectiveness of mitigation measures implemented during project execution. While most construction-related impacts are expected to be localised and temporary, careful management will be required to ensure compliance with national environmental regulations and the Inter-American Development Bank (IDB) Environmental and Social Performance Standards (ESPS).

One of the primary ecological impacts will be associated with site preparation activities, including grading, excavation, and earthworks required for the construction of treatment facilities, storage tanks, and associated infrastructure. Although the immediate site is already free of trees and natural vegetation of value, the localised habitat disturbance can potentially impact surrounding forested habitats which common wildlife species utilise for foraging, shelter, or movement. If construction occurs near watercourses or other ecologically sensitive habitats, there is a risk of disrupting aquatic and riparian ecosystems. Habitat disturbance may also temporarily displace birds, reptiles, amphibians, and small mammals from the construction area. Although these impacts are expected to be localised, they could be more significant if sensitive species or habitats occur within the project's area of influence.

Earthworks and excavation activities may increase the potential for soil erosion and sediment transport, particularly during periods of intense rainfall, which are common in Tobago. The site is surrounded by undulating/hilly terrain, therefore, sediment-laden runoff could enter nearby streams, drainage channels, or downstream coastal environments, resulting in reduced water quality, increased turbidity, and temporary impacts on aquatic habitats and species. Construction activities involving heavy machinery may also generate dust, noise, and vibration, causing temporary disturbances to both terrestrial wildlife and nearby communities. Night-time lighting, if required, could further affect nocturnal species by altering natural movement patterns and behavior.

The use of construction equipment and machinery presents additional environmental risks, particularly through the accidental release of fuels, lubricants, hydraulic fluids, or other hazardous substances. Improper storage or handling of these materials could result in localised soil and water contamination, with potential impacts on terrestrial and aquatic ecosystems. Similarly, the generation of construction waste, including packaging materials, excavated spoil, and general refuse, could contribute to environmental degradation if not properly managed and disposed of at approved facilities.

From a social perspective, construction activities may result in temporary disruptions to nearby residents, businesses, and road users. Increased traffic associated with the transport of materials, equipment, and workers may contribute to congestion, road safety concerns, and reduced accessibility in immediate areas. Noise and dust emissions may also affect nearby households and sensitive receptors. Occupational health and safety risks will be present for

construction workers due to excavation activities, operation of heavy equipment, working at heights, and potential exposure to hazardous materials. Community health and safety risks may arise if construction sites are not adequately secured or if public access is not effectively controlled.

Overall, the majority of construction impacts associated with the proposed Hillsborough Water Treatment Plant are expected to be temporary, localised, and reversible. With the implementation of appropriate environmental and social management measures, including erosion and sediment control, biodiversity protection, waste management, traffic management, occupational health and safety procedures, and stakeholder engagement programmes, residual impacts are anticipated to remain low to moderate in significance. Effective environmental monitoring and adherence to IDB environmental and social requirements will be essential to minimising adverse impacts while maximising the long-term benefits of improved water supply infrastructure for the Hillsborough community and the wider Tobago region.

Table 5-4: Impacts, Proposed Mitigation Measures, Management Plans and Responsible Party for the Construction 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								
Site clearing and earthworks	High	Soil disturbance, erosion, and sedimentation into water courses.	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
Excavation and grading on slopes	Moderate	Slope instability and increased runoff leading to sediment discharge downstream.	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
Stockpiling and material storage	High	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
Operation of construction vehicles and machinery	High	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

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RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
Solid waste generation (construction debris, packaging)	High	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
Hazardous waste and chemical use (fuels, lubricants, chlorine, caustic soda)	Moderate	Soil and water contamination, worker exposure risk, fire hazard.	Negative	Moderate to High	Medium- to long-term if spills occur.	- Bund and label chemical storage. - Maintain MSDS on-site. - Train staff in spill response and HAZMAT handling. - Use secondary containment.	Waste Management Plan Hazardous materials handling management plan	WASA, Contractor
Noise and vibration from machinery	High (localized)	Nuisance to residents and wildlife; stress to fauna during WTP works	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	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
Decommissioning of old WTP plant	Moderate	Generation of solid and hazardous waste; risk of chemical release.	Negative	Moderate	Short-term	- Drain and neutralize residual chemicals. - Dismantle units safely. - Dispose of materials per EMA requirements.	Waste Management Plan	WASA, Contractor
Transportation of materials and equipment	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	WASA, Contractor

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							Management Plan - Traffic and Road Safety Management Plan	
ECOLOGICAL								
Clearing green space within plant footprint and ancillary facilities	High	Loss of green space and localised habitat disturbance for flora and fauna	Negative	Low	Long-term	- Only clear the necessary footprint; retain surrounding green space (as opposed to concretising the property)	Biodiversity Management Plan	Contractor/ WASA
Construction activities within previously undisturbed areas	Low	Habitat fragmentation and displacement of wildlife	Negative	Moderate	Temporary to Long-term	- Restrict works to designated construction areas; establish ecological buffer zones; restore disturbed habitats	Biodiversity Management Plan	Contractor/ WASA
Earthworks, excavation, and grading activities in vegetative habitats	High	Soil erosion and sedimentation of nearby watercourses and drainage channels	Negative	Moderate	Temporary	- Install erosion and sediment controls; stabilize exposed soils; undertake progressive rehabilitation	Erosion and Sediment Control Plan	Contractor/ WASA
Increased sediment runoff into streams	Low to Moderate	Reduced water quality and impacts on aquatic habitats and aquatic species	Negative	Moderate	Temporary	- Use sediment traps, silt fences, and drainage controls; avoid major earthworks during heavy rainfall periods	Water Quality Monitoring Plan	Contractor/ WASA
Noise and vibration from heavy equipment affecting fauna	Moderate to High	Temporary disturbance to birds, reptiles, bats, and other wildlife	Negative	Minor to Moderate	Temporary	- Restrict construction to daylight hours; maintain equipment; avoid sensitive breeding seasons where possible	Biodiversity Management Plan	Contractor/ WASA

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Night-time lighting during construction affecting fauna	Low	Disruption of nocturnal wildlife behaviour and movement patterns	Negative	Minor	Temporary	- Use downward-facing, low-spill lighting and limit unnecessary illumination	Biodiversity Management Plan	Contractor/ WASA
Improper disposal of construction waste in the surrounding environment	Low	Habitat degradation and impacts on wildlife through pollution	Negative	Moderate	Temporary	- Segregate waste streams; dispose at licensed facilities; conduct regular inspections	Waste Management Plan	Contractor/ WASA
Introduction and spread of invasive species through equipment and materials	Moderate	Displacement of native species and degradation of natural habitats	Negative	Moderate	Long-term	- Clean machinery prior to site entry; monitor and control invasive species	Biodiversity Management Plan	Contractor/ WASA
SOCIAL								
Road degradation due to movement of heavy equipment	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	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 Corporation regarding road reinstatement. - Communicate publicly	Road Reinstatement Plan (within CESMP)	WASA, Contractor, THA Division of Infrastructure, Public Utilities and Transportation (DIPUT)

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Land acquisition and livelihood disturbance (Transmission Routes)	Low-Medium	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	Low	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 Protection and Restoration Plan (LALPRP)	WASA
Noise, dust, and vibration from construction activities	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, equipment movement)	High	Accidents involving residents, children, pedestrians	Negative	Moderate	Short term	- Secure work sites. - Barriers. - Signage. - Lighting at night. - Community sensitisation	HSE Plan; Stakeholder Engagement Plan	Contractor, WASA
Interruption of water service during tie-ins	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	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.	Social Management Plan; Labour Management Plan	Contractor, WASA

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						- Advertise positions early within local communities. - Work with communities to establish transparent recruitment procedures. - Integrate gender inclusion measures.		
Inadequate communication with affected communities	High	Confusion, mistrust, unsafe behaviours, grievances	Negative	Moderate-High	Short to medium term	- Implement community communication plan. - Engage all directly and indirectly affected communities (e.g. Mason Hall). - Use multiple communication channels to advertise - Provide mechanisms to provide feedback and address grievances.	Stakeholder Engagement Plan; Grievance Redress Plan	Contractor, WASA
Employment and economic opportunities	High	opportunities will arise through the direct employment of workers, engagement of subcontractors, procurement of goods and services, and expenditure by workers within the local economy. skilled, semi-skilled and unskilled workers to support site preparation, excavation,	Positive	High	Short term	- NA	NA	WASA

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
		civil works, equipment installation, transportation, environmental management, health and safety oversight, and project administration.						

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5.1.2 The Operations Phase

The operational phase of the proposed Water Treatment Plant (WTP) in Hillsborough, Tobago, is expected to provide substantial long-term benefits through improved water supply reliability, enhanced public health outcomes, and increased resilience of the island's water infrastructure. However, the operation of the facility may also result in a number of environmental and social impacts that require ongoing management and monitoring. While these impacts are generally less intensive than those associated with construction activities, they are continuous in nature and therefore require appropriate operational controls to ensure compliance with national environmental regulations and the Inter-American Development Bank (IDB) Environmental and Social Performance Standards (ESPS).

The treatment process may generate environmental impacts through the production of sludge, filter backwash water, and other treatment residuals. If not properly managed, these waste streams could degrade soil and water quality through increased turbidity, nutrient loading, or chemical contamination of receiving environments. Operational activities will also involve the storage and use of chemicals such as chlorine, coagulants, pH adjustment agents, and other treatment additives. Accidental spills, leaks, or improper handling of these substances could pose risks to terrestrial and aquatic ecosystems as well as to worker and community health. Appropriate chemical storage facilities, secondary containment systems, and emergency response procedures will therefore be required to minimise environmental risks.

The operation of pumps, treatment equipment, backup generators, and other mechanical systems may result in localised noise emissions, although these are generally expected to remain within acceptable levels if the facility is properly designed and maintained. The plant will also consume electricity on a continuous basis, contributing indirectly to greenhouse gas emissions associated with energy generation. While these emissions are typically modest compared to other infrastructure sectors, improving energy efficiency and exploring opportunities for renewable energy integration could further enhance the environmental sustainability of the facility.

From an ecological perspective, routine plant operations are expected to have relatively limited direct impacts on biodiversity provided that abstraction rates remain within sustainable limits and operational discharges comply with applicable standards. Nevertheless, ongoing monitoring of nearby watercourses and aquatic habitats may be required to detect any changes in ecological conditions over time. There is also the potential for invasive plant species to establish within maintained facility grounds if vegetation management practices are not appropriately implemented.

Social impacts during operation are expected to be overwhelmingly positive. The facility will improve the reliability, quality, and availability of potable water for residents, businesses, institutions, and tourism-related enterprises in Hillsborough and surrounding communities. Improved access to safe drinking water can contribute to enhanced public health outcomes, reduced vulnerability during drought periods, improved sanitation, and increased economic productivity. Reliable water supply is

also expected to support community development and strengthen climate resilience by reducing the risk of water shortages during periods of reduced rainfall and increasing climatic variability.

The primary social benefit of the Project is the improvement of water supply reliability, operational efficiency and long-term service resilience within the Hillsborough Reservoir supply zone. The construction of a new Water Treatment Plant are expected to improve the ability of WASA to convey treated water to communities served by the system, including Green Hill, Belmont, Sandy River, Mason Hall and surrounding areas.

The Project is expected to reduce the frequency of service disruptions associated with the existing infrastructure. Improved system reliability may contribute to improved household wellbeing, reduced inconvenience associated with water supply interruptions and enhanced service delivery to businesses, public institutions and community facilities.

The Project may also improve WASA's ability to undertake routine maintenance and respond to operational issues more effectively through the installation of modern infrastructure and improved access arrangements.

Overall, the operational impact associated with improved water supply reliability and service quality is expected to be positive and long-term. No additional enhancement measures are considered necessary, as the anticipated benefits will be realised through the effective operation, maintenance, and ongoing management of the upgraded water treatment and transmission infrastructure. **Community Health and Wellbeing**

Reliable access to potable water contributes directly to public health, sanitation, household wellbeing and overall quality of life. Improved service reliability may reduce the need for water storage practices that create public health concerns and may improve household confidence in the water supply system.

The Project may be particularly beneficial to vulnerable groups, including older persons, persons with disabilities, persons with chronic illnesses and households that experience difficulty coping with prolonged service interruptions.

Overall, operational impacts on community health and wellbeing are expected to be positive and long-term.

Operational Traffic and Access Impacts

Under normal operating conditions, traffic and access impacts are expected to be minimal. Routine inspection, maintenance and repair activities may require occasional vehicle access to sections of the associated facilities. However, these activities are expected to be infrequent, localised and of relatively short duration.

Worker and Community Safety

Routine operation of the WTP is not expected to generate significant worker-community interaction or community safety concerns. Potential risks are generally associated with maintenance activities, emergency repairs and access to operational facilities.

Implementation of WASA's operational health and safety procedures, asset management systems and emergency response arrangements will assist in maintaining safe operations throughout the life of the Project.

Decommissioning of the Existing Water Treatment Plant

The principal social impacts associated with decommissioning of the existing WTP are expected to relate to worker health and safety and the transportation of workers, equipment and demolition materials to and from the site. Given the isolated location of the facility and its proximity to the proposed replacement WTP, impacts on surrounding communities are expected to be limited. Potential worker-worker conflicts, construction nuisance and worker-community interactions are expected to be minor and readily manageable through implementation of the Occupational Health and Safety Plan, Worker Code of Conduct and traffic management measures.

Overall, the social impacts associated with decommissioning of the existing Hillsborough Water Treatment Plant are expected to be temporary, localised and manageable. The most significant impact is expected to be worker health and safety due to the nature of demolition activities and transportation requirements associated with the removal of equipment and materials.

Overall

Overall, operational safety impacts are expected to be minor and manageable.

The operational phase is expected to result in predominantly positive social outcomes through improved water supply reliability, enhanced service delivery and increased system resilience. Negative social impacts during operation are expected to be limited and generally associated with routine maintenance activities and occasional repair works.

From a social perspective, the operational benefits of the Project are expected to outweigh the temporary adverse impacts experienced during construction.

Occasional maintenance activities may also require temporary interruptions to water service; however, these disruptions are expected to be infrequent and can be managed through advance communication and contingency planning.

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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								
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
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
Water abstraction (hydrological alteration)	Low to Moderate	Reduction of environmental flow, potential stress to aquatic ecosystems.	Negative	Moderate	Long-term	- - Install flow meters and maintain minimum environmental flow.- Monitor river levels seasonally.- Adjust abstraction during dry season.	Water quality management plan Biodiversity management plan	WASA
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

RISKS	PROBABILITY OF IMPACT	POTENTIAL IMPACTS	DIRECTION OF IMPACT	MAGNITUDE OF IMPACT	IMPACT DURATION	PROPOSED MITIGATION MEASURES	MANAGEMENT PLANS REQUIRED	RESPONSIBLE PARTY
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								
Increased abstraction of raw water during operation affecting aquatic species	Moderate	Reduction in environmental flows affecting downstream aquatic ecosystems	Negative	Moderate to Major	Long-term	- Establish sustainable abstraction limits; maintain environmental flow requirements; monitor stream health	Water Resources Management Plan	WASA Operator
Discharge of treatment plant backwash water and sludge into waterbodies affecting aquatic species	Moderate	Degradation of receiving water quality and impacts on aquatic habitats	Negative	Moderate	Long-term	- Provide sludge treatment and appropriate disposal; ensure effluent meets regulatory standards prior to discharge	Water Quality Monitoring Plan	WASA Operator
Accidental chemical spills during plant operation affecting surrounding flora and fauna	Low to Moderate	Localised impacts on soil, groundwater, and aquatic ecosystems	Negative	Moderate to Major	Long-term	- Secondary containment systems; emergency response procedures; operator training	Emergency Response Plan	WASA Operator
Routine operation and maintenance activities disturb nearby habitats	Moderate	Minor disturbance to nearby habitats and wildlife	Negative	Minor	Long-term	- Implement environmental operating procedures and staff training	Operational Management Plan	WASA Operator
SOCIAL								
Improved access to potable water and service reliability	Definite	Improved water supply and scheduling.	Positive	High	Long term	- Ensure operational maintenance and timely service response.	Operations and Maintenance (O&M) Plan	WASA

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		Enhanced household health, hygiene, and quality of life; improved business operations.				- Ongoing public communication	Stakeholder Engagement Plan	
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. - Update emergency response protocols	O&M Plan Climate Resilience Strategy	WASA
Service interruptions due to operational maintenance or system failure	Unlikely-Likely (depending on O&M)	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

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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
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	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 primary objective of the Environmental and Social Management Plan (ESMP) is to provide a structured, systematic framework that ensures the rehabilitation and upgrading works are implemented in a manner that prevents, minimises, or otherwise effectively manages adverse environmental and social impacts. In alignment with the IDB Environmental and Social Performance Standards, national regulatory requirements, and international best practice, the ESMP outlines the measures necessary to safeguard environmental resources, protect community wellbeing, and ensure worker health and safety throughout both the construction and operational phases of the projects.

More specifically, the ESMP seeks to translate the findings of the Environmental and Social Assessment (ESA) into actionable management measures by clearly defining mitigation strategies, operational controls, monitoring protocols, and compliance requirements for each identified impact. It establishes roles and responsibilities for WASA, contractors, and supervising entities to ensure accountability, consistent implementation, and effective oversight. The ESMP also seeks to ensure that all contractors and subcontractors adhere to a uniform standard of environmental and social performance across all project sites.

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.

Table 5-2: Environmental and Social Responsibilities for Project Intervention

Project Phase	Activity	Responsibility	Monitoring	Oversight
Design	Grievance Redress Mechanism (for the duration of the Program)	WASA	MPU	IDB
	Final Project Design / Engineering Design	Independent Contractors	WASA	IDB
	Environmental and Social Assessment	Independent Consultants	WASA	IDB
	Public Consultation	WASA	MPU	IDB
	Preparation of E&S Technical Specifications for Bidding Documents	WASA	MPU	IDB
	Environmental Permits (when applicable)	WASA	MPU	WASA
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	MPU	IDB
	Final E&S Report	Contractor	WASA	MPU
	Final E&S Report	WASA		IDB
Operation	Operation and maintenance of the new installed infrastructure	Each plant WASA	MPU	IDB (initial period of 3 years after work completion)
Decommissioning	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

This section presents the structure of the ESMP, which follows on from the identification of the potential environmental and social impacts and mitigative actions for the proposed new Hillsborough Water Treatment Plant.

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	WASA

The ESMP applies to all activities, facilities, and operations associated with the Hillsborough Water Treatment Plant.

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 minimising 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. 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.
5. Stakeholder Engagement and Grievance Management – ensuring continuous consultation and information disclosure to affected communities and other stakeholders, in accordance with ESPS 10.

6. 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.
7. 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.

PLANS	DESCRIPTION	RELEVANT IDB ESPS
Water Quality Management Plan	This Water Quality Management Plan will focus on the protection and maintenance of water quality within the project areas and the surrounding receiving environment. The plan will contain a series of action items to ensure that rehabilitation and construction activities associated with the water treatment plant have minimal impacts on source water quality, treatment processes, and downstream water resources. The plan will also outline measures to prevent contamination from construction-related activities, maintain compliance with applicable water quality standards, protect public health, and ensure the continued delivery of safe and reliable potable water throughout the project lifecycle.	ESPS 3 addresses the need to prevent and minimise pollution and promote the sustainable management of resources, including the protection of water quality from contamination arising from project activities. ESPS 1 underscores the importance of identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle, including the implementation of effective monitoring and mitigation measures for water quality. ESPS 4 recognises that project activities, equipment, and infrastructure can pose risks to community health and safety, particularly where changes in water quality may affect the safety and reliability of potable water supplies.
Air Quality Management Plan	This Air Quality Management Plan will focus on the control and minimisation of air emissions associated with the construction of a new water treatment plant and decommissioning of the existing WTP. The plan will include a series of mitigation measures and action items to reduce dust generation from earthworks, prevent and control emissions from construction equipment and machinery, and manage odours and other air pollutants that may arise during construction, installation, and commissioning activities. It will also establish monitoring requirements and good	ESPS 3 addresses the need to prevent and minimise pollution to air from project-related activities, including dust, emissions from machinery, and other airborne pollutants. ESPS 1 underscores the importance of identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle, including the implementation of mitigation and monitoring measures for air quality. ESPS 4 recognises that emissions such as dust, exhaust fumes, and other air

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PLANS	DESCRIPTION	RELEVANT IDB ESPS
	housekeeping practices to ensure compliance with applicable air quality standards, protect worker and community health, and maintain acceptable ambient air conditions throughout the project lifecycle.	pollutants from construction and operational activities can increase risks to community health and safety.
Noise and Vibration Management Plan	This Noise and Vibration Management Plan will focus on the control and minimisation of noise and vibration impacts associated with the construction of a new water treatment plant and the decommissioning of the existing WTP. The plan will include a series of mitigation measures and action items to reduce noise generated from construction activities, heavy machinery, transport movements, and equipment installation, as well as to manage vibration impacts that may affect nearby structures and sensitive receptors. It will also establish monitoring requirements, work scheduling controls, and good practice construction methods to ensure compliance with applicable noise standards.	ESPS 3 addresses the need to prevent and minimise noise and vibration pollution arising from project activities, including construction equipment operation and associated works. ESPS 1 underscores the importance of identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle, including the implementation of mitigation measures and monitoring programmes for noise and vibration. ESPS 4 recognises that elevated noise levels and vibration from project activities can increase risks to community health, well-being, and safety, particularly for nearby sensitive receptors.
Waste Management Plan (WMP)	This Waste Management Plan will focus on the proper management, handling, storage, transport, and disposal of solid and liquid wastes generated during construction of a new water treatment plant and the decommissioning of the existing WTP. The plan will include a series of mitigation measures and action items to minimise waste generation at source, promote reuse and recycling where feasible, and ensure the safe disposal of construction and operational wastes, including general waste, packaging materials, excavated spoil, and any sludge or process-related residues.	ESPS 3 addresses the need to prevent and minimise pollution through the effective management of solid and liquid wastes, including reduction, reuse, recycling, and safe disposal practices. ESPS 1 underscores the importance of identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle, including waste generation and the implementation of appropriate mitigation and monitoring measures. ESPS 4 recognises that improper waste handling and disposal can create risks to community health and safety, including exposure to contaminants, pests, and pollution of water and surrounding environments.

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PLANS	DESCRIPTION	RELEVANT IDB ESPS
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. Hazardous materials present a risk to human health, community, and the environment due to their physical, chemical, or biological characteristics and should be handled, stored and disposed of in a safe manner.	The IDB Guidelines for Community Health, Safety and Security (ESPS 4) considers that hazardous materials and substances, for example: compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; hydrocarbons, among others. Minimizing the use of hazardous materials is critical, and if these cannot be avoided the handling, storage management and disposal need to be managed in a manner not detrimental the physical, ecological and social environment.
Disaster management Plan	This Disaster Management Plan will focus on establishing a comprehensive framework for preparedness, mitigation, response, and recovery in relation to natural and human-induced disasters that may affect the water treatment plant during its construction, operation and decommissioning. The plan will include a series of measures and action items to address hazards such as hurricanes, floods, earthquakes, landslides, and other extreme weather events, as well as secondary impacts including infrastructure damage, service disruption, and contamination risks. It will also define institutional roles and responsibilities, early warning systems, communication protocols, evacuation and shutdown procedures, and coordination mechanisms with national disaster management authorities to ensure effective response, minimise losses, and support the rapid restoration of critical water supply services throughout the project lifecycle.	ESPS 1 underscores the importance of identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle, including disaster and climate-related risks, and ensuring the implementation of appropriate management and response systems. ESPS 4 recognises that project infrastructure and operations may be vulnerable to natural hazards and disaster events, which can pose significant risks to community health, safety, and continuity of essential services such as potable water supply. ESPS 3 addresses the need to prevent and manage environmental contamination and pollution that may occur as a result of disaster events, including the release of hazardous materials or deterioration of water quality following extreme weather impacts.
Emergency Response Plan	The Emergency Management Plan establishes protocols to prepare for, respond to, and recover from emergencies affecting the water treatment plant. It 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.	ESPS 1 underscores the importance of identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle, including emergency response systems. Emergency Response aligns with IDB ESPS4 requirements for community safety.

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PLANS	DESCRIPTION	RELEVANT IDB ESPS
Biodiversity Management Plan	This Biodiversity Management Plan will focus on the protection, conservation, and restoration of biodiversity within and surrounding the water treatment plant during its construction, operation and decommissioning. The plan will include a series of mitigation measures and action items to avoid and minimise habitat disturbance, protect any remaining flora and fauna, and prevent indirect impacts such as pollution, noise, dust, and altered drainage patterns from affecting sensitive ecosystems. It will also outline requirements for vegetation protection, invasive species management, site rehabilitation, and ecological monitoring to ensure compliance with applicable environmental standards, maintain ecosystem integrity, and enhance opportunities for biodiversity recovery where feasible throughout the project lifecycle.	ESPS 6 recognises the importance of protecting and conserving biodiversity, including habitats and species potentially affected by project activities, and promoting the sustainable management and restoration of natural ecosystems. ESPS 1 underscores the importance of identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle, including impacts on biodiversity and the implementation of appropriate mitigation and monitoring measures. ESPS 3 addresses the need to prevent and minimise pollution and environmental degradation, including impacts on air, water, and soil that may indirectly affect biodiversity and ecosystem health.
Decommissioning Plan	The existing Hillsborough Water Treatment Plant would need to be decommissioned following successful commissioning of the replacement 2.0 IMGD facility. Decommissioning needs to be undertaken in a manner that protects Hillsborough Reservoir, downstream receiving waters, public health and the environment, while eliminating environmental liabilities associated with the existing facility. All activities shall be undertaken in accordance with the Environmental Management Act of Trinidad and Tobago, Water Pollution Rules, applicable waste management requirements, WASA operational requirements, WHO Guidelines for Drinking-water Quality, IDB Environmental and Social Performance Standards (ESPS), IFC General EHS Guidelines and Good International Industry Practice (GIIP).	ESPS 1 underscores the importance of identifying, assessing, and managing environmental and social risks and impacts throughout the project lifecycle, including impacts during the decommissioning or closure phase of a project, highlighting the appropriate mitigation and monitoring measures. ESPS 3 addresses the need to prevent and minimise pollution and promote the sustainable management of resources even through the decommissioning process to water quality from contamination arising from associated activities. ESPS 4 recognises that decommissioning activities, equipment, and infrastructure can pose risks to community health and safety, particularly where changes in water quality may affect the safety and reliability of potable water supplies.
Social Management Plan (IMP)	Contains: - Local Employment and Gender Inclusion Management Plan - Worker Health and Safety and Labour Management Plan - Stakeholder Engagement Plan - Grievance Redress Plan	Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. ESPS 2: Labor and Working Conditions

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PLANS	DESCRIPTION	RELEVANT IDB ESPS
	Worker Behaviour and Anti-Harassment Plan	ESPS 5: Land Acquisition and
	Community Health and Safety Management Plan	Involuntary Resettlement
	Traffic and Road Safety management Plan	ESPS 7: Indigenous Peoples
	Utility Service Interruption and Access Management Plan	ESPS 8: Cultural Heritage
	Land Acquisition and Resettlement Framework	ESPS 9: Gender Equality
	Livelihood Protection Plan	
	Livelihood Restoration Framework	
	Cultural Heritage Management Plan	

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6.5 Water Quality Management Plan

The proposed construction and operation of the water treatment plant 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 the Appendix 3. Table 6-1 below is the parameters deemed to have the highest potential to contaminate water sources and deteriorate the quality of treated water.

Table 6-1 Trinidad and Tobago National Ambient Water Quality Standards – Freshwater (EMA)

	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.
 - 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 staggered replacement of plant infrastructure commences, 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.

- 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 6-2 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 Hillsborough 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 Hillsborough water treatment plant, 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.
 - ✓ 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 PM₁₀, PM_{2.5}, and Total Suspended Particulates (TSP), which are of particular concern during site preparation, earthworks, and construction.

Table 6-3 WHO and EMA Ambient Air Quality Guidelines for PM_{2.5} and PM₁₀

Parameter	Averaging Time	WHO 2021 (µg/m ³)	EMA Standards (µg/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 6-4 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 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. 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.
4. 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.
- 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 6-5 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 6-6 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 6-5) 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 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.
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.

6.8.1 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, bundled, 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.

6.8.2 Indicators

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

Table 6-7: 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

6.8.3 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 6-8: 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.
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.

6.9 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.

6.9.1 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.

6.9.2 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)
 - 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.

6.9.3 Key Performance Indicators

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

Table 6-9 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 with hazardous materials	WASA personnel	

6.9.4 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.

6.9.5 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.

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6.10 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 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 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.

6.10.1 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).
- 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 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.

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.

6.10.2 Monitoring and Compliance

Monitoring of the 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 WTP has been designed as a climate-resilient facility, integrating structural and operational safeguards against tropical storms, drought, flooding, and earthquakes.

6.10.3 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	

6.10.4 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.

6.11 Emergency Management Plan

The Emergency Management Plan establishes protocols to prepare for, respond to, and recover from emergencies affecting the water treatment plant. 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**

6.11.1 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 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.
- **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, 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.

6.11.2 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, 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.

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6.11.3 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
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

6.11.4 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.

6.12 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 forested landscapes surrounding the site for the proposed water treatment plant, including the adjacent forest habitats.
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 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.

6.12.1 Management Measures

- Integrate biodiversity protection clauses in all construction contracts and site environmental procedures.
- Conduct pre-construction botanical and wildlife surveys (covering wet and dry seasons) to identify and locate any Tobago-endemic plant species, ESS nesting sites, or critical wildlife corridors within the project area.
- Establish and clearly demarcate a minimum 30-m riparian buffer zone and no-go areas (e.g., avoidable riparian zones that are intact, pristine forest patches) prior to mobilisation within which no vegetation clearance, earthworks, spoil deposition, or vehicle access is permitted.
- Restrict vegetation clearance to the approved project footprint and use existing access routes where possible.
- Schedule high-noise activities during daylight hours only and as best as possible outside sensitive breeding seasons (March–July).
- Preserve mature trees (>25cm DBH) where feasible, especially those offering nesting or shade functions.
- Stockpile excavated material away from watercourses and cover with geotextile sheeting during rainfall events

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.
- Immediately contain and remediate any fuel or chemical spill; maintain pre-positioned spill kits at all active work sites within 200 m of a watercourse
- Prohibit discharge of disinfection water, concrete washout, or any process water to natural watercourses; provide sealed collection sumps for all waste fluids
- Prohibit hunting, wildlife collection, or disturbance of wildlife by construction workers; enforce through contractual obligations and disciplinary procedures

Invasive Species Control

- Inspect all fill and topsoil sources for invasive species.
- Clean all construction equipment and vehicles before entering the site.
- Restrict spoil disposal to approved designated sites; prohibit dumping of soil or vegetation in or adjacent to watercourses or forest areas.
- Conduct quarterly monitoring for invasive species colonisation and implement manual or mechanical removal if detected

6.12.2 Monitoring and Compliance

Biodiversity and habitat monitoring is designed to ensure that the mitigation and management measures outlined in this plan 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;
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.

6.12.3 Indicators

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

Table 6-10: Key Performance Indicators for Biodiversity and Habitat Management

INDICATOR	TARGET / PERFORMANCE STANDARD	FREQUENCY	MEANS OF VERIFICATION	RESPONSIBLE PARTY
TURBIDITY AND TSS	≤10% above baseline	Weekly (construction)	Water Quality Report	WASA Env. Officer (via Independent Lab)
PRESENCE OF SENSITIVE 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
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)

6.12.4 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 for 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.

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 6-11: 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) / TOBAGO HOUSE OF ASSEMBLY, DEPARTMENT OF NATURAL RESOURCES AND FORESTRY	Provide technical guidance for flora/fauna management and ensure construction and operation activities do not severely impact the species and habitat within the Reserve.
EMA	Regulatory oversight; review compliance reports and conduct periodic inspections.
IDB	Review environmental performance as part of project supervision and safeguard compliance verification.

6.13 Decommissioning Plan

6.13.1 Management Measures

6.13.1.1 Background and Decommissioning Objectives

The existing Hillsborough Water Treatment Plant shall be decommissioned following successful commissioning of the replacement 2.0 IMGD facility. The Hillsborough Water Treatment Plant draws water from the Hillsborough reservoir. The treatment processes include coagulation, flocculation, sedimentation, rapid sand filtration and disinfection. There is no aeration. The chemicals used are Alum for coagulation and flocculation, Carbon for taste and odour, lime for pH, and Chlorine for disinfection. There is no mechanism for proper disposal of the sludge as there are no sludge ponds.

Decommissioning shall be undertaken in a manner that protects Hillsborough Reservoir, downstream receiving waters, public health and the environment, while eliminating environmental liabilities associated with the existing facility.

All activities shall be undertaken in accordance with the Environmental Management Act of Trinidad and Tobago, Water Pollution Rules, applicable waste management requirements, WASA operational requirements, WHO Guidelines for Drinking-water Quality, IDB Environmental and Social Performance Standards (ESPS), IFC General EHS Guidelines and Good International Industry Practice (GIIP).

6.13.1.2 Structural Isolation & Hydraulic Safeguarding

Intake Switch-Over Lockout: Implement strict mechanical Lock-Out/Tag-Out (LOTO) isolation on all raw water intake valves and gravity-fed connections to this 'old' plant to the Hillsborough Reservoir.

Electrical Grid Severing: Coordinate with T&TEC to permanently disconnect high-voltage grid lines feeding the 'old' high-lift pumps, chemical mixers, and air blowers

6.13.1.3 Source Water and Receiving Water Protection

Protection of Hillsborough Reservoir and downstream watercourses shall be a primary environmental objective during decommissioning activities.

Treatment units, drainage channels and pipelines shall be isolated prior to cleaning and dismantling. Residual process water, washwater, sediments and demolition debris shall be contained and managed to prevent discharge to the reservoir or adjacent watercourses. Temporary erosion, sediment and spill control measures shall be maintained throughout decommissioning activities.

Any accidental release with the potential to affect water quality shall be immediately contained, investigated and corrected.

6.13.1.4 Chemical and Hazardous Materials Management

All treatment chemicals shall be inventoried and removed from the facility prior to demolition activities.

Residual alum, lime and activated carbon shall be removed from storage facilities, dosing systems and associated pipework. All chlorine cylinders shall be isolated, and 150lb chlorine cylinders recovered from the chemical dosing bay and transferred for reuse or returned to the supplier. Chlorine lines, regulators and dosing equipment shall be depressurized, purged and verified safe prior to cutting or dismantling local pipelines to prevent localized toxic chlorine gas vapor releases into the adjacent environment.

The chemical storage room shall be cleaned and inspected following removal of all chemicals to verify that no residual contamination remains.

6.13.1.5 Sludge and Treatment Residuals Management

Treatment units, sludge channels, washwater drains and associated infrastructure shall be inspected for accumulated sludge and treatment residuals.

Sludge and sediments shall be removed, dewatered where practicable and transported to an approved disposal facility. Waste tracking records shall be maintained for all removed materials.

No sludge, sediment, filter backwash solids or treatment residuals shall be discharged to the receiving environment during decommissioning activities.

6.13.1.6 Generator and Fuel System Removal

Diesel fuel, lubricants, batteries and associated materials shall be removed from the standby generator prior to dismantling.

The generator area shall be inspected for evidence of hydrocarbon contamination. Any contaminated material identified shall be removed and appropriately managed. Spill prevention and response measures shall remain in place throughout removal activities.

6.13.1.7 Decommissioning of Process Infrastructure

The coagulation, flocculation, sedimentation, filtration and disinfection systems shall be drained, cleaned and inspected prior to dismantling.

The underground clear well and backwash water storage tank shall be cleaned and assessed to determine the most appropriate closure option. Structures retained on site shall be secured against unauthorized access, standing water, vector breeding and public safety risks.

6.13.1.8 Site Rehabilitation and Environmental Closure

Upon completion of decommissioning activities, all wastes, redundant infrastructure and temporary facilities shall be removed from the site.

Disturbed areas shall be stabilized and rehabilitated as necessary to prevent erosion, sediment transport and drainage instability. Open basin cavities shall be backfilled with certified clean fill dirt. The final topsoil slope shall be graded to eliminate low spots, preventing standing rainwater from creating breeding grounds for *Aedes aegypti* mosquitoes. Also native Savannah grass shall be planted immediately to stabilize the earth against erosion during heavy tropical downpours.

The site shall be left in a safe, stable and environmentally acceptable condition.

6.13.2 Monitoring and Compliance

Monitoring shall be undertaken throughout decommissioning activities to verify implementation of mitigation measures and compliance with applicable environmental requirements.

Monitoring activities shall include:

- inspection of reservoir and watercourse protection measures;
- verification of chemical removal and decontamination activities;
- verification of chlorine cylinder transfer and disposal records;
- inspection of sludge removal and disposal activities;
- inspection of generator removal and fuel management activities;
- verification of waste management records;
- inspection of erosion and sediment control measures;
- verification of site rehabilitation activities; and
- investigation and documentation of environmental incidents and non-compliances.

Inspections shall be undertaken prior to commencement of decommissioning activities, during high-risk activities, following significant rainfall events, following environmental incidents and as part of the final environmental closure inspection.

Any non-compliance identified shall be documented and corrective actions implemented promptly.

Monitored Operational Activity	Statutory Compliance Standard	Minimum Sampling Frequency
Tank Draining & Basin Fluid Evacuation	Water Pollution Rules (WPR) Schedule I: pH must be strictly between 6.0 – 9.0; TSS must remain < 30 mg/L before leaving property.	Continuous grab testing per active batch discharge event.
Demolition & Concrete Crushing	EMA Ambient Air Quality Standards: PM10 boundary limit < 150 µg/m ³ over a 24-hour averaging period.	Continuous daily tracking during active crushing or heavy excavation.
Material Haulage & Sludge Logistics	Waste Management Rules (WMR): 100% containment; zero visible tracking of mud/sludge on public asphalt; valid EMA-permitted waste handler signatures.	Every departing truck load.
Stockpiling chemical pipes & scrapped Pumps	WPR Section 4 (General Prohibition): Zero visible oily sheen or chemically colored runoff permitted in public stormwater channels.	Daily, plus immediate inspection following any heavy rainfall event.

6.13.3 Key Performance Indicators

Indicator	Target
Water Quality Compliance	100%
Release of sludge, sediment or process water to reservoir or watercourses	Zero
Chlorine release incidents	Zero
Fuel or oil spills	Zero
Significant environmental incidents	Zero
Treatment chemicals removed and accounted for	100%
Chlorine cylinders removed and accounted for	100%
Sludge disposal records completed	100%
Waste transfer records completed	100%
Significant erosion associated with decommissioning activities	Zero
Environmental closure verification completed	100%

6.13.4 Roles and Responsibilities

WASA

- **Ultimate Oversight:** Acts as the primary asset owner and applicant for the decommissioning Certificate of Environmental Clearance (CEC)
- Approves and oversees decommissioning activities.
- Verifies operational shutdown of the facility.
- Review environmental compliance documentation.
- Confirm satisfactory environmental closure of the site.
- **Regulatory Liaison:** Submits the Final Closure and Rehabilitation Report to the EMA to request formal site de-registration and release from CEC obligations.
- **Inter-Agency Coordination:** Manages formal communication channels and updates with the Tobago House of Assembly (THA)

Contractor Project Manager

- **Operational Execution:** Directs all field personnel, heavy equipment scheduling, and demolition sequencing in strict alignment with the ESMP.
- Implement all decommissioning and mitigation measures.
- **Subcontractor Management:** retains and monitors the performance of certified specialty subcontractors for gas chlorine extraction, and hazardous waste transport.

- Maintain environmental compliance throughout decommissioning activities.
- Maintain records of waste, sludge and chemical management.
- Undertake site rehabilitation and restoration activities.

Environmental Officer

- **Compliance Testing:** Conduct monitoring and compliance inspections including daily on-site field testing for pH and total suspended solids (TSS) of all residual basin fluids before discharge
- **Chain of Custody Control:** Manages the legal waste tracking system for all departing chemical, sludge and structural wastes.
- Verify implementation of mitigation measures.
- Investigate environmental incidents and non-compliances.
- Prepare environmental monitoring and closure documentation.
- **Post-Closure Audits:** Coordinates the 12-month post-closure groundwater sampling and soil core grid analysis with an accredited laboratory.

Health and Safety Officer

- **Safety Enforcement:** Implements and verifies Lock-Out/ Tag-Out (LOTO) procedures, confined space air-purging protocols, and mandatory worker PPE compliance
- Oversee chlorine handling and chemical removal activities.
- **Nuisance Control:** Monitors daily boundary dust levels (PM10) and ensures all stock piles and departing trucks are securely covered.
- **Vector Management:** Conducts weekly site walkthroughs to locate and eliminate areas of standing water that could breed mosquitoes.
- Monitor worker safety compliance.
- Implement emergency response procedures.
- Verify safe closure of confined spaces and underground structures.

6.13.5 Post-Closure Activities and Decommissioning Closure Verification

Following complete infrastructure removal, the project must enter a 12-month post-closure validation phase which includes

1. **Groundwater Quality Audit:** Sample quarterly, monitoring wells (one upgradient, two downgradient) around the historical footprints of the old chemical storage bays to track potential historical chemical migration.

2. **Soil Validation Core Sampling:** Take systematic grid-based soil core samples across the old treatment plant footprint. Ensure heavy metal contents and pH levels conform to safe residential/industrial baseline numbers.
3. **Formal Permit Close-Out:** Compile clean water reports, certified soil samples, and disposal manifests into a comprehensive **Decommissioning Closure Verification Report**. This report is then submitted directly to the EMA to officially de-register the old facility, close out the decommissioning CEC requirements, and transfer full site management to the team operating the new 2.0 IMGD plant.

This Decommissioning Closure Verification Report shall be prepared by the Contractor Project Manager and reviewed by WASA and the Environmental Officer.

This Report shall confirm that all chemicals, fuels, wastes and residual materials have been removed and appropriately managed; sludge and treatment residuals have been disposed of at approved facilities; infrastructure has been safely decommissioned; disturbed areas have been rehabilitated; and the site has been left in a safe, stable and environmentally acceptable condition.

6.14 Social Management Plan

6.14.1 Introduction

This Social Management Plan (SMP) has been prepared to provide a framework for managing the social impacts, risks and opportunities associated with the proposed Hillsborough Water Treatment Plant (WTP), and decommissioning of the existing WTP.

The SMP is based on the findings of the Social Assessment and identifies the measures required to avoid, minimise, mitigate or manage adverse social impacts and enhance potential project benefits during the construction, decommissioning and operational phases of the Project. The SMP also establishes the responsibilities of the Contractor, WASA, Supervising Engineer and other relevant parties for implementation, monitoring and reporting.

Consideration was given to engineering, operational, environmental and social factors, including potential impacts on communities, road users, access arrangements, community health and safety, and constructability considerations.

The Social Assessment identified several key social issues requiring management throughout the life of the Project. These include traffic, transportation and road safety impacts associated with the movement of workers, equipment and materials; worker health and safety risks; community health and safety concerns; local employment expectations; potential disruptions to access and utility services; and the need for ongoing stakeholder engagement and grievance management.

In response to these findings, the SMP has been structured around a series of thematic management plans designed to address the principal social risks and impacts identified during the assessment process. Each management plan establishes objectives, management measures, implementation responsibilities, monitoring requirements and reporting procedures to support effective social impact management throughout project implementation. Table 1.1

presents the management plans comprising the SMP and the principal social issues addressed by each plan.

Table 1.1: Social Management Plan Framework

Management Plan	Principal Social Issues Addressed
1. Stakeholder Engagement and Grievance Management Plan	Stakeholder engagement, information disclosure, grievance management, community communication
2. Local Employment, Gender Inclusion and Workforce Conduct Plan	Local employment opportunities, gender inclusion, worker conduct, worker-community relations
3. Traffic, Transportation and Road Safety Management Plan	Construction traffic, road safety, access restrictions, transportation of workers, equipment and materials
4. Community Health and Safety Management Plan	Community safety, public access, trench and excavation safety, vulnerable groups, emergency preparedness
5. Worker Health and Safety and Labour Management Plan	Occupational health and safety, worker welfare, labour management, worker grievance procedures
6. Utility Service Interruption and Access Management Plan	Utility disruptions, service continuity, property access, reinstatement and community notifications

Collectively, these management plans provide the framework through which social impacts and risks will be managed and monitored throughout project implementation. The plans should be read in conjunction with the Environmental Management Plans of the ESMP and other project management plans prepared for the Project.

6.14.2 Institutional Arrangements and Responsibilities

6.14.2.1 Purpose

This section outlines the institutional arrangements for implementation, monitoring and reporting of the SMP. Effective implementation of the SMP will require coordination among WASA, the Contractor, the Supervising Engineer and other relevant stakeholders throughout the construction, decommissioning and operational phases of the Project.

Overall responsibility for ensuring implementation of the SMP rests with WASA. Day-to-day implementation of social management measures during construction and decommissioning will be the responsibility of the Contractor, while the Supervising Engineer will provide oversight, monitoring and verification of compliance with project requirements.

6.14.2.2 Roles and Responsibilities

The roles and responsibilities of WASA, the Contractor, the Supervising Engineer, the Community Liaison Officer (CLO) and Contractor Health, Safety and Environmental Personnel for implementation of this Plan are outlined below.

6.14.3 Water and Sewerage Authority

WASA will have overall responsibility for ensuring that social risks and impacts are managed in accordance with project requirements and applicable environmental and social commitments.

Key responsibilities include:

- Providing overall oversight of SMP implementation;
- Ensuring adequate resources are available for implementation of social management measures;
- Supporting stakeholder engagement activities as required;
- Reviewing social monitoring reports;
- Addressing significant social issues that may arise during project implementation; and
- Coordinating with relevant government agencies and stakeholders where necessary.

6.14.3.1 Contractor

The Contractor will be primarily responsible for implementing the social management measures identified in this SMP.

Key responsibilities include:

- Preparing and implementing contractor-specific management procedures consistent with the SMP;
- Assigning suitably qualified personnel to oversee social management activities;
- Implementing mitigation measures identified in the SMP;
- Maintaining records of social management activities;
- Managing stakeholder complaints received at the site level;
- Reporting social incidents, grievances and non-compliance issues;
- Undertaking corrective actions where required; and
- Ensuring workers comply with the Worker Code of Conduct and occupational health and safety requirements.

6.14.3.2 Supervising Engineer

The Supervising Engineer will provide oversight of SMP implementation and verify compliance with project requirements.

Key responsibilities include:

- Monitoring implementation of management measures;
- Reviewing contractor performance;
- Verifying compliance with project requirements;
- Conducting site inspections and audits;
- Reviewing social monitoring reports;
- Tracking corrective actions and non-conformances; and
- Advising WASA on social performance issues.

6.14.3.3 Contractor Community Liaison Officer

The Contractor should designate a suitably qualified CLO to serve as the primary point of contact between the Project and affected stakeholders during construction and decommissioning activities.

Key responsibilities of the CLO may include:

- Leading the implementation of the Stakeholder Engagement and Grievance Management Plan;
- Serving as the primary contact for community enquiries and complaints;
- Coordinating community notifications regarding construction activities, traffic disruptions, utility interruptions and other project-related activities;
- Maintaining records of stakeholder engagement activities and grievances;
- Supporting implementation of local employment communication measures;
- Liaising with community representatives, residents, businesses, road users and other stakeholders as required;
- Assisting with the identification and resolution of community concerns before they escalate into grievances;
- Receiving complaints, acknowledging, tracking, and maintaining communication with complainants and monitoring grievance resolution;
- Supporting the Contractor and Supervising Engineer in monitoring community-related impacts and stakeholder concerns; and
- Preparing stakeholder engagement and grievance management reports.

6.14.3.4 Contractor Health, Safety and Environmental Personnel

The Contractor should designate appropriately qualified personnel to oversee implementation of health, safety and environmental requirements.

Responsibilities may include:

- Daily monitoring of SMP implementation;
- Stakeholder liaison and community notifications;
- Management of grievances;
- Monitoring worker conduct;
- Supporting implementation of traffic and community safety measures;
- Maintaining monitoring records; and
- Preparing periodic reports.

6.14.3.5 Communication and Reporting

Regular communication among WASA, the Contractor and the Supervising Engineer will be required to support effective implementation of the SMP.

Communication mechanisms may include:

- Site meetings;
- Progress meetings;
- Incident reporting procedures;
- Grievance reporting;
- Monthly monitoring reports; and
- Corrective action tracking for community-related challenges.

Social incidents, grievances, significant complaints and non-compliance issues should be reported promptly to the Supervising Engineer and WASA in accordance with project reporting procedures.

6.14.4 Responsibility Matrix

Then finish with a simple table:

Table 2.1: Summary of SMP Responsibilities

Activity	WASA	Contractor	Supervising Engineer
Overall SMP Oversight	✓		
SMP Implementation		✓	
Stakeholder Engagement	✓	✓	Monitor
Grievance Management	Oversight	✓	Monitor
Traffic and Transportation Management Measures		✓	Monitor
Community Health and Safety Measures		✓	Monitor
Worker Health and Safety Measures		✓	Monitor
Local Employment and Gender Measures	Oversight	✓	Monitor
Monitoring and Reporting	Review	Prepare	Verify
Corrective Actions	Oversight	Implement	Verify

6.15 Stakeholder Engagement and Grievance Management Plan (SEGMP)

6.15.1 Introduction and Objectives

This Stakeholder Engagement and Grievance Management Plan (SEGMP) establishes the framework for identifying, informing, consulting and engaging stakeholders affected by the Hillsborough Water Treatment Plant Project, including construction of the new WTP, and decommissioning of the existing WTP.

The Plan also establishes the Project Grievance Mechanism (GM), which provides stakeholders with accessible channels through which concerns, complaints, enquiries and requests for information may be submitted and addressed in a timely and transparent manner.

The SEGMP seeks to promote open communication, meaningful stakeholder participation and responsive grievance management throughout project implementation.

The objectives of the Plan are to:

- Ensure transparent, timely and accessible communication with affected stakeholders throughout project implementation.
- Provide stakeholders with accurate information regarding project activities, schedules, anticipated impacts, mitigation measures and project benefits.
- Support safe implementation of project activities through advance notification of construction works, traffic disruptions, access restrictions and utility interruptions.
- Promote inclusive participation by ensuring that vulnerable and under-represented groups have opportunities to access information and provide feedback.

- Establish accessible and transparent procedures for receiving, investigating and resolving grievances.
- Strengthen trust, accountability and constructive relationships among WASA, the Contractor, affected communities and other stakeholders.
- Support continuous improvement through monitoring stakeholder concerns, grievances and lessons learned.

The SEGMP serves as the primary communication interface between the Project and affected stakeholders and provides the stakeholder engagement and grievance management framework supporting implementation of all other social management plans contained within the SMP.

6.15.2 Management Measures

6.15.2.1 Stakeholder Identification and Mapping

- Establish and maintain a stakeholder database throughout the Project lifecycle.
- Identify stakeholders potentially affected by construction, decommissioning and operational activities.
- Periodically review and update stakeholder information as project activities progress.
- Pay particular attention to vulnerable groups, including older persons, persons with disabilities, pregnant women, persons who are acutely ill or homebound, women-headed households and other potentially disadvantaged groups.

Project stakeholders identified are provided in the table below.

Table: List of Project Stakeholders

Group	Stakeholders
Project Proponent	• Ministry of Public Utilities/WASA
Directly Affected Communities	• Mason Hall, Easterfield, Concordia, Belmont, Mount St. George, Studley Park/Barbados Bay
Residents and Property Occupiers	• Residents located adjacent to transmission main construction corridors and construction traffic routes along Easterfield Road, Belmont Road, Northside Road, and access roads used for WTP construction and decommissioning activities • Property owners affected by temporary access restrictions
Vulnerable Groups	• Older persons, persons with disabilities, persons who are acutely ill or homebound, persons with respiratory illnesses (including persons with asthma), pregnant women, children and school-aged youth, women-headed households, low-income households
Businesses and Economic Stakeholders	• Local businesses and commercial establishments, roadside vendors, contractors and service providers, local suppliers, transport operators along the relevant roads directly affected by transmission pipeline installation
Community Organisations and Institutions	• Village councils and community groups, faith-based organisations, sports and recreational organisations, schools and educational facilities, health facilities and healthcare providers
Government and Public Agencies	• Tobago House of Assembly (THA), Division of Infrastructure, Public Utilities and Public Transportation, Division of Health, Wellness and Social Protection, Tobago Emergency Management Agency (TEMA), Town and Country Planning Division, Trinidad and Tobago Police Service, Trinidad and Tobago Fire Service, Utility providers

Project Stakeholders	Contractor, Supervising Engineer, Community Liaison Officer, Project workers
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6.15.2.2 *Information Disclosure and Community Notifications*

The Contractor, through the CLO, should provide timely and accessible information regarding Project activities.

Information to be communicated may include:

- Construction schedules and work programmes.
- Traffic diversions and road closures.
- Temporary access restrictions.
- Utility interruptions and service disruptions.
- High-impact construction activities.
- Community health and safety precautions.
- Employment opportunities and recruitment procedures.

Information should be disseminated through appropriate communication channels including:

- Community meetings.
- Community notice boards.
- Printed notices and flyers.
- WhatsApp groups and digital platforms.
- Local radio announcements.
- Direct engagement with community representatives.
- Door-to-door outreach where necessary.

Advance notification should be provided wherever practicable prior to activities likely to affect community stakeholders. Particular attention should be given to stakeholders located within Mason Hall, Easterfield, Concordia, Belmont, Mount St. George and Studley Park/Barbados Bay, where project activities may result in traffic disruptions, temporary access restrictions, utility interruptions, construction-related nuisance or other project-related impacts requiring advance notification and stakeholder engagement.

6.15.2.3 *Stakeholder Engagement Activities*

Stakeholder engagement activities may include:

- Community meetings and information sessions.
- Stakeholder consultations.
- Small-group discussions.
- Meetings with community organisations, businesses and institutions.
- Briefings with schools, health facilities and other sensitive receptors.
- Targeted engagement with vulnerable groups.

All stakeholder engagement activities should be documented and maintained within the Project stakeholder engagement records.

6.15.2.4 Stakeholder Enquiries and Information Requests

The Project should maintain mechanisms through which stakeholders may:

- Request Project information;
- Submit enquiries;
- Provide feedback and suggestions; and
- Raise concerns regarding Project activities.
- Stakeholder enquiries should be documented and addressed within reasonable timeframes.

6.15.2.5 Grievance Management

The Project should maintain an accessible Grievance Mechanism (GM) throughout the Project lifecycle. 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;
- 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.

A dedicated telephone number and email address should be provided for the Project.

All grievances should be:

- Recorded within the Project Grievance Register;
- Assigned a unique reference number;
- Acknowledged and communicated by the CLO;
- Screened and classified according to issue type and level of urgency;
- Investigated by appropriate personnel;
- Resolved within established timeframes; and
- Closed and documented upon completion of corrective actions.

6.15.2.6 Grievance Timelines

Step	Timeline
Receipt of grievance	Day 0
Registration in GM Register	Within 24 hours
Acknowledgement to complainant	Within 24 hours
Screening and classification	Within 48 hours
Assignment to responsible party	Within 3 working days
Investigation initiated	Within 5 working days
Proposed corrective action communicated	Within 10 working days
Resolution of Level 1 grievance	Within 14 calendar days
Resolution of Level 2 grievance	Within 21 calendar days
Resolution of Level 3 grievance	Within 30 calendar days
Closure notification issued	Within 5 days of resolution
Escalation request lodged by complainant	Within 10 days of receiving outcome

6.15.2.7 Grievance Escalation

Where a complainant is dissatisfied with the proposed resolution, grievances may be escalated through the following levels:

- Level 1 – Contractor Project Management;
- Level 2 – WASA Project Management Team;
- Level 3 – WASA Senior Management; and
- Level 4 – Appropriate national administrative, regulatory or judicial mechanisms

The following table provides a description, examples, timeframe and responsible party.

Table: Grievance Classification Levels

Grievance Level	Description	Examples	Target Response / Resolution Timeframe	Responsible Party
Level 1 – Minor Grievances	Routine concerns that can be addressed quickly through direct communication and corrective action by the Contractor or CLO. These grievances	Information requests; dust complaints; noise complaints; minor traffic concerns; minor access restrictions;	Acknowledge within 24 hours. Resolve within 7 calendar days.	CLO and Contractor

	typically have limited impacts and do not require extensive investigation.	isolated worker conduct concerns; requests for clarification.		
Level 2 – Moderate Grievances	Issues requiring investigation, coordination among project personnel or implementation of corrective measures. These grievances may affect multiple stakeholders or persist over a longer period.	Repeated traffic disruptions; property access restrictions; utility interruption complaints; reinstatement concerns; repeated nuisance complaints; minor property damage.	Acknowledge within 24 hours. Investigation initiated within 5 working days. Resolve within 14 calendar days.	CLO, Contractor and Supervising Engineer
Level 3 – Significant Grievances	Grievances involving significant impacts, safety concerns, unresolved disputes or issues affecting vulnerable groups. These grievances require formal investigation and management attention.	Significant property damage; community health and safety concerns; repeated unresolved complaints; major utility service disruption concerns; serious worker misconduct; impacts affecting vulnerable persons.	Acknowledge within 24 hours. Investigation initiated within 3 working days. Resolve within 30 calendar days.	Contractor, Supervising Engineer and WASA
Level 4 – Critical Grievances	Serious incidents requiring immediate intervention by WASA senior management and, where applicable, referral to external authorities. These grievances may involve significant harm, legal implications or regulatory reporting requirements.	Fatalities; serious injuries; SEA/SH allegations; major public safety incidents; criminal activities; legal claims; significant environmental or social incidents; matters involving law enforcement agencies.	Immediate notification (within 24 hours). Immediate investigation and escalation. Resolution timeframe determined by the nature of the incident and applicable legal requirements.	WASA, Contractor, Supervising Engineer and Relevant Authorities

6.15.2.8 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:

- (i) 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.

6.15.2.9 Confidentiality and Non-Retaliation

- Grievances should be handled confidentially.
- Anonymous reporting should be permitted.
- Sensitive complaints should be managed through appropriate confidentiality procedures.
- Complainants should be protected from retaliation, intimidation or discrimination.
- Access to grievance records should be restricted to authorised personnel.

6.15.3 Monitoring and Compliance

6.15.3.1 Monitoring Activities

- Weekly review of stakeholder engagement activities and stakeholder enquiries;
- Weekly review of community notifications and information dissemination activities;
- Weekly review of grievances received and actions taken;
- Monthly review of stakeholder engagement performance;
- Monthly review of grievance trends, recurring and escalated issues;
- Periodic audits by WASA and the Supervising Engineer; and
- Verification of implementation of corrective actions.

6.15.3.2 Compliance Measures

- Corrective actions should be implemented where deficiencies are identified.
- Persistent non-compliance should be addressed in accordance with contractual requirements.
- Stakeholder engagement and grievance management performance should be included in routine Project reporting.
- Lessons learned should be incorporated into ongoing Project implementation.

6.15.4 Indicators (KPIs)

KPI	Monitoring Method	Frequency	Responsibility
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Number of stakeholder notifications issued	Communication records	Monthly	Contractor CLO
Number of stakeholder engagement activities conducted	Engagement records	Monthly	Contractor CLO
Stakeholder participation rates	Attendance records	Monthly	Contractor CLO
Participation of vulnerable groups	Attendance records	Monthly	Contractor CLO
Number of stakeholder enquiries received and addressed	Stakeholder database	Monthly	Contractor CLO
Number of grievances received	Grievance Register	Monthly	Contractor CLO
Percentage of grievances acknowledged within 24 hours	Grievance Register	Monthly	Contractor CLO
Percentage of grievances resolved within target timeframes	Grievance Register	Monthly	Contractor CLO, WASA
Number of grievances escalated	Grievance Register	Monthly	WASA
Stakeholder satisfaction with engagement and grievance management processes	Stakeholder feedback	Quarterly	Contractor CLO, WASA

6.15.5 Roles and Responsibilities

Entity/Role	Key Responsibilities
WASA	Provide oversight of SEGMP implementation; review stakeholder engagement performance; review escalated grievances; support coordination with government agencies and utility providers; monitor implementation of corrective actions.
Contractor	Implement stakeholder engagement and grievance management measures; support community consultations; implement corrective actions; maintain engagement and grievance records; support reporting requirements.
Contractor CLO	Lead implementation of the SEGMP; maintain stakeholder and grievance databases; serve as primary point of contact for stakeholders; coordinate community notifications; facilitate engagement activities; receive, register and track grievances; maintain communication with complainants; prepare stakeholder engagement and grievance reports.
Supervising Engineer	Verify compliance with SEGMP requirements; review stakeholder engagement records and grievance registers; monitor corrective actions; provide recommendations regarding stakeholder engagement and grievance performance.
Project Workers	Comply with stakeholder engagement requirements and the Worker Code of Conduct; interact respectfully with stakeholders and community members; report stakeholder concerns to supervisors or the CLO.

6.16 Local Employment, Gender Inclusion and Workforce Conduct Plan

6.16.1 Introduction and Objectives

This Local Employment, Gender Inclusion and Workforce Conduct Plan establishes the measures required to promote local employment opportunities, support gender inclusion, encourage fair and transparent labour practices and maintain respectful workforce behaviour throughout implementation of the Hillsborough WTP, and decommissioning of the existing WTP.

The Plan seeks to maximise local employment and economic benefits arising from the Project while managing community expectations regarding employment opportunities and ensuring that recruitment and workforce management practices remain transparent, equitable and non-discriminatory.

For the purposes of this Plan, local communities include Mason Hall, Easterfield, Concordia, Belmont, Mount St. George, Studley Park/Barbados Bay and other communities located within the project-affected area.

The objectives of this Plan are to:

- Promote local employment by providing opportunities for suitably qualified residents from communities within the Project Area of Influence.
- Promote fair, transparent and accessible recruitment and employment practices.
- Encourage greater participation of women in Project-related employment opportunities.
- Reduce barriers that may limit women's participation in the workforce.
- Support participation of Tobago contractors, suppliers and service providers where feasible.
- Strengthen community trust and minimise grievances associated with perceptions of unfair recruitment practices.
- Promote respectful workforce behaviour and positive worker-community relations.
- Support safe, inclusive and non-discriminatory working environments.
- Establish monitoring and reporting mechanisms to assess local employment, gender inclusion and workforce conduct outcomes.

This Plan supports implementation of the SEGMP, Worker Health and Safety Management Plan, Community Health and Safety Management Plan, Worker Code of Conduct (CoC), Worker Grievance Mechanism and Project Grievance Mechanism.

6.16.2 Management Measures

The Plan establishes measures to promote local employment opportunities, support gender inclusion, manage workforce conduct and ensure fair, transparent and non-discriminatory recruitment and employment practices throughout the Project.

6.16.2.1 Local Employment and Procurement Commitments

- Where suitably qualified and experienced candidates are available, priority should be given to residents from project-affected communities.
- Establish and maintain a Local Employment Registry managed jointly by the Contractor and CLO.
- Advertise employment opportunities within affected communities through community notice boards, social media platforms, community organisations, local leaders, WhatsApp groups and other appropriate communication channels.
- Clearly communicate job requirements, qualifications, application procedures and recruitment timelines.
- Conduct community outreach activities to explain available employment opportunities and recruitment procedures.

- Maintain records of local recruitment efforts and employment outcomes.
- Provide feedback to unsuccessful candidates where feasible.
- Encourage the use of local suppliers, subcontractors, transport operators and service providers where feasible and consistent with Project requirements.
- Communicate clearly that some professional, technical and specialist positions may be filled by personnel mobilised from the Contractor's existing workforce or from outside Tobago where required skills are not available locally.
- Communicate realistically the anticipated number and types of employment opportunities available in order to manage community expectations.

6.16.2.2 *Gender Inclusion Measures*

- Actively encourage women to apply for employment opportunities associated with the Project.
- Promote recruitment of women across a range of occupational categories including administration, environmental and social management, occupational health and safety, traffic management, community liaison, quality control, surveying, supervisory, skilled and semi-skilled positions where feasible.
- Include equal opportunity statements in recruitment advertisements and employment communications.
- Publicise employment opportunities through channels that are accessible to women within affected communities.
- Ensure recruitment, training, promotion and employment decisions are undertaken without discrimination based on gender.
- Avoid biased job descriptions, discriminatory selection criteria or employment practices that may disadvantage women.
- Maintain a safe and respectful workplace through implementation of the Worker Code of Conduct and anti-harassment procedures.
- Provide separate sanitation facilities for male and female workers where required.
- Promote equal access to training, mentoring and skills development opportunities.

6.16.2.3 *Reducing Barriers to Workforce Participation*

- Provide gender equality and respectful workplace awareness training as part of worker induction and ongoing workforce training programmes.
- Ensure women have access to the same employment information, recruitment opportunities and training opportunities as male applicants and workers.
- Maintain confidential and accessible mechanisms for reporting discrimination, harassment, intimidation or inappropriate workplace behaviour.
- Consider reasonable accommodations to support participation of persons with disabilities where feasible and appropriate.
- Integrate gender and inclusion considerations into workforce management, occupational health and safety measures and worker welfare arrangements.
- Consider reasonable measures that support women's participation and retention within the workforce where practicable.

6.16.2.4 *Recruitment and Employment Processes*

- Implement transparent, merit-based recruitment and selection procedures.
- Document recruitment and selection decisions to support transparency and accountability.
- Maintain records of:
 - a. Applicants;
 - b. Interviewed candidates;
 - c. Hired workers; and
 - d. Reasons for non-selection where applicable.
- (ii) Prohibit recruitment fees, coercion, favouritism, nepotism or other unfair employment practices.
- (ii) Retain recruitment records for auditing and monitoring purposes.
- (ii) Ensure all workers receive written employment agreements outlining terms and conditions of employment.

6.16.2.5 *Equal Opportunity and Non-Discrimination*

- Prohibit discrimination based on gender, pregnancy, disability, ethnicity, age, religion or other protected characteristics recognised under applicable legislation.
- Ensure women are not restricted solely to lower-paying or traditionally gendered employment roles.
- Ensure equal pay for equal work in accordance with applicable labour legislation.
- Prohibit adverse treatment arising from pregnancy, family responsibilities or caregiving responsibilities.
- Consider opportunities for recruitment and inclusion of PWDs where feasible and appropriate.

6.16.2.6 *Workforce Conduct and Community Relations*

The Contractor should promote a safe, respectful and professional working environment and ensure that all workers conduct themselves appropriately in their interactions with fellow workers, community members, businesses, road users and other stakeholders throughout the Project lifecycle.

Prepare and implement a Project-level Worker Code of Conduct which requires all workers to:

- Treat fellow workers, community members, road users, property owners and other stakeholders with dignity, courtesy and respect.
- Refrain from discrimination, harassment, sexual harassment, intimidation, bullying, abusive behaviour or any other form of inappropriate conduct.
- Conduct themselves in a professional manner when working in or near communities, residences, schools, health facilities, businesses and other sensitive receptors.
- Respect local customs, traditions, cultural practices and community norms.
- Comply with all Project occupational health, safety, security and environmental requirements.

- Use Project equipment, vehicles and facilities responsibly and in accordance with established procedures.
- Refrain from the use of illegal drugs, alcohol misuse or any behaviour that may compromise safety, productivity or community relations.
- Respect private property and refrain from trespassing, unauthorised access or damage to property.
- Report incidents of misconduct, conflicts, grievances, unsafe behaviour or other concerns to their supervisor or the Community Liaison Officer (CLO).
- Cooperate with investigations relating to workplace misconduct, grievances, incidents or breaches of the Code of Conduct.

6.16.2.7 *Labour Grievance Mechanism*

- Maintain a dedicated grievance mechanism for labour-related concerns.
- Ensure workers are informed of grievance procedures during induction and throughout employment.
- Provide accessible and confidential reporting channels for concerns relating to:
 - Discrimination;
 - Harassment;
 - Unfair treatment;
 - Unsafe working conditions;
 - Employment practices;
 - Wage and benefit issues; and
 - Worker conduct concerns.
- Allow anonymous reporting where appropriate.
- Ensure labour grievances are acknowledged within 24 hours and addressed within established grievance resolution timeframes.
- Maintain records of grievances received, actions taken and outcomes achieved.

6.16.3 *Monitoring and Compliance*

6.16.3.1 *Monitoring Activities*

- Weekly monitoring of workforce composition by gender, community of origin and occupational category.
- Monthly review of recruitment and employment records.
- Monitoring of local recruitment efforts and outcomes.
- Monitoring of female participation across occupational categories.
- Monitoring of local supplier and subcontractor participation.
- Review of labour grievance records to identify patterns of exclusion, discrimination or workplace concerns.
- Verification of employment advertisements, outreach activities and recruitment records.
- Monitoring of workforce conduct complaints and worker-community interaction concerns.

6.16.3.2 Compliance Measures

- Non-compliance should trigger corrective actions by the Contractor and may result in Corrective Action Requests issued by WASA or the Supervising Engineer.
- Persistent non-compliance with the requirements of this Plan should be addressed in accordance with applicable contractual provisions.
- Violations of the Worker CoC may result in disciplinary action, suspension or removal from the Project.
- Progress should be reported as part of routine SMP compliance reporting.

6.16.4 Indicators (KPIs)

The following KPIs should be used to monitor implementation and effectiveness of this Plan throughout project implementation.

KPI	Monitoring Method	Frequency	Responsibility
Percentage of workforce from local communities	Workforce records	Monthly	Contractor
Number and percentage of female workers employed	HR records	Monthly	Contractor
Number and percentage of women employed by occupational category	HR records	Monthly	Contractor
Number of local employment outreach activities conducted	CLO records	Monthly	Contractor CLO
Percentage of job advertisements circulated within affected communities	Communication records	Monthly	Contractor CLO
Number of women applying compared with number hired	Recruitment records	Quarterly	Contractor
Number of Tobago suppliers and subcontractors engaged	Procurement records	Quarterly	Contractor
Number of labour-related grievances received and resolved	Labour GM records	Monthly	Contractor
Number of worker induction and workforce conduct training sessions conducted	Training records	Monthly	Contractor
Number of workforce conduct complaints received and resolved	Incident and grievance records	Monthly	Contractor

6.16.5 Roles and Responsibilities

Entity/Role	Key Responsibilities
WASA	Provide oversight of local employment and gender inclusion commitments; review monitoring reports; monitor implementation of corrective actions; ensure alignment with Project requirements.
Contractor	Implement local recruitment measures; advertise employment opportunities; maintain workforce records; implement non-discrimination measures; provide workforce training; maintain Labour GM; monitor and report on implementation of the Plan.
Contractor CLO	Maintain the Local Employment Registry; disseminate employment information; facilitate community outreach; support communication with local communities; maintain outreach records; support management of employment-related grievances.

Supervising Engineer	Verify implementation of local employment, gender inclusion and workforce conduct measures; review workforce records and monitoring reports; identify non-compliance and recommend corrective actions.
Contractor HSE Personnel	Monitor workplace conditions; support implementation of the Worker Code of Conduct; investigate workplace conduct concerns; support awareness and training activities.
Project Workers	Comply with workplace requirements; uphold respectful conduct; report concerns, grievances, unsafe conditions or incidents of discrimination and harassment.

6.17 Traffic, Transportation and Road Safety Management Plan (TTRSMP)

6.17.1 Introduction and Objectives

Construction of the proposed Hillsborough WTP, and decommissioning of the existing WTP will require the transportation of workers, construction materials, equipment, fuel, aggregates, pipes and other supplies throughout the construction period. Construction activities may also require the transportation of demolition materials, excavated material and other waste streams to and from project sites.

Construction traffic has the potential to affect residents, businesses, road users, pedestrians, public transportation operators and other stakeholders through increased traffic volumes, temporary access restrictions, road safety risks, traffic delays, road deterioration and construction-related nuisance. Potential impacts are expected to be most pronounced along Easterfield Road, Belmont Road, Northside Road, Castara Road and the Easterfield Road/Caledonia Road corridor used to access project work areas and transport materials and equipment.

Traffic and transportation impacts associated with the Project are expected to occur primarily during the construction and decommissioning phases. Accordingly, the Contractor should prepare and implement a Traffic Management Plan (TMP) prior to commencement of works. The TMP should be developed in consultation with relevant authorities and stakeholders, as appropriate, and submitted to WASA and the Supervising Engineer for review and approval prior to the commencement of construction activities.

The TMP should establish the measures required to manage construction-related traffic, transportation and road safety risks and minimise disruption to residents, businesses, road users and other stakeholders. The Plan should also seek to maintain safe and efficient movement of vehicles and pedestrians while reducing the potential for traffic congestion, access restrictions and traffic-related incidents associated with project activities.

The objectives of this Plan are to:

- Promote safe movement of workers, residents, road users and construction vehicles.
- Minimise traffic disruptions and transportation-related impacts.
- Maintain safe and reasonable access to homes, businesses, community facilities and public infrastructure.
- Reduce risks associated with the movement of heavy equipment and construction vehicles.
- Protect pedestrians and other vulnerable road users.

- Provide timely communication regarding traffic disruptions, diversions and access restrictions.
- Minimise deterioration of roads affected by project-related traffic.
- Ensure compliance with applicable traffic management and road safety requirements.

This Plan should be implemented in conjunction with the SEGMP, Community Health and Safety Management Plan (CHSMP), Worker Health and Safety Management Plan (WHSMP) and Utility Service Interruption and Access Management Plan (USIAMP).

6.17.2 Management Measures

A. Traffic Management Planning

- Coordinate traffic management arrangements with relevant authorities and stakeholders.
- Identify approved haul routes, access routes and construction vehicle routes.
- Review traffic management arrangements regularly and update as necessary.
- Schedule high-volume transportation activities to minimise disruption where feasible.

B. Construction Traffic Management

- Use designated routes for transportation of workers, materials and equipment.
- Minimise unnecessary vehicle movements.
- Ensure vehicles are operated by appropriately licensed and trained personnel.
- Restrict vehicle speeds in communities and near sensitive receptors.
- Maintain vehicles in safe operating condition.
- Ensure loads are properly secured during transportation.
- Avoid obstruction of public roads except where authorised and appropriately managed.

C. Transmission Main Construction Along Road Corridors

- Implement phased construction to minimise the length of road corridor under active construction at any one time.
- Maintain access to residences, businesses and community facilities wherever practicable.
- Provide temporary pedestrian crossings and alternative access arrangements where required.
- Coordinate works to minimise disruptions along Easterfield Road, Belmont Road and Northside Road.
- Maintain emergency vehicle access at all times.
- Provide advance notification of road closures, lane restrictions and access disruptions.

D. Traffic Control and Road Safety Measures

- Install and maintain appropriate traffic signs, warning signs, barriers and traffic control devices around active work areas.
- Implement temporary traffic control measures where lane closures or road restrictions are required.
- Provide trained traffic marshals where necessary.
- Maintain safe pedestrian access around work areas.
- Ensure adequate visibility around work zones.
- Maintain access for emergency vehicles at all times.

- Provide adequate lighting and warning devices where work occurs during low-light conditions.

E. Access Management

- Maintain access to homes, businesses, agricultural properties and community facilities wherever practicable.
- Provide temporary access arrangements where normal access is disrupted.
- Coordinate access arrangements with affected stakeholders.
- Minimise the duration of access restrictions.
- Restore access promptly following completion of works.

F. Transportation of Materials, Equipment and Waste

- Establish designated routes for transportation of construction materials and equipment.
- Manage transportation of excavated material, demolition debris and other waste in accordance with approved procedures.
- Prevent spillage of materials onto public roads.
- Clean affected roads where construction activities result in mud, debris or material deposition.
- Monitor transportation activities to minimise impacts on communities and road users.

G. Road Infrastructure Protection, Restoration and Reinstatement

- Conduct pre-construction condition assessments of roads and associated infrastructure likely to be affected by project activities.
- Monitor the condition of roads used by construction traffic throughout project implementation.
- Implement measures to minimise deterioration of road surfaces and associated infrastructure.
- Repair damage attributable to project activities, including damage to road surfaces, shoulders, drainage structures, signage, road markings and other affected road infrastructure.
- Reinstatement roads and associated infrastructure disturbed during construction activities to pre-construction or agreed conditions.
- Coordinate reinstatement activities with the THA, and other relevant stakeholders.
- Inspect reinstated areas to verify satisfactory completion and address any deficiencies identified.

H. Community Notifications and Information Disclosure

- Provide advance notice of planned road closures, traffic diversions, lane restrictions and significant traffic disruptions.
- Communicate transportation schedules for major equipment deliveries where relevant.
- Inform stakeholders of temporary access restrictions and alternative access arrangements.
- Disseminate information through the CLO using appropriate communication channels.
- Respond promptly to traffic-related complaints and concerns.

H. Road Condition Monitoring and Reinstatement

- Conduct pre-construction road condition assessments where appropriate.

- Monitor roads used by project traffic for signs of deterioration attributable to project activities.
- Repair damage resulting from project-related traffic where required.
- Reinstate roads and affected road infrastructure following completion of construction activities.

6.17.3 Monitoring and Compliance

The Contractor should monitor implementation of traffic management measures throughout project implementation. Monitoring should include inspections of traffic control measures, vehicle operations, road safety performance, stakeholder complaints, access management measures and road conditions.

Any deficiencies identified should be corrected promptly and documented through the Project corrective action process.

Traffic-related incidents, complaints and non-compliance issues should be recorded, investigated and reported in accordance with Project requirements.

6.17.4 Indicators (KPIs)

The following KPIs should be used to monitor implementation of this Plan.

KPI	Monitoring Method	Frequency	Responsibility
Number of traffic-related complaints received	Complaint records	Monthly	Contractor CLO
Number of road safety incidents involving project vehicles	Incident records	Monthly	Contractor
Percentage of planned community traffic notifications issued	Notification records	Monthly	Contractor CLO
Number of access-related complaints received	Complaint records	Monthly	Contractor CLO
Number of traffic management non-compliances identified and corrected	Inspection records	Monthly	Contractor
Number of vehicle operator safety briefings conducted	Training records	Monthly	Contractor
Number of road condition inspections completed	Inspection records	Monthly	Contractor

6.17.5 Roles and Responsibilities

Entity/Role	Key Responsibilities
WASA	Provide oversight of implementation of the TTRSMP and review significant traffic-related issues.
Contractor	Prepare and implement traffic management measures; maintain safe transportation practices; monitor compliance; investigate incidents; implement corrective actions.
Contractor CLO	Coordinate stakeholder notifications; communicate road closures, traffic diversions and access restrictions; receive and track traffic-related complaints.
Supervising Engineer	Monitor implementation of traffic management measures; review traffic performance; verify corrective actions and compliance.

Traffic Marshals/ Site Personnel	Implement day-to-day traffic control measures; support safe movement of vehicles and pedestrians around work areas.
Project Workers and Drivers	Comply with traffic management procedures, speed restrictions, road safety requirements and instructions from traffic control personnel.

6.18 Community Health and Safety Management Plan (CHSMP)

6.18.1 Introduction and Objectives

Construction of the proposed Hillsborough WTP, and decommissioning of the existing WTP have the potential to affect the health, safety and wellbeing of residents, businesses, road users and other stakeholders located within the Project affected communities.

Potential impacts may arise from construction activities, excavation and trenching works, movement of heavy equipment and construction vehicles, construction-related noise, dust and vibration, temporary access restrictions, and other project-related activities.

Particular consideration should be given to vulnerable groups that may experience greater exposure or sensitivity to project-related impacts, including older persons, persons with disabilities, pregnant women, children, persons who are acutely ill or homebound and persons with respiratory illnesses.

The objectives of this Plan are to:

- Protect the health, safety and wellbeing of affected communities throughout project implementation.
- Prevent or minimise community exposure to project-related hazards and risks.
- Promote safe interaction between project activities and surrounding communities.
- Reduce construction-related nuisance and disturbance.
- Address the needs of vulnerable and potentially disproportionately affected groups.
- Promote awareness of project activities and associated safety measures.
- Establish procedures for responding to community health and safety incidents and emergencies.

This Plan should be implemented in conjunction with the SEGMP, TTRSMP, Worker Health and Safety Management Plan (WHSMP) and Utility Service Interruption and Access Management Plan (USIAMP).

6.18.2 Management Measures

A. Worksite Security and Public Access Control

Clearly demarcate active work areas using barriers, fencing, signage and other appropriate access control measures.

- Restrict unauthorised access to construction and decommissioning work areas.
- Install warning signs at locations where community members may be exposed to construction hazards.
- Maintain appropriate site security measures throughout project implementation.
- Secure construction materials, equipment and hazardous substances to prevent unauthorised access.

B. Excavation, Trenching and Public Safety

- Install barriers, fencing, warning tape and signage around open excavations and trenches.
- Cover, secure or backfill excavations as soon as practicable following completion of works.
- Maintain safe pedestrian movement around excavation areas.
- Provide temporary crossings where pedestrian routes are affected.
- Inspect excavations regularly to verify effectiveness of safety measures.
- Implement additional safety controls in areas located near residences, businesses, schools or other sensitive receptors.

C. Construction Nuisance Management

- Implement dust suppression measures where required.
- Maintain construction equipment in good working condition.
- Minimise unnecessary noise generation and vehicle idling.
- Schedule particularly disruptive activities during appropriate daytime hours where practicable.
- Manage construction activities to minimise vibration-related impacts.
- Respond promptly to community complaints relating to dust, noise and vibration.

D. Community Health and Wellbeing

- Monitor activities that may affect community health, wellbeing or quality of life.
- Minimise the duration of community disturbances where practicable.
- Provide advance notification of activities likely to generate significant nuisance or disruption.
- Implement corrective actions where community health and safety concerns are identified.

E. Vulnerable Groups

- Consider the needs of vulnerable persons and groups when planning and implementing project activities.
- Provide reasonable accommodation measures where feasible to minimise impacts on vulnerable persons.
- Give particular consideration to maintaining access to homes, healthcare facilities and essential services.
- Coordinate with affected individuals where specific assistance measures may be required.

F. Worker-Community Interactions

- Promote respectful interactions between project workers and community members.
- Require compliance with the Worker CoC.
- Investigate complaints relating to worker behaviour.
- Implement corrective actions where worker conduct contributes to community concerns or grievances.
- Promote awareness of local customs, community norms and stakeholder sensitivities.

G. Emergency Preparedness and Response

- Develop and implement emergency response procedures for incidents that may affect community health and safety.
- Coordinate emergency response arrangements with relevant agencies where required.
- Maintain emergency contact information at project sites.
- Report and investigate community health and safety incidents.
- Implement corrective actions following incidents and emergency events.

6.18.3 Monitoring and Compliance

The Contractor should monitor implementation of community health and safety measures throughout project implementation. Monitoring should include inspections of worksite security measures, public access controls, excavation safety measures, community complaints, worker-community interactions and community health and safety incidents.

Any deficiencies identified should be corrected promptly and documented through the Project corrective action processes.

Community health and safety incidents, complaints and non-compliance issues should be recorded, investigated and reported in accordance with Project requirements.

6.18.4 Indicators (KPIs)

The following KPIs should be used to monitor implementation of this Plan.

KPI	Monitoring Method	Frequency	Responsibility
Number of community health and safety complaints received and resolved	Complaint records	Monthly	Contractor CLO
Number of community health and safety incidents associated with Project activities	Incident records	Monthly	Contractor
Number of unauthorised access incidents reported	Incident records	Monthly	Contractor
Number of excavation and trench safety inspections completed	Inspection records	Monthly	Contractor
Number of worker conduct complaints received and resolved	Complaint and grievance records	Monthly	Contractor CLO
Number of corrective actions implemented for community health and safety issues	Corrective Action Register	Monthly	Contractor HSE personnel

6.18.5 Roles and Responsibilities

The roles and responsibilities for implementation of this Plan are outlined below.

Entity/Role	Key Responsibilities
WASA	Provide oversight of implementation of the CHSMP and review significant community health and safety issues.

Contractor	Implement community health and safety measures; maintain worksite security; manage public safety risks; investigate incidents and implement corrective actions.
Contractor CLO	Communicate community health and safety information; receive and track complaints; support engagement with affected stakeholders.
Supervising Engineer	Monitor implementation of community health and safety measures; verify compliance and corrective actions.
Contractor HSE Personnel	Conduct inspections; monitor public safety measures; investigate incidents; maintain records and support reporting.
Project Workers	Comply with community health and safety requirements and the Worker Code of Conduct.

6.19 Worker Health and Safety and Labour Management Plan (WHSLMP)

6.19.1 Introduction and Objectives

Construction of the proposed Hillsborough WTP, and decommissioning of the existing WTP will expose workers to a range of occupational health, safety and labour-related risks. These risks may arise from excavation and trenching activities, operation of heavy equipment and construction vehicles, manual handling, work at heights, exposure to dust, noise and vibration, adverse weather conditions, fatigue, and other construction-related hazards.

The Project also requires the implementation of fair and transparent labour management practices to promote worker wellbeing, compliance with applicable legislation and standards, and the maintenance of safe and respectful working conditions.

The objectives of this Plan are to:

- Protect the health, safety and wellbeing of all Project workers.
- Prevent workplace injuries, illnesses and occupational incidents.
- Promote safe work practices and hazard awareness.
- Ensure compliance with applicable occupational health and safety and labour requirements.
- Provide fair, transparent and non-discriminatory labour management practices.
- Establish procedures for worker training, incident reporting, grievance management and corrective action.
- Promote a safe, respectful and inclusive work environment.

This Plan should be implemented in conjunction with the LEGIWCP, CHSMP, TTRSMP, and SEGMP.

6.19.2 Management Measures

A. Occupational Health and Safety Management

- Prepare and implement a Project-specific Occupational Health and Safety (OHS) Plan prior to commencement of works.
- Identify workplace hazards and undertake risk assessments for all major work activities.
- Implement appropriate hazard control measures in accordance with the hierarchy of controls.
- Conduct routine workplace inspections and safety audits.

- Establish safe work procedures for construction, decommissioning and operational activities.
- Maintain records of inspections, incidents, corrective actions and safety performance.

B. Worker Training, Induction and Competency

- Provide site-specific induction training to all workers prior to commencement of work.
- Conduct regular toolbox meetings and safety briefings.
- Provide task-specific training for workers undertaking specialised or high-risk activities.
- Ensure workers possess the licences, certifications and competencies required for assigned duties.
- Maintain training records for all workers.

C. Personal Protective Equipment (PPE)

- Ensure workers wear appropriate PPE relevant to assigned tasks.
- Ensure PPE is maintained in good condition and replaced as required.
- Train workers in the proper use, maintenance and storage of PPE.
- Monitor compliance with PPE requirements.

D. High-Risk Construction Activities

- Implement specific safety measures for excavation and trenching activities.
- Establish safe procedures for operation of heavy equipment and construction vehicles.
- Implement controls for work at heights where applicable.
- Manage risks associated with confined spaces, lifting operations and electrical hazards.
- Ensure emergency rescue procedures are available for high-risk activities.

E. Worker Health and Wellbeing

Provide access to potable drinking water, sanitation facilities and welfare amenities.

Implement measures to manage heat stress, fatigue and other occupational health risks.

Encourage workers to report health concerns and unsafe conditions.

Provide access to first aid services and emergency medical assistance.

Promote worker wellbeing through awareness programmes and supportive workplace practices.

F. Gender Considerations in Occupational Health and Safety

- Ensure that occupational health and safety measures are implemented in a manner that protects all workers, regardless of gender.
- Provide appropriate sanitation and welfare facilities for male and female workers.
- Ensure that PPE is available in suitable sizes and specifications for both male and female workers.
- Promote a safe and respectful working environment free from discrimination, harassment, bullying and sexual harassment.
- Provide confidential mechanisms through which workers may report gender-related concerns, discrimination, harassment or inappropriate workplace behaviour.

- Ensure that women have equal access to occupational health and safety information, training and emergency response procedures.
- Investigate and address reported incidents of discrimination, harassment or gender-based misconduct in accordance with established procedures.

G. Labour Management

- Implement fair, transparent and non-discriminatory recruitment and employment practices.
- Provide written terms and conditions of employment.
- Comply with applicable labour legislation and contractual requirements.
- Prohibit forced labour, child labour and discriminatory employment practices.
- Maintain employment records and documentation.

H. Worker Grievance Mechanism

- Establish and maintain a Worker Grievance Mechanism throughout the Project lifecycle.
- Inform workers of grievance procedures during induction and ongoing training activities.
- Provide confidential and accessible channels for reporting grievances.
- Permit anonymous reporting where appropriate.
- Record, investigate and resolve worker grievances within established timeframes.
- Maintain grievance records and document corrective actions.

I. Incident Reporting and Investigation

- Establish procedures for reporting occupational incidents, injuries, near misses and unsafe conditions.
- Investigate incidents and determine root causes.
- Implement corrective and preventive actions.
- Maintain incident records and reporting systems.
- Notify relevant authorities where required by law.

J. Emergency Preparedness and Response

- Develop and implement emergency response procedures.
- Maintain emergency contact information and communication systems.
- Provide first aid equipment and trained first aid personnel.
- Conduct periodic emergency drills and exercises.
- Review and update emergency procedures as required.

6.19.3 Monitoring and Compliance

The Contractor should monitor implementation of worker health and safety and labour management measures throughout project implementation. Monitoring should include workplace inspections, safety audits, training records, worker grievance records, incident reports and compliance reviews.

Any deficiencies identified should be corrected promptly and documented through the Project corrective action process.

Occupational incidents, injuries, grievances and non-compliance issues should be recorded, investigated and reported in accordance with Project requirements.

6.19.4 Indicators (KPIs)

The following KPIs should be used to monitor implementation of this Plan.

KPI	Monitoring Method	Frequency	Responsibility
Number of occupational incidents and injuries reported	Incident records	Monthly	Contractor
Number of lost-time injuries (LTIs)	Incident records	Monthly	Contractor
Number of workplace inspections completed	Inspection records	Monthly	Contractor
Number of toolbox meetings and safety briefings conducted	Training records	Monthly	Contractor
Number of worker grievances received and resolved	Worker Grievance Register	Monthly	Contractor
Number of corrective actions implemented for health, safety and labour issues	Corrective Action Register	Monthly	Contractor

6.19.5 Roles and Responsibilities

The roles and responsibilities for implementation of this Plan are outlined below.

Entity/Role	Key Responsibilities
WASA	Provide oversight of implementation of the WHSLMP and review significant health, safety and labour issues.
Contractor	Implement worker health, safety and labour management measures; provide resources; conduct training; investigate incidents; maintain records and implement corrective actions.
Contractor HSE Personnel	Conduct inspections, audits and monitoring activities; investigate incidents; maintain safety records; support training and reporting activities.
Supervising Engineer	Monitor implementation of the Plan; verify compliance; review monitoring reports and corrective actions.
Contractor CLO	Support communication of worker conduct requirements where worker-community interactions occur and coordinate referral of relevant grievances.
Project Workers	Comply with health, safety and labour requirements; use PPE; participate in training; report hazards, incidents and grievances; comply with the Worker Code of Conduct.

6.20 Utility Service Interruption and Access Management Plan (USIAMP)

6.20.1 Introduction and Objectives

Construction of the proposed Hillsborough Water Treatment Plant (WTP), and decommissioning of the existing WTP may result in temporary interruptions to utility services and restrictions on access to homes, businesses, community facilities and other properties.

Potential impacts are expected to be greatest during transmission main construction activities where excavation, trenching, pipe installation and tie-in works may require temporary disruptions to water supply services, temporary access restrictions and management of pedestrian and vehicular movement. Temporary access restrictions may also occur during construction of the new WTP and decommissioning of the existing WTP.

The transition from the existing WTP to the new facility also requires careful planning to ensure continuity of water supply services and minimise disruptions to customers served by the system.

The objectives of this Plan are to:

- Minimise interruptions to water supply and other utility services.
- Maintain reasonable access to homes, businesses, community facilities and public infrastructure.
- Protect access for vulnerable persons and emergency service providers.
- Ensure timely communication regarding planned service interruptions and access restrictions.
- Establish procedures for managing and restoring services following interruptions.
- Minimise inconvenience to affected stakeholders.

This Plan should be implemented in conjunction with the SEGMP, TTRSMP, CHSMP, and WHSMP.

6.20.2 Management Measures

A. Utility Service Interruption Planning

- Prepare and implement procedures for managing planned and unplanned utility service interruptions.
- Coordinate planned service interruptions with WASA operations personnel and relevant utility providers.
- Schedule service interruptions to minimise inconvenience to affected stakeholders where practicable.
- Minimise the duration of planned interruptions.
- Maintain records of planned and unplanned service interruptions.

B. Water Supply Service Continuity

Develop and implement a transition strategy to maintain continuity of service during commissioning of the new WTP and decommissioning of the existing WTP.

- Coordinate tie-in activities and system modifications to minimise disruption to customers.
- Identify critical customers and sensitive receptors that may be affected by interruptions.
- Implement contingency measures where prolonged interruptions cannot be avoided.
- Restore services as quickly as practicable following interruptions.

C. Notification of Planned Service Interruptions

- Provide advance notice of planned service interruptions to affected stakeholders.
- Communicate the expected duration of interruptions and anticipated restoration times.

- Disseminate notifications through appropriate communication channels identified in the SEGMP.
- Provide updates where interruption durations change significantly from those originally communicated.
- Maintain records of notifications issued.

D. Access Management During Construction

- Maintain access to residences, businesses, community facilities and public infrastructure wherever practicable.
- Implement temporary access arrangements where normal access is disrupted.
- Coordinate access arrangements with affected property owners and occupiers.
- Maintain safe pedestrian access around work areas.
- Minimise the duration of access restrictions.
- Restore normal access promptly following completion of works.

E. Access for Vulnerable Persons and Essential Services

- Give particular consideration to access needs of vulnerable groups.
- Maintain access for emergency services at all times.
- Coordinate with affected stakeholders where temporary assistance measures may be required.
- Ensure access to healthcare facilities, schools and other essential services is maintained.

F. Property Reinstatement

- Reinstall driveways, walkways, fences, walls and other affected property features disturbed by project activities.
- Restore access arrangements to pre-construction or agreed conditions.
- Inspect reinstated areas to verify satisfactory completion.
- Address legitimate reinstatement concerns raised by stakeholders.

G. Utility Conflicts and Coordination

- Identify existing utility infrastructure that may be affected by construction activities prior to commencement of excavation and trenching works.
- Coordinate with WASA regarding the location and protection of existing water supply infrastructure and service connections.
- Verify the location of existing pipelines, valves, hydrants and associated infrastructure prior to excavation activities.
- Coordinate with T&TEC, telecommunications providers and other utility operators where construction activities have the potential to affect their infrastructure.
- Implement measures to minimise accidental damage to utility infrastructure during excavation and construction activities.
- Immediately notify the relevant utility provider where damage to utility infrastructure or service interruptions occur.
- Establish procedures for responding to utility strikes and restoring affected services as quickly as practicable.

- Maintain records of utility-related incidents, service interruptions and corrective actions undertaken.

H. Utility Conflicts and Coordination

- Identify utility infrastructure that may be affected by construction activities.
- Coordinate with utility providers prior to commencing works near existing utility infrastructure.
- Implement measures to minimise accidental damage to utility services.
- Report and respond promptly to utility-related incidents.

J. Utility-Related Complaints and Grievances

- Record and investigate complaints relating to utility interruptions and access restrictions.
- Implement corrective actions where required.
- Manage grievances in accordance with the SEGMP and Project Grievance Mechanism.
- Communicate investigation findings and corrective actions to affected stakeholders.

6.20.3 Monitoring and Compliance

The Contractor should monitor implementation of utility service interruption and access management measures throughout project implementation. Monitoring should include review of service interruption records, access restrictions, stakeholder complaints, reinstatement activities and corrective actions.

Any deficiencies identified should be corrected promptly and documented through the Project corrective action process.

Utility-related complaints, access concerns and non-compliance issues should be recorded, investigated and reported in accordance with Project requirements.

6.20.4 Indicators (KPIs)

The following KPIs should be used to monitor implementation of this Plan.

KPI	Monitoring Method	Frequency	Responsibility
Number of planned service interruptions communicated in advance	Notification records	Monthly	Contractor CLO
Number of unplanned service interruptions associated with Project activities	Incident records	Monthly	Contractor
Number of utility-related complaints received and resolved	Complaint records	Monthly	Contractor CLO
Number of access-related complaints received and resolved	Complaint records	Monthly	Contractor CLO
Number of properties requiring reinstatement	Reinstatement records	Monthly	Contractor
Number of reinstatement issues resolved	Reinstatement records	Monthly	Contractor

Number of corrective actions implemented for utility interruption and access issues	Corrective Register	Action	Monthly	Contractor
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6.20.5 Roles and Responsibilities

The roles and responsibilities for implementation of this Plan are outlined below.

Entity/Role	Key Responsibilities
WASA	Provide oversight of service interruption management; coordinate operational requirements; support service continuity planning; review significant utility-related complaints and incidents.
Contractor	Implement utility interruption and access management measures; coordinate access arrangements; undertake reinstatement works; maintain records; implement corrective actions.
Contractor CLO	Communicate planned service interruptions and access restrictions; coordinate stakeholder notifications; receive and track complaints and grievances.
Supervising Engineer	Monitor implementation of the Plan; verify compliance; review reinstatement activities and corrective actions.
Contractor HSE Personnel	Monitor implementation of access management measures; investigate incidents; maintain records and support reporting activities.
Project Workers	Comply with utility interruption and access management procedures and report incidents or concerns to supervisors.

6.21 Review and Updating of the SMP

This SMP is intended to be a living document and should be reviewed periodically throughout project implementation to ensure that management measures remain effective and responsive to changing project conditions.

The Contractor, WASA and the Supervising Engineer should be review the effectiveness of the SMP and its associated management plans based on monitoring results, inspections, incidents, grievances, stakeholder feedback and lessons learned during project implementation.

Where necessary, management measures, monitoring requirements and implementation arrangements should be updated to address emerging risks, unforeseen impacts or opportunities for improvement.

DRAFT

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.

6.21.1 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.
- Provide nighttime lighting and reflective tape for visibility.
- Install “Heavy Vehicles Turning”, and “Slow Down Construction Ahead” signs near community access roads.

- Notify local residents, schools, and businesses in the wider project area in advance of major transport.
- 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.

6.21.2 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.

6.21.3 Indicators

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

Table 6-12: 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

6.21.4 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 6-13: Roles and Responsibilities for Traffic Management

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.

ENTITY / ROLE	KEY RESPONSIBILITIES
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.

6.22 Project Components with Potential Land Acquisition and Livelihood Implications

The Hillsborough Water Treatment Plant and Transmission Main Project comprises two principal components with the potential to generate land access, land acquisition or livelihood-related impacts. These components are summarised in Table 5.

Table 5: Project Components with Potential Land Acquisition and Livelihood Implications

Project Component	Description	Potential Land Acquisition and Livelihood Considerations
Hillsborough Water Treatment Plant Development	Design and construction of a new 2.0 IMGD Water Treatment Plant at the Hillsborough Reservoir, including treatment units, storage facilities, chemical handling systems, sludge management facilities, administrative and operational buildings, mechanical and electrical infrastructure, drainage works, slope stabilisation, fencing, landscaping and associated site development works.	Based on information currently available, the Water Treatment Plant is expected to be constructed on lands adjacent to the existing facility and no additional land acquisition is currently anticipated. Temporary construction-related impacts may occur during implementation.
Transmission Main Infrastructure	Installation of a new transmission main and associated appurtenances required to convey treated water from the Hillsborough Water Treatment Plant to the existing water supply network. Three route alternatives have been identified, including alignments within public road reserves and rights-of-way and an alternative traversing forested lands.	Depending on the final alignment selected, potential impacts may include temporary occupation of land, temporary access restrictions, temporary disruption to livelihood activities, easements, rights-of-way or other land access requirements.

6.22.1 Hillsborough Water Treatment Plant Development

The proposed Water Treatment Plant component will be located at the Hillsborough Reservoir and is intended to improve potable water production, operational reliability and climate resilience within Tobago's water supply system. Based on information currently available, the facility is expected to be constructed on lands adjacent to the existing Hillsborough Water Treatment Plant and no additional land acquisition is currently anticipated. Nevertheless, temporary construction-related impacts may occur during implementation and will be managed in accordance with the provisions of this Plan.

6.22.2 Transmission Main Infrastructure

The Project includes the installation of a new transmission main and associated infrastructure required to connect the proposed Water Treatment Plant to the existing water distribution network. At the time of preparation of this Plan, the final alignment has not yet been confirmed. Three route alternatives have been identified, including two alternatives that generally follow existing public road reserves and rights-of-way and a third alternative that traverses forested lands to connect with the existing transmission network.

The final alignment selected will influence the nature and extent of any land acquisition, land access requirements, temporary occupation of land, access restrictions and livelihood-related

impacts. Consequently, the potential impacts associated with this component remain preliminary and will be further assessed during detailed design and route selection.

6.22.3 Potential Land Acquisition and Economic Displacement Risks

6.22.4 Current Status of Design Development

At the time of preparation of this Plan, detailed engineering design activities remain ongoing and final land requirements have not yet been confirmed. Preliminary information indicates that the proposed water treatment plant will have a similar footprint to the existing plant, while transmission infrastructure are expected to be either located within established road right-of-ways (ROWs) or through forest lands. Pipeline and network upgrade works are anticipated to be undertaken primarily within existing road reserves, public rights-of-way and utility corridors.

Consequently, the nature and extent of potential land acquisition, access restrictions and livelihood-related impacts cannot yet be fully quantified. This section therefore identifies potential risks and considerations that may require further assessment during detailed design and Project implementation.

6.22.5 Preliminary Land Requirements

Based on information currently available, the preliminary land requirements associated with the Project are summarised in Table 6. These requirements remain subject to refinement as detailed design, ROW investigations, cadastral verification and stakeholder engagement activities progress.

Table 6: Preliminary Land Requirements

Project Component	Preliminary Land Requirement	Current Status
Matura Water Treatment Plant and Intake Infrastructure	Lands adjacent to the existing Matura Water Treatment Plant and associated intake infrastructure	Final land requirements subject to detailed design and verification
Matura-Valencia Transmission Pipeline Infrastructure	Cross-country transmission corridor traversing private lands, State lands, agricultural lands, sand and gravel extraction areas, environmentally sensitive lands and protected areas	Final alignment, right-of-way requirements and land acquisition requirements remain under investigation
Salybia Component	To be determined	Detailed design and land requirements not yet confirmed
Temporary Construction Areas	To be determined	To be confirmed during detailed design and construction planning
Laydown Areas and Material Storage Areas	To be determined	To be confirmed during detailed design and construction planning
Temporary Access Arrangements	To be determined	To be confirmed during detailed design and construction planning

Preliminary investigations indicate that the transmission pipeline component may require land acquisition, easements, rights-of-way or other land access arrangements along portions of the proposed corridor. Current planning estimates suggest that multiple properties may potentially be affected; however, detailed design activities and land investigations remain ongoing and the final extent of any land acquisition or access requirements has not yet been determined.

In addition to privately owned lands, portions of the proposed corridor may traverse State-owned lands, protected areas and lands currently utilised for agricultural, extractive or other livelihood activities. Consequently, further investigations will be required to confirm land ownership, land use patterns, occupancy arrangements and the nature and extent of any potential impacts.

6.22.6 Potential Types of Land Acquisition

Depending on the final transmission main alignment selected and the requirements identified during detailed design, the Project may involve different forms of land access, land use or temporary land occupation. At the time of preparation of this Plan, the extent of any land acquisition or land access requirements has not yet been confirmed.

6.22.7 Permanent Land Acquisition

Based on information currently available, permanent land acquisition is not anticipated for the proposed Water Treatment Plant component, as the facility is expected to be constructed on lands adjacent to the existing Hillsborough Water Treatment Plant. However, the need for permanent land acquisition associated with the transmission main infrastructure will be confirmed following completion of detailed design, route selection and land ownership investigations.

6.22.8 Temporary Land Occupation

Temporary occupation of land may be required during construction for work areas, equipment staging, material storage, contractor facilities and temporary access arrangements. Depending on the final transmission main alignment selected, temporary occupation may occur within public road reserves, rights-of-way, forested lands or other areas identified during detailed design.

4.3.3 Easements and Rights-of-Way

The Project may require easements, access agreements, rights-of-way or other land access arrangements for the installation, operation and maintenance of transmission infrastructure. Where the preferred alignment follows existing public road reserves and rights-of-way, additional land access requirements may be limited. However, should the preferred alignment traverse lands outside existing public road reserves, additional land access arrangements may be required.

Table 7: Potential Land Access Requirements

Type of Requirement	Potential Application
Permanent Land Acquisition	Transmission infrastructure and associated facilities where required
Temporary Land Occupation	Construction work areas, laydown areas and contractor facilities

Easements and Rights-of-Way	Infrastructure installation, operation and maintenance where required
Temporary Access Arrangements	Construction access and movement of equipment and materials

6.22.9 Potentially Affected Land Users and Livelihood Activities

The Project has the potential to affect a range of land users, resource users and livelihood activities. At the current stage of Project development, the extent of any affected persons or livelihood activities has not yet been determined.

Potentially affected land users and livelihood activities are summarised in Table 8.

Table 8: Potentially Affected Land Users and Livelihood Activities

Category	Potential Relevance to the Project
Agricultural Users	Potential impacts where crops, trees or productive land are affected by temporary construction activities or land requirements.
Informal Land Users	Potential impacts on persons utilising road reserves, verges, public lands or other areas for livelihood or income-generating activities.
Commercial Enterprises	Potential impacts arising from temporary construction activities, traffic disruptions or restricted customer access.
Roadside Vendors	Potential impacts where vending activities occur adjacent to pipeline works, road reserves or construction areas.
Resident Occupants	Potential impacts where occupied properties are located within or adjacent to the final transmission main alignment.

Based on information currently available, residential displacement is not anticipated. However, this will be confirmed following finalisation of site selection, land ownership verification and detailed design activities.

6.22.10 Vulnerable Persons and Households

Certain individuals and households may be more vulnerable to Project-related impacts due to economic, social, physical or other circumstances that may reduce their ability to respond to or recover from disruptions. These may include:

- Elderly persons;
- Persons with disabilities;
- Female-headed households;
- Low-income households;
- Informal workers and vendors;
- Resource-dependent households;
- Social assistance recipients; and
- Persons with limited livelihood alternatives.

The identification of vulnerable persons and households will be undertaken during subsequent surveys, consultations and impact assessments where land acquisition, access restrictions or livelihood impacts are confirmed.

6.22.11 Potential Impacts

At the current stage of Project development, the nature and extent of impacts cannot yet be fully quantified. However, based on available information and the requirements of ESPS 5, the Project has the potential to generate the impacts summarised in Table 9.

Table 9: Preliminary Assessment of Potential Land Acquisition and Livelihood Risks

Impact Type	Classification	Potential Relevance
Physical Displacement	Loss of housing, land, structures or access to property that results in the need for relocation	Not currently anticipated but cannot be fully ruled out pending completion of route selection, land ownership investigations and detailed design
Economic Displacement	Loss of income, livelihoods, productive resources or livelihood opportunities resulting from Project activities	Potentially relevant
Temporary Business Disruption	Temporary restrictions on customer access, reduced visibility, traffic disruptions or temporary interruptions to business operations	Potentially relevant
Loss of Income	Temporary interruptions to commercial, agricultural, informal or other livelihood activities	Potentially relevant
Loss of Access	Temporary restrictions on access to properties, businesses, public spaces or other locations utilised for economic or livelihood purposes	Potentially relevant
Community-Level Economic Effects	Temporary changes in local traffic patterns, business activity and access arrangements during construction	Potentially relevant

Based on information currently available, the proposed Water Treatment Plant component is not expected to require additional land acquisition. However, the final transmission main alignment has not yet been confirmed and the extent of any land acquisition, access requirements or livelihood-related impacts remains uncertain.

Consequently, the principal risks currently identified relate to temporary access restrictions, temporary occupation of land, temporary economic disruption and potential impacts on agricultural users, informal land users, businesses and other livelihood activities. These risks will be further assessed and refined during detailed design, route selection and Project implementation.

6.23 Land Acquisition and Resettlement Framework

6.23.1 Avoidance and Minimisation Principles

Consistent with the requirements of ESPS 5, the Project should seek to avoid or minimise land acquisition, displacement and livelihood impacts through careful site selection, design optimisation and construction planning.

Where impacts cannot be avoided, measures should be implemented to minimise impacts and ensure that affected persons are treated fairly and equitably. Compensation, assistance 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.

6.23.2 Screening and Impact Identification

As detailed design progresses, all Project components should be screened to determine whether land acquisition, temporary land occupation, access restrictions or livelihood impacts may occur.

The screening process should include:

- Confirmation of final land requirements;
- Verification of land ownership and tenure arrangements;
- Identification of affected assets and land uses;
- Identification of affected land users and livelihood activities;
- Identification of vulnerable persons and households; and
- Determination of the nature and significance of potential impacts.

Table 10: Land Acquisition and Livelihood Screening Process

Step	Activity
1	Confirm final design and land requirements
2	Verify land ownership and tenure arrangements
3	Identify affected assets and land uses
4	Identify affected land users and livelihood activities
5	Identify vulnerable persons and households
6	Determine required mitigation, compensation and restoration measures

6.23.3 Land Acquisition Process

Where land acquisition or land access arrangements are required, the process should include verification of ownership and land use arrangements, stakeholder engagement, valuation, compensation and implementation of agreed measures prior to commencement of the relevant Project activities.

Table 11: Land Acquisition Process

Step	Description
Land requirement confirmation	Confirm land requirements based on final design
Ownership verification	Confirm ownership, occupancy and land use arrangements
Stakeholder engagement	Consult with affected persons and stakeholders
Valuation	Undertake valuation of affected assets where required

Compensation and assistance	Determine and implement applicable measures
Land access	Secure lawful access to affected lands
Monitoring	Monitor implementation and outcomes

Based on current Project information, permanent land acquisition is not anticipated for the proposed Water Treatment Plant component. However, the final transmission main alignment has not yet been confirmed and the need for land acquisition, easements, rights-of-way or other land access arrangements will be determined following completion of detailed design and route selection.

6.23.4 Census and Asset Inventory

Where impacts are identified, a census and asset inventory should be undertaken to identify affected persons, affected assets and affected livelihood activities.

The inventory may include:

- Land parcels;
- Structures and improvements;
- Crops and trees;
- Businesses and commercial activities;
- Informal livelihood activities; and
- Other affected assets or resources.

6.23.5 Socio-Economic Surveys

Where land acquisition, economic displacement or livelihood impacts are identified, socio-economic surveys may be undertaken to establish baseline conditions and inform compensation, assistance and livelihood restoration measures.

The surveys may include:

- Household characteristics;
- Sources of income and livelihoods;
- Land use and resource use patterns;
- Business activities;
- Vulnerability considerations; and
- Livelihood restoration needs.

6.23.6 Valuation Methodology

Valuation of affected assets should be undertaken using recognised valuation methods and, where required, qualified valuation professionals.

Valuation may include:

- Land;
- Structures and improvements;
- Crops and trees;
- Business assets; and
- Other affected resources.

Compensation should be determined in accordance with applicable national legal requirements and relevant IDB requirements.

6.23.7 Eligibility Criteria

Eligibility for compensation, assistance or livelihood restoration measures should be determined based on the nature of the impact and the status of the affected person, land user or livelihood activity.

Table 12: Preliminary Eligibility Categories

Category	Potential Eligibility
Legal landowners	Compensation and assistance where applicable
Leaseholders and tenants	Assistance and compensation where applicable
Residential Occupants	Assistance where occupancy or access is affected
Agricultural users	Compensation and assistance where applicable
Commercial enterprises	Assistance where business activities are affected
Informal land users	Assistance where livelihood activities are affected
Roadside vendors	Assistance where livelihood activities are affected

6.23.8 Entitlement Framework

The entitlement framework establishes the types of assistance 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 requirements
Temporary occupation of land	Restoration of land and compensation where applicable
Loss of crops or trees	Compensation where applicable
Temporary business disruption	Appropriate assistance measures where applicable
Loss of livelihood opportunities	Livelihood restoration measures where applicable
Temporary loss of access	Appropriate mitigation and assistance measures
Temporary disruption to residential access	Appropriate mitigation and access management measures

The final entitlement framework should be refined following completion of detailed design and impact identification activities.

6.23.9 Compensation Procedures

Where compensation is required, the following principles should apply:

- Compensation should be determined using appropriate valuation methods.
- Affected persons should be informed of applicable compensation arrangements.
- Compensation agreements should be documented.
- Compensation should be provided prior to commencement of activities resulting in the loss of assets, access or livelihood opportunities, unless otherwise agreed.

- Appropriate records should be maintained.

6.23.10 Special Assistance for Vulnerable Persons

Where vulnerable persons or households are identified, additional assistance measures may be provided to facilitate meaningful participation and reduce the risk of disproportionate impacts.

Such measures may include:

- Additional consultation and engagement;
- Assistance with accessing compensation processes;
- Additional livelihood support measures where appropriate; and
- Referrals to relevant social support services where appropriate.

6.23.11 Documentation and Recordkeeping

WASA should maintain appropriate records relating to:

- Land requirements;
- Asset inventories;
- Socio-economic surveys;
- Consultation activities;
- Compensation agreements;
- Grievances and resolutions;
- Livelihood restoration measures; and
- Monitoring and reporting activities.

Records should be maintained in accordance with applicable Project procedures and data management requirements.

6.23.12 Monitoring and Compliance

Implementation of the measures described regarding Land Acquisition and Resettlement be monitored throughout Project implementation to ensure compliance with this Plan, applicable national legislation and relevant IDB requirements.

Monitoring activities may include review of land acquisition records, asset inventories, compensation documentation, stakeholder engagement records, grievance records and implementation reports. Where monitoring identifies deficiencies or non-compliance, corrective actions should be implemented in a timely manner.

6.23.13 Indicators (KPIs)

Table 14 presents the key performance indicators that will be used to monitor implementation and effectiveness 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 requirements verified prior to acquisition or access	Review of land acquisition and design records	WASA
Affected persons and assets identified and documented	Census and asset inventory records	WASA / Supervising Consultant

Compensation agreements completed prior to land access	Review of compensation records	WASA
Land acquisition and compensation grievances resolved within established timeframes	Review of grievance records	WASA
Required mitigation, compensation and restoration measures implemented	Monitoring reports and site verification	WASA / Supervising Consultant

6.23.14 Roles and Responsibilities

Table 15 outlines the roles and responsibilities of the parties responsible for implementing, monitoring and reporting on the measures described in this section.

Table 15: Roles and Responsibilities for Land Acquisition and Resettlement

Party	Responsibility
WASA	Overall implementation of the Land Acquisition and Resettlement Framework and compliance with applicable requirements
Supervising Consultant	Monitoring, verification and reporting on implementation of framework measures
Construction Contractor	Compliance with approved land access arrangements and implementation of applicable mitigation measures
Commissioner of State Lands	Administration of State land matters where applicable
Qualified Valuation Professional	Valuation of affected assets where required
Contractor CLO	Stakeholder engagement, issue resolution and support to implementation activities

6.24 Livelihood Protection

6.24.1 Objectives

The objective of this section is to establish measures to avoid, minimise and manage livelihood-related impacts associated with Project construction and implementation.

Specifically, the Project should seek to:

- Avoid unnecessary disruption to livelihood activities;
- Maintain access to businesses, properties and economic activities wherever feasible;
- Minimise disruptions to agriculture and informal economic activities;
- Ensure timely communication regarding construction activities that may affect livelihoods;
- Identify and address livelihood-related concerns in a timely manner; and

- Reduce the potential for economic displacement during Project implementation.

6.24.2 Livelihood Risk Identification

Based on the current Project design, the principal livelihood risks are expected to arise from temporary construction activities, access restrictions, traffic disruptions and temporary occupation of land. The main livelihood activities potentially affected by the Project are summarised in Table 16.

Table 16: Potential Livelihood Risks

Livelihood Activity	Potential Risk
Businesses	Temporary restrictions on customer access, reduced visibility, parking restrictions, traffic disruptions and temporary interruptions to business operations.
Agriculture	Temporary impacts on crops, trees, productive land uses or access to agricultural areas where construction activities occur adjacent to agricultural lands.
Informal Economic Activities	Temporary impacts on roadside vending, small-scale trading and other informal income-generating activities occurring within road reserves, verges or public spaces.
Residential Occupants	Temporary access restrictions, construction disturbance and disruption to normal movement patterns.

The nature and extent of these risks will depend on the final design, construction methods, location of works and duration of construction activities. Potential impacts will be further assessed and refined as additional Project information becomes available.

6.24.3 Construction-Related Livelihood Protection Measures

The Project should implement livelihood protection measures throughout construction to minimise disruptions to affected persons and livelihood activities.

6.24.4 Advance Notification

Where construction activities have the potential to affect access, movement patterns or livelihood activities, advance notice should be provided to potentially affected stakeholders.

Notifications may include information regarding:

- Planned construction activities;
- Expected duration of works;
- Traffic management arrangements;
- Temporary access restrictions;
- Alternative access arrangements; and
- Contact information for Project representatives.

Where feasible, notifications should be provided prior to commencement of the relevant works.

6.24.5 Stakeholder Engagement

Affected stakeholders should be informed and consulted regarding construction activities that may affect livelihoods, access arrangements or economic activities.

Stakeholder engagement activities may include:

- Meetings with affected businesses;
- Engagement with roadside vendors and informal users;
- 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.

6.24.6 Traffic and Access Management

Traffic and access management measures should be implemented to minimise disruption to businesses, residents, road users and livelihood activities.

Measures may include:

- Phased construction scheduling;
- Temporary traffic management arrangements;
- Clearly marked alternative routes;
- Maintenance of pedestrian access;
- Provision of temporary access arrangements where required; and
- Coordination with relevant authorities regarding traffic management measures.

Construction activities should be planned to minimise unnecessary restrictions on access to businesses, properties and community facilities.

6.24.7 Business Access Protection

Where construction activities occur adjacent to commercial establishments, reasonable measures should be implemented to maintain business access and reduce disruption to business operations.

Measures may include:

- Maintaining customer and pedestrian access;
- Providing temporary access routes where necessary;
- Scheduling works to minimise disruption during peak business periods where feasible;
- Providing advance notice of activities that may affect business operations;

- Maintaining access for deliveries and service vehicles where practicable; and
- Responding promptly to business-related concerns raised through stakeholder engagement or grievance mechanisms.

6.24.8 Protection of Agricultural Activities

Where agricultural activities may be affected by temporary construction activities, measures should be implemented to minimise disruption and avoid unnecessary damage to crops, trees and productive land.

Measures may include:

- Delineation of work areas;
- Avoidance of unnecessary disturbance outside approved work areas;
- Restoration of temporarily occupied areas following construction; and
- Consultation with affected land users where required.

6.24.9 Protection of Informal Livelihood Activities

Where roadside vendors, informal traders or other informal livelihood activities may be affected, the Project should seek to minimise disruption through communication, planning and stakeholder engagement.

Measures may include:

- Advance notification of works;
- Identification of affected livelihood activities;
- Consultation regarding access requirements;
- Temporary relocation arrangements where feasible; and
- Consideration of livelihood restoration measures where impacts cannot be avoided.

6.24.10 Emergency Response Procedures

Where unforeseen Project activities result in significant disruption to access, business operations, livelihood activities or essential 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.

6.24.11 Communication and Public Information

Timely communication is essential to minimise disruptions to livelihoods and economic activities during Project implementation.

Information regarding construction schedules, access restrictions, traffic management arrangements, and other activities with the potential to affect livelihoods should be communicated to affected stakeholders through appropriate channels.

Stakeholder engagement and information disclosure activities should be undertaken in accordance with the Project SEP.

Information may be communicated through community meetings, stakeholder consultations, notices, signage, social media platforms, local media, direct engagement and other appropriate communication channels.

6.24.12 Grievance Management

Stakeholders should have access to the Project Grievance Mechanism (GM) to raise concerns relating to livelihoods, access restrictions, business disruption or other economic impacts.

All livelihood-related grievances should be managed in accordance with the procedures established under the Project Grievance Mechanism and Stakeholder Engagement Plan.

6.24.13 Monitoring and Compliance

Implementation of the livelihood protection measures described in this section should be monitored throughout Project construction to ensure compliance with this Plan and to assess the effectiveness of mitigation measures.

Monitoring activities may include site inspections, stakeholder consultations, review of grievance records, verification of access arrangements and assessment of issues affecting retail and vending businesses, and other livelihood activities.

Where monitoring identifies significant livelihood impacts or recurring issues, corrective actions and additional mitigation measures should be implemented as appropriate.

6.24.14 Indicators (KPIs)

Table 17 presents the key performance indicators that will be used to monitor implementation and effectiveness of the livelihood protection measures.

Table 17: Livelihood Protection KPIs

Key Performance Indicator	How Will It Be Monitored and Measured	Responsibility
Advance notifications issued prior to livelihood-affecting works	Review of notification records and stakeholder engagement records	Contractor / CLO

Access maintained to affected businesses and properties during construction	Site inspections and stakeholder feedback	Contractor
Livelihood-related grievances resolved within established timeframes	Review of grievance records	WASA
Livelihood protection measures implemented in accordance with this Plan	Site inspections and monitoring reports	Supervising Consultant / WASA

6.24.15 Roles and Responsibilities

Table 18 outlines the roles and responsibilities of the parties responsible for implementing, monitoring and reporting on the livelihood protection measures described in this section.

Table 18: Roles and Responsibilities for Livelihood Protection Measures

Party	Responsibility
WASA	Overall oversight and compliance with livelihood protection requirements
Supervising Consultant	Monitoring implementation and reporting on compliance
Construction Contractor	Implementation of livelihood protection measures and maintenance of access arrangements
Contractor CLO	Stakeholder communication, issue resolution and support to affected stakeholders
Affected Stakeholders	Participation in consultations and communication of livelihood-related concerns

6.25 Livelihood Restoration Framework

6.25.1 Objectives

The objective of this section is to address livelihood impacts that cannot be adequately avoided or mitigated through the livelihood protection measures.

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 activities;
- Provide additional support to vulnerable persons and households where required;
- Promote fair, transparent and consistent implementation of livelihood restoration measures; and
- Ensure compliance with applicable national legislation and relevant IDB requirements.

6.25.2 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 17: 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

6.25.3 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:

- Residential occupants affected by Project activities;
- Agricultural users;
- Commercial enterprises;
- Roadside vendors;
- Informal land users engaged in livelihood activities; and
- Other persons whose livelihoods are demonstrably affected by Project activities.

Eligibility should be determined through impact assessments, stakeholder engagement, socio-economic surveys and other relevant investigations undertaken by the Project.

6.25.4 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.

6.25.5 Temporary Income Assistance

Where Project activities result in demonstrable temporary income losses that cannot be avoided or adequately mitigated, temporary income assistance may be considered.

The nature and extent of any assistance should be determined based on:

- The severity and duration of the impact;

- The extent of income disruption;
- The vulnerability of the affected person or household; and
- The availability of alternative mitigation measures.

6.25.6 Business Continuity and Restoration Measures

Where businesses are affected by Project activities, restoration measures may include:

- Temporary access arrangements;
- Business access signage;
- Adjustments to construction scheduling where feasible;
- Temporary relocation assistance where appropriate;
- Communication and customer awareness measures; and
- Other site-specific measures intended to support continuation of business operations.

6.25.7 Agricultural Compensation and Reinstatement Measures

Where agricultural activities are affected, restoration measures may include:

- Compensation for affected crops, trees or productive assets where applicable;
- Restoration of temporarily occupied agricultural land;
- Reinstatement of access arrangements;
- Rehabilitation of disturbed areas; and
- Other measures appropriate to the nature of the impact.

6.25.8 Assistance for Informal Livelihood Activities

Where roadside vendors, informal traders or other informal livelihood activities are affected, restoration measures may include:

- Temporary relocation assistance where feasible;
- Support for re-establishing activities following construction;
- Enhanced communication and engagement;
- Temporary access arrangements; and
- Other measures appropriate to the nature of the impact.

6.25.9 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.

6.25.10 **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.

6.25.11 **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

6.25.12 **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
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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

6.26 Cultural Heritage Management Plan

6.26.1 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.

6.26.1.1 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.

6.27 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 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 outlined 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 an 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.

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8 Appendices

Appendix 1: 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		

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.

Appendix 2: 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.

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.

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: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 ^o 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 ^o 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

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Appendix 3: 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

Appendix 4: 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

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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

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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

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PESTICIDES/ HERBICIDES		PROTECTION OF AQUATIC LIFE & AQUATIC ECOSYSTEMS	WATER SUPPLY	RECREATIONAL USE
51	PCBs ($\mu\text{g/L}$)	≤ 0.014	≤ 0.5	Not Applicable
52	Toxaphene ($\mu\text{g/L}$)	≤ 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 ($\mu\text{g/L}$)	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 ($\mu\text{g/L}$)	≤ 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 ($\mu\text{g/L}$)	≤ 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 ($\mu\text{g/L}$)	≤ 27 (short term); ≤ 0.8 (long term)	≤ 280	Not Applicable
64	Malathion ($\mu\text{g/L}$)	≤ 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 ($\mu\text{g/L}$)	≤ 5.8	Not Applicable	Not Applicable
71	Anthracene ($\mu\text{g/L}$)	≤ 0.012	Not Applicable	Not Applicable
72	Benzo[a]anthracene ($\mu\text{g/L}$)	≤ 0.018	Not Applicable	Not Applicable
73	Benzo[a]pyrene ($\mu\text{g/L}$)	Not Applicable	≤ 0.01	Not Applicable
74	Fluoranthene ($\mu\text{g/L}$)	≤ 0.04	Not Applicable	Not Applicable

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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

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	$\leq 100,000$

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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

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

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 5: 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 another^[2].

- **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.**

Sexual Harassment versus SEA^[4]

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 Conduct^[5] 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:
 - o 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.
 - o A worker that is connecting electricity input to households says that he can connect women headed households to the grid in exchange for sex.
 - o A project worker gets drunk after being paid and rapes a local woman.
 - o A project worker denies passage of a woman through the site that he is working on unless she performs a sexual favor.
 - o A manager tells a woman applying for a job that he will only hire her if she has sex with him.
 - o 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 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:
 - o Male staff comment on female staffs' appearances (both positive and negative) and sexual desirability.
 - o 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.
 - o A male manager touches a female staff members' buttocks when he passes her at work.
 - o 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.
- **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: _____

^[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

^[4] Ibid

^[5] In accordance with the United Nations Convention on the Rights of the Child.

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, HEALTH, SGRC DISASTER UNIT)	Access routes; emergency coordination protocol	Email; briefings	Before major works	WASA

GENERAL PUBLIC	Project updates;	Local radio;	Monthly	WASA
THE MEDIA	progress; water service changes	posters; media	social	

Appendix 7: 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.)

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