Environmental and Social Assessment for Rehabilitation of the Chatham Water Treatment Plant and Drilling of Chatham #15 Well

Prepared by:

WATER & SEWERAGE AUTHORITY

For:

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National Water Sector Transformation Program

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Table of Contents

List of Figures

List of Tables

List of Acronyms

ARP	Air Pollution Rules
AWWA	American Water & Wastewater Association
CBO	Community Based Organization
CEC	Certificate of Environmental Clearance
CRO	Community Relations Officer
CSO	Central Statistical Office
CTTRC	Couva Tabaquite Talparo Regional Corporation
EA	Executing Agency
EM Act	Environmental Management Act
EMA	Environmental Management Authority
ERP	Emergency Response Plan
ESA	Environmental & Social Assessment
ESA	Environmentally Sensitive Area
ESMF	Environmental & Social Management Framework
ESMP	Environmental & Social Management Plan
ESS	Environmentally Sensitive Species
FRM	Facility Risk Management
GORTT	Government of the Republic of Trinidad and Tobago
GPS	Global Positioning System
HASP	Health & Safety Plan
IADB	Inter-American Development Bank
IFC	International Finance Corporation
LRRP	Livelihood Restoration & Resettlement Plan
MPU	Ministry of Public Utilities
MSDS	Material Safety Data Sheet
NEP	National Environmental Policy
NGO	Non-governmental Organization
NIDCO	National Infrastructure Development Company Limited
NIPDEC	National Insurance Property Development Company Limited
NIWRMP	National Integrated Water Resources Management Plan
NPCR	Noise Pollution & Control Rules
OP	Operating Policy
OSHA	Occupational Safety & Health Agency
PEU	Project Implementing Unit

PPE	Personal Protective Equipment
PTSC	Public Transportation Service Commission
PVC	Poly Vinyl Chloride
SPC	Special Purpose Company
T&TEC	Trinidad & Tobago Electricity Commission
TO&G	Total Oil & Gas
TSS	Total Suspended Solids
WASA	Water and Sewerage Authority
WMP	Waste Management Plan
WQ	Water Quality
WRA	Water Resources Agency
WTP	Water Treatment Plant

Part 1 – Environmental & Social Assessment (ESA)

1.0 Introduction

The Water and Sewerage Authority (WASA) is responsible for the supply of water and sewerage services to the population of Trinidad and Tobago. However, over the years there have been ever increasing challenges in meeting this mandate resulting a reduction in both the quantity and quality of supply to the areas served. Ageing infrastructure resulting in increased non-revenue water (NRW) and the effects of climate change have significantly impacted the volume of water available leading to water scheduling with some areas receiving a supply once every nine days.

The Authority seeks to address this situation and improve supply to the affected areas to a 24-hour supply at least three days per week through the development of several projects across the twin islands. These projects include the drilling of six (6) new wells to provide an additional supply to underserved areas, the rehabilitation of five (5) water treatment plants, the establishment of two (2) new water treatment plants and five (5) pipeline projects will form part of wider National Water Sector Transformation Project.

The Inter-American Development Bank (IADB) was approached by the Government of the Republic of Trinidad & Tobago (GORTT) with the Ministry of Public Utilities (MPU) as the executing agency, to secure funding, in part, for this National Water Sector Transformation Project to address the on-going problem of an inadequate supply of potable water. The proposal was submitted to the IADB for consideration to access funding under the IADB Conditional Credit Line for Investment Projects (CCLIP). The project was accepted and the loan, TT-L1055, was approved on 2022-12-14. Subsequently the Loan contract agreements between the Government of the Republic of Trinidad & Tobago (GORTT) and the IADB were signed on 2023-03-07.

As a conditions precedent, programmatic Environmental & Social Assessments (ESAs) and Environmental & Social Management Plans (ESMPs), for the specific projects, guided by the IADBs ESA and ESMP Frameworks prepared for the TT-L1055 loan, must be completed, and no objection approval granted by the IADB, before the project can progress.

As such this ESA & ESMP focuses on the **Rehabilitation of the Chatham Water Treatment Plant and Drilling of the Chatham #15 Well including the associated pipeline only.**

1.1 Background/Rationale

The Chatham WTP is a groundwater treatment facility located at LP No. 1973 Southern Main Road, Chatham in the South West part of Trinidad. The Plant was commissioned in the year 1983 and upgraded under the South Water Project in the year 1999. It has a Design Capacity of 13,636 m3/day (3.0 IMGD) and supplies potable water to approximately 7,071 households (23,333 persons), comprising of both domestic and commercial customers from Quarry Village, Rancho Quemado, Bennet Village, Santa Flora, Palo Seco, St Francis Village, Erin, Sheila Lamorell Gardens, Dickie Trace, Los Bajos, Waddle Village, Chatham North, Chatham South, Boodram Trace, Point Coco, Unity Road, Augustusville, Coromandel Road, SMR from Cap De Ville Junction to Point Coco Extension Junction and the Cap De Ville Storage Reservoir.

The facility is over thirty-seven (37) years old and equipment at the facility are in dire need of major repairs/replacement. Due to the present condition of assets, production has reduced to approximately

1.8 IMGD and it has become challenging to maintain the design capacity and reliability of service to the customers served by the Chatham WTP.

Often, settlements, particularly those on the extremities of the distribution network, face challenges in receiving a regular supply of water. Thus, apart from Chatham North, Chatham South and Point Coco which receive a 24 /7 supply, all the other villages and supply zones have been placed on temporary water schedules of once every nine (9) days.

There is a new production well to be drilled (Chatham #15) for the purpose of providing an additional estimated daily yield of 1000m^3/d (220,000 igpd). Water from this well will be sent to the Chatham Water Treatment Plant via a proposed 1.5 km of 100 mm polyvinyl chloride (PVC) transmission pipeline that will interconnect with the existing transmission main along the Southern Main Road.

This increased availability of water, along with the planned refurbishment works, should enable the Chatham Plant to return to its designed capacity of 3.0 IMGD. This would translate to the Authority progressing towards its goal of achieving a 24/3 supply to the underserved and communities receiving a potable pipeborne supply of water more regularly.

Benefits to the public include:

- Increase in the plant's efficiency and reliability of service
- Ensure consistent water quality meeting the WHO guidelines to the customers served by the Chatham WTP.
- To alleviate health and safety concerns.
- Reduced costs as persons/business may no longer have to purchase water from private suppliers.
- Potential for increased local economic benefits – more or expanded businesses, agricultural activities in area, increased need for labour etc.

1.2 Overview of the Scope of Works

1.2.1 Rehabilitation of the Chatham WTP

Due to the present dilapidated condition of plant assets, the construction of a new clarifier, aerator, chemical building and related works are intended to increase the plant's efficiency and to ensure consistent water quality meeting the WHO guidelines to the residents served by the Chatham Water Treatment Plant.

The general scope of works associated with the works are:

Pre-construction:

- Design of new High-Rate Clarifier (Two Trains, Duty/Standby arrangement)
- Design of new Aerator
- Site Preparation
- Slope Stability and Erosion Protection Measures
- Establishment of site boundaries
- Designation of storage areas

- Mobilization of site support/ancillary equipment
- Decommission and Removal of the existing clarifiers No. 1 and No. 2

Construction

- Construction of new High-Rate Clarifiers
- Construction of new Aerator
- Construction of new complete Chemical Room and related infrastructure
- Interconnection process piping for Aerator, Clarifier and Chemical Room
- Interconnection instrumentation and control the existing Chatham WTP
- Interconnection of electrical works for Aerator, Clarifier and Chemical Room to the existing Chatham WTP
- Refurbishment of Filters
- Refurbishment of Clearwell
- Sludge pond to be cleaned
- Site access walkway and drainage works

1.2.2 Drilling of Chatham #15 Well

The general scope of works associated with this well is as follows:

Pre-construction:

- Removal of vegetation and site clearing
- Establishment of site boundaries
- Designation of storage areas
- Mobilization of drill rig
- Mobilization of site support/ancillary equipment

Construction

- Drilling, development and equipping of the proposed well.
- Construction of the associated well kiosk to house controls and electrical panels
- Testing and commissioning of the well
- Civil works – installation of fencing, lighting etc.
- Installation of the associated transmission pipeline within the ROW of Bobby Trace and the Chatham North Trace Road, utilizing the verge where available

1.3 Analysis of Alternatives

1.3.1 No Action/ Project

If the project is not implemented, the issues related to disruptions and scheduling of water supply, will continue to plague the project area and all other areas served by the Chatham Water Treatment Plant (WTP), and the corresponding issue of an unreliable 24/7 water supply will also continue. The projected impacts of climate change are expected to result in overall lower rainfall amounts and increased temperatures (increased evaporation) and thus reduced volumes of water in surface water sources. If

this is coupled with continued over-abstraction of surface water, it can result in deleterious effects on the country's water resource in the long run.

As indicated, the existing plant and equipment are old, obsolete and requires frequent maintenance. This results in frequent breakdowns which affect the supply to the consumers. Thus, no action will also result in further deterioration of the asset and failure to maintain potable Water Quality Standards.

1.3.2 Alternative Project

The use of surface water instead of groundwater could be considered, however surface water quality in this watershed is limited and may be impacted by anthropogenic activities – runoff from agricultural activities, sand mining, extensive use of septic tank and soakaway systems (no central sewers) - and as such water quality may be negatively impacted. Additionally, the existing WTP serving the area is designed for the treatment of groundwater and as such, surface water with varying levels of contamination (usually more than groundwater) will require an additional WTP and the associated costs of construction and operation of same.

The effects of climate change on surface water stores can also affect the volume of water available for safe abstraction for the maintenance of ecological flows. In the long-run, a new WTP may still not be able to meet demands which are highest in the Dry Season, incidentally, when the surface/raw water supply may be the lowest.

2.0 Approach/Method Statement

An initial desktop review of existing information was conducted with the view to identify any information and/or data gaps that existed as well as areas that required further investigations. This was used to describe the general environmental and socio-economic baseline conditions of the region in which the projects are located. Rapid field surveys were undertaken at the proposed site of the Chatham #15, along the pipeline route from the well to its point of interconnection with the existing transmission main and around the general vicinity of the Chatham Water Treatment Plant. The Environmental Assessment is intended to include but is not limited to the following:

2.1 Desktop Review

A review of all available environmental documentation for the sites, including CEC applications, environmental assessments, topographical maps, hydrogeological studies, engineering/technical drawings and site photographs, drainage plans, permits and approvals, plans for mitigation and monitoring of impacts and risks.

2.2 Limitations

As water production well projects are small – works are confined to a single lot of land (5000sq ft) with primarily short term impacts on the public, therefore, extensive environmental assessments are not typically conducted. The refurbishment works at the Chatham WTP are to be conducted onsite, within the existing plant boundaries, therefore, no new area is to be cleared. Hence, the analysis of such works

is focused mainly on the project design and sustainability. Where information is provided on the general environmental and socio-economic baseline conditions it is based on reports from other entities and as such the findings of this report, are contingent upon their validity and interpretations made from the reviewed reports and documents. The rapid field surveys did not allow for a more thorough assessment of each household characteristics along the pipeline route. Thus, professional judgment was made based on visual observations and comparison against documented data for the Siparia Region.

3.0 Project Description

The following describes the general scope works to be done for the proposed new Chatham #15 well.

3.1 General Preliminary Works

1. Site Clearing and grading
2. Mobilization and temporary facilities.
3. Insurances and bonds.
4. General Maintenance & site controls
5. Control and maintenance of traffic during transport of equipment to site
6. All health safety and environmental requirements as per the Certificate of Environmental Clearance in for the project, as well as to satisfy the requirements of OSHA.
7. Commissioning and hydraulic testing of all components.
8. Relocation/Removal of utilities if necessary.
9. As-Built Drawings – Measure and record details of work to be concealed when completed inclusive of utilities and structures.
10. Project Documentation – To be inclusive of As-built drawings, Operations and Maintenance Manuals, schedules, method statements etc.
11. Public communication, temporary works and testing of materials and works.

3.2 Construction

3.2.1 Well Drilling

There are several methods available for the drilling of a well; the particular drilling method used differs because geological conditions vary from hard rock to completely unconsolidated sediments such as alluvial sands and gravels. Although particular methods have been more widely used than others, the drilling method is also dependent on the depth and diameter of the well, type of formation to be penetrated, the sanitation requirements and the principal use of the well. The two main drilling methods employed by the Authority in the drilling of the production wells and test holes are:

1. The Mud Rotary/Direct Rotary Method
2. The Air Drilling System.

The Mud Rotary method is the preferred method to be used at the Freeport Wells sites.

1. Drilling of a borehole using rotating bits – drag and roller bits
2. Use of under-reamers to straighten and clean the borehole and reamers to enlarge the borehole diameter beneath the filter pack. The Chatham #15 well will have a diameter of 43.18cm and a depth of at least 457m.
3. Fabrication of Well Liner in accordance with design and specifications. This consists of Casings and Screens that will be placed in the borehole, centralizers should be placed every 12.2m (40ft)

on the casing to ensure that there is a uniform annular space around the casing. All Casings and Screens are required to meet AWWA (American Water Works Association) and ASTM (American Society for Testing and Materials)

4. Installation of Well Liner, backwashing of the well and installation of the Gravel Pack. The size of this annular space should have a diameter that is 4 to 8 inches larger than the casing.

3.2.2 Well Development

Well development involves the use of the following methods:

- Backwashing,
- Air-Lifting,
- Jetwashing and Surging using a pump.

The mud-dispersant SAPP (Sodium Acid Pyrophosphate) will be used for the removal of the drilling fluid, Aqua-Gel.

3.2.3 Well Disinfection

All water that seeps into the ground is contaminated to some degree as it may pick up carbon dioxide, minerals, bacteria and inorganic compounds from both the atmosphere and the soil. As such disinfection of the well is required to ensure a sanitary supply of water.

1.0 Use of granular chlorine in the form of calcium hypochlorite for disinfection
2.0 Mixing of the calcium hypochlorite with water and pumping the solution down into the well and around the screens.
3.0 After a fixed duration of approximately 24hrs, pumping out of the disinfecting water.
4.0 Repetition of the process to ensure that the well is properly disinfected.

3.2.4 Associated Works for the Well

Electrical:

- Installation of a motor control center
- Installation of a Variable Speed Drive
- Installation of Relays – overload, phase failure, under / over voltage, ground fault, auxiliary.
- Installation of Voltmeter, Ammeter; panel type and Current transformers
- Installation and connection of Voltmeter, phase and line selector switch
- Installation and connection of Ammeter, phase selector switch
- Installation and connection of Start, stop and reset buttons
- Installation and connection of Off / Hand / Auto selector switch
- Installation and connection of a distribution panel complete with main breaker, distribution breakers to the motor control centers, for lighting and for outlets.
- Installation and connection of a double fluorescent lighting fixture and duplex outlets inside each section of the building.
- Installation and connection of a meter base and a service pole and arrange for T&TEC power connection to the starter building.

- Installation and connection of all cables for the complete electrical and control wiring of the station.
- Installation and connection of an automatic wash-out system
- Installation and connection of a flow meter
- Installation and connection of a Local Control Panel
- Installation and connection of a SCADA system

Instrumentation & Controls

- Installation and connection of a lockable steel panel complete with a high-pressure discharge switch.
- Installation and connection of all interconnecting control cables from the panel to the motor control center protected in conduits.
- Installation and connection of all line pressure gauges
- Installation and connection of a magnetic type flow meter on the discharge pipeline

Civil Works

- Construction of a starter
- Construction of an electrical kiosk
- Landscaping and planting of grass on the fenced compound;
- Painting of station and WASA logo and station title on the wall of the control room;
- Paving and fencing of the compound and driveway; and the construction of a concrete plinth around the well
- Fabrication and installation of entry gate

Mechanical Works

- Install and connect one (1) submersible deep-well pump and motor complete with column assembly and crossover
- Fabricate and install wellhead assembly
- Install spare deep well pump set
- Fabricate and install well head manifold
- Install High Pressure Switch
- Install two (2) pressure gauges one to monitor well head pressure and one to monitor system pressure

The anticipated duration of all works is four (4) months.

3.2.5 Pipeline installation

The open cut trench construction method will be employed for the installation of the pipelines. This method is commonly used to install pipelines beneath the ground or street surface. The installation consists of trenching, laying the pipe, backfilling the trench, compacting the fill, and restoring the ground surface. To facilitate the installation of 1.5 km of 100 mm PVC pipeline, the trench will have a depth of at

least 1.0 meter and a width of 200 - 350mm. The length of open trench during construction would typically be equivalent to a single day's installation of pipe.

1. Trenching:
   - Roadways will be carefully marked to highlight the positioning of the trench. Where pipeline will be installed in the verge, markers will be placed instead to highlight the trench position.
   - Overlying asphalt cut to a straight edge using an asphalt saw and removed by an excavator.
   - An excavator with a $3ft^3$ bucket will then proceed to excavate a trench to a depth of 1.0 meter and a width of 350mm.
2. Installation of the pipeline:
   - Backfilling of trench with sandfill to a depth of 100mm,
   - Placement of pipeline in the trench then
   - Complete backfilling.
3. Restoration of road:
   - Placement of a 150mm layer of base-course (granular imported material grade A) on top of the sub-base followed by the final asphalt wearing surface course.
4. Bridge crossings
5. Culvert crossings
6. Utility crossings
7. Hydrostatic/pressure and water tightness testing
8. Disinfection of the proposed pipeline in accordance with American Water Works Association (AWWA) C651 standard.

The expected duration for completion of the pipeline works is four (4) months

3.2.6 Rehabilitation of the Chatham Water Treatment Plant

It is proposed that all of the works will be of a Design/Build nature and as such a detailed methodology will only be available pending the selection of a suitable contractor and the subsequent preparation and approval of designs. Hence, the following provides a general approach to the performance requirements for each of the major works:

Aerators

The existing Tray Aerator complete with supporting steel structure is in a dilapidated condition. The louvered enclosure placed around the Aerator was removed to undertake emergency repair works on the unit; however it was not re-installed. Currently, spillage of water impacts negatively on the structure, accelerating algae growth which created an additional slip hazard especially for personnel entering the area to conduct routine checks.

As such the existing structure will be removed and new two-train aerator will be installed.

New High Rate Clarifier

The existing Clarifier No. 2 has been out of operation since 2018; the Sludge Scraper Mechanism is completely detached due to severe corrosion and urgently needs to be replaced. As such, all physical

components of the Clarification System including the Steel Shell, Internal Components (flocculator, coagulation basin, rapid mixer), Influent Line from the Aerator to Clarifier No. 2, Effluent Line from Clarifier No. 2 to the Filter Inlet, Drive Units, all Ancillary Electrical and Mechanical Components and the defective Desludging Valves were all completely removed.

These will be replaced with newly designed two-train clarifier inclusive of flash mix and flocculation sections, Tube or plate settlers, sludge collection system (hopper bottom design), instrumentation and appurtenances. The works will include the design, supply and installation of an integrated coagulation/ flocculation/clarification system. The system will operate under a duty stand by arrangement to ensure continuous operation of the plant under excessively turbid conditions as well as during maintenance.

New Chemical Room

A new lime dosing, mixing and storage building will be constructed. The coagulant mixing and dosing system shall consist of a coagulant mixing tank and coagulant dosing tanks; both with a capacity for 3 days storage as well as associated metering pumps, mixers and new piping/diffuser systems. The coagulant mixing and storage tanks shall be enclosed in a bond wall capable of receiving accidental spills or overflows. A common receiving bond will be provided for each group of compatible chemicals, which provides sufficient containment volume to prevent accidental discharge in the event of failure of the tanks

Decommission and Removal of the existing clarifiers No. 1 and No. 2

The existing steel clarifiers No. 1 and No. 2 are to demolished and removed inclusive of all related tank shell, internal components and decommissioned pipework. The existing clarifier tank hopper bottom and related effluent interconnection port will be filled in and site filled in and levelled with appropriate non-shrinkable material.

Refurbishment of Four (4) Filters

Since the filters and their steel structures are becoming corroded, they will be refurbished including the existing external shells, internal components (laterals, strainers/nozzles support structures etc.) and related interconnecting pipework infrastructure at the Chatham WTP. The existing filters are of the Automatic Valveless Gravity (AVG) design and will be restored to their required design parameters. The old filter media will be removed and landfilled while new filter sand and anthracite media will be installed

in accordance with the underdrain manufacturer instructions and the requirements of AWWA B100 latest edition. In addition, each filter cell will be disinfected in accordance with the requirements of AWWA B100 and the ten state standards.

Cleaning of Sludge Pond

The existing sludge pond which is used to handle filter backwash water will be cleaned and rehabilitated. The excavated material from the sludge pond shall be removed and allowed to be dewatered, after

which it will be disposed off at the nearest landfill. All dewatering will occur onsite with silt fences installed to minimise runoff of silted material.

The rehabilitation works proposed for the Chatham WTP is expected to be of six (6) months duration.

4.0 Legislative Framework

4.1 Policy Statement

All aspects of the Projects will be managed in accordance with the Executing Agency/MPU/WASA HSE policies, industry best management practices, international and local standards as well as the specific HSE Design Standards for the project. In addition, MPU/WASA are committed to conducting its business in a manner which:

- Ensures that all facilities are designed, constructed, commissioned, maintained and operated to high and consistent standards and in accordance with national policies.
- Complies with the requirements of the EMA and OSHA.
- Meets the Environmental & Social policy and safeguard requirements of the IADB; and
- Is compatible with the balanced economic and environmental needs of the community.

4.2 National Laws & Policies, International Treaties & Conventions and IADB Environmental and Social Safeguards

There are several national laws and policies which fall under different government agencies that apply to the design, construction and operation of the proposed water wells in Trinidad & Tobago. The primary legislation that applies to environmental protection and conservation is the Environmental Management Act, 2000 (EM Act, 2000) which is enforced by the Environmental Management Authority (EMA). Secondary legislation under the EM Act, 2000 which would apply to this project includes the Certificate of Environmental Clearance Rules, 2001 as well as the Noise Pollution & Control Rules, 2001.

Trinidad & Tobago is also a signatory to a number of international treaties and conventions which relate to environmental and socio-economic management. This project as well as the ESA and ESMP is intended to be consistent with the national legislation, international treaties and conventions as well as IADB and International Finance Corporation (IFC) protocols and policies. Table 1 below provides a summary listing of the legal requirements.

Table 1: Summary Listing of Legal Requirements

National Laws & Policies	International Treaties & Conventions	Inter-American Development Bank Policies
Environmental Management Act (EM Act) 1. Certificate of Environmental Clearance Rules (CEC Rules) 2. Water Pollution Rules (WPR) 3. Noise Pollution Control Rules	*UNESCO Convention for the Protection of the World Cultural and Natural Heritage (World Heritage Convention)*	OP-102: Access to Information Policy (April 2010). The Chatham ESA and ESMP must be made publicly available inclusive of strategies, project

National Laws & Policies	International Treaties & Conventions	Inter-American Development Bank Policies
(NPCR) 4. Environmentally Sensitive Areas Rules (ESA Rules) 5. Environmentally Sensitive Species Rules (ESS Rules) 6. Air Pollution Rules (APR) 7. Waste Management Rules (WMR)		procurement documents, operating manuals and project completion reports.
Water and Sewerage Act (WASA Act)	*United Nations Convention on Biological Diversity, UNCED*	OP-703: Operational Policy on Environment and Safeguards Compliance (January 2006) and Guidelines (May 2007). See Table 2 below.
Waterworks & Water Conservation Act	*The 2030 Agenda*	OP-704: Operational Policy on Natural Disaster Risk Management (February 2007) and Guidelines (March 2008). This project is required to consider the necessary measures to reduce disaster risk to acceptable levels as determined by the Bank. A Disaster Risk Assessment is considered as part of the ESA.
Occupational Safety and Health Act (OSH Act)	*United Nations Framework Convention on Climate Change (UNFCCC) Gender Action Plan*	OP-708: Public Utilities Policy (November 2013). This project is a public utilities project (water and sanitation) and aligns with the general Policy Principles of access, good governance, efficiency, innovation and environmental sustainability
Forests Act		OP-761: Operational Policy on Gender Equality in Development (November 2010) and Guidelines (September 2013. A Stakeholder Engagement Strategy and Plan has been prepared.
Fisheries Act		
Plant Protection Act		
Conservation of Wildlife Act		

National Laws & Policies	International Treaties & Conventions	Inter-American Development Bank Policies
National Trust of Trinidad and Tobago Act		
Freedom of Information Act		
Municipal Corporations Act *State Lands (Regularization of Tenure) Act*		
Town and Country Planning Act		
Industrial Relations Act		
Land Acquisition Act		
Minerals Act		
Mines, Quarries & Borings Act		
Motor Vehicles and Road Traffic Act		
Planning and Facilitation Development (PAFD) Act		
Public Health Ordinance		
National Environment Policy (NEP)		
Integrated Solid Waste Management Policy		
National Oil Spill Contingency Plan		
National Integrated Water Resources Management Policy		
(WASA) Water and Wastewater Design Guideline		
National Protected Areas Policy		
National Forest Policy		
National Policy on Gender and Development (draft)		
National Spatial Development Strategy (NSDS)		
National Climate Change Policy (NCCP)		

Of importance is the IDB's OP-703: Operational Policy on Environment and Safeguards Compliance which guides the environmental quality of the Bank's operations and its support to environmental projects in the Latin American and Caribbean region. Contained within are the policy directives related to both environmental mainstreaming and safeguards. The environmental safeguards establish procedures and standards to ensure quality and the environmental sustainability of both public and private sector operations. The principal policy directives are outlined in the Table 2 below. A brief description is provided along with it is relationship of each directive to the project.

Table 2: Application of OP-703 Policy Directives on Environmental and Safeguards Compliance

Directive	Description	Relationship to the Project
B1	Bank Policies - The Bank will only finance operations and activities that comply with the	Proposed project will comply with the necessary environmental provisions contained within the applicable Bank Policies including:

Directive	Description	Relationship to the Project
	directives of this Policy, and consistent with the relevant provisions of other Bank policies.	OP 102 – Disclosure of Information Policy OP-704: Operational Policy on Natural Disaster Risk Management OP-708: Public Utilities Policy OP-761: Operational Policy on Gender Equality in development
B2	Country Laws & Regulations - The Bank will require the project is designed and carried out in compliance with environmental laws and regulations of Trinidad and Tobago including national obligations established under ratified Multilateral Environmental Agreements (MEAs).	Proposed project complies with local laws and regulations: Certificates of Environmental Clearance (CEC) have been issued by Environmental Management Authority in accordance with the CEC Rules, 2001. These are provided in Annex A of the ESMP All works will be undertaken in accordance with the Noise Pollution Rules, 2001 All discharges from the Chatham Water Treatment Sludge Pond will be in compliance with the Water Pollution Rules, 2019
B3	Screening & Classification - All Bank-financed operations will be screened and classified according to their potential environmental impacts.	Proposed project has been screened and classified at Category B which requires the need for an Environmental and Social Assessment and an Environmental and Social Management Plan (ESMP). A Strategic Environmental and Social Assessment (SESA) and an Environmental and Social Management Framework (ESMF) has also been prepared which guides the preparation of the ESA & ESMP.
B4	Other Risk Factors - In addition to risks posed by environmental impacts, the Bank will identify and manage other risk factors that may affect the environmental sustainability of its operations.	Vulnerability to disasters identified as potential risk and as such Disaster Management has been considered and plan developed in Annex E of the ESMP.
B5	Environmental Assessment Requirements are prepared in accordance with the IDB guidelines.	As the project is Category B, ESA and ESMP documents have been prepared to address environmental and social impacts of the project These will be reviewed and approved by the Bank prior to the selection of contractors and execution of works.
B6	Consultations - As part of the environmental assessment process, Category “A” and “B” operations will require	Category B classification requires consultation, A Public Consultation Plan has been outlined in section 7.0 of the ESA based on a Stakeholder Analysis and Stakeholder Engagement Process provided in Annex K. These have

Directive	Description	Relationship to the Project
	consultations with affected as well as other interested parties and consideration of their views and expertise.	been developed for implementation upon non-objection of the Bank.
B7	Supervision & Compliance-The Bank will monitor the executing agency/borrower's compliance with all safeguard requirements stipulated in the loan agreement and project operating or credit regulations.	Requirement for implementation of environmental safeguards, plans, policies included in Tender and Contract documents, budgetary allocations for monitoring and reporting also made a requirement. Safeguard indicators, as appropriate, will be clearly defined in the logical/results framework, followed up in project monitoring reports and reviewed in mid-term reviews and project completion reports. Annexes I & J describes how the Contractor will be managed including key performance indicators and process for corrective actions.
B8	Transboundary Impacts -The environmental assessment process will identify and address, early in the project cycle, transboundary issues associated with the operation.	**Not Applicable** as the proposed project does not require the use of any other country's resources – waterways watershed, coastal marine resources etc.
B9	Natural Habitats & Cultural Sites - The Bank will not support operations that, in its opinion, significantly convert or degrade critical natural habitats or that damage critical cultural sites.	**Not Applicable** as the project does not convert or degrade critical natural habitats or cultural sites. Verification of presence of cultural resources was done in consultation with the National Trust of Trinidad and Tobago. However, in the likelihood of a chance find; a Chance Find Procedure has been developed in Annex H of the ESMP which will form part of contractual documents.
B10	Hazardous Materials - Bank-financed operations should avoid adverse impacts to the environment and human health and safety occurring from the production, procurement, use, and disposal of hazardous material, including organic and inorganic toxic substances, pesticides and persistent organic pollutants (POPs).	The proposed projects **DO NOT** produce any hazardous materials. Project may utilize fuels, oils for the operation of equipment that may pose a risk to the environmental and social aspects of the project if not properly handled or managed. Mitigation measures in accordance with Directive B11. These are outlined Mitigation Measures and Plans (Tables 21-24 of the ESMP) as well Annex D od the ESMP.
B11	Pollution Prevention & Abatement - Bank-financed operations will include as appropriate, measures to prevent, reduce or eliminate	Appropriate measures to prevent or reduce pollution that may result from the proposed activities have been developed in the Mitigation Measures and Plans (Tables 21-24 of the ESMP) based an assessment of significance of the impacts as described in section 6.0 of the ESA.

Directive	Description	Relationship to the Project
	pollution emanating from their activities.	
B12	Projects under construction - The Bank will finance operations already under construction, only if the borrower can demonstrate that the operation complies with all relevant provisions of this Policy.	**Not Applicable** as the proposed project is not under construction
B13	Non-investment Lending & flexible lending instruments.	Proposed projects will be financed through CCLIP Loan
B14	Multiple Phase & Repeat Loan	**Not Applicable**. Proposed Project is not part of a multiple phase or repeat loan arrangement.
B15	Co-financing Operations	**Not Applicable**. Proposed project financed only through IDB Loan TT-L1055
B16	In-country Systems - the Bank will consider the use of the borrowing member countries' existing systems of safeguards for identifying and managing environmental and social impacts.	**Not Applicable.** The projects will follow and comply with the Bank's Environmental and Social Safeguards.
B17	Procurement - suitable safeguard provisions for procurement of goods and services in Bank-financed projects may be incorporated into project-specific loan agreements, operating regulations and bidding documents, as appropriate, to ensure environmentally responsible procurement.	Bank Approved ESA and ESMP will form part of Contractor Bidding Documents and ESG provisions incorporated in contracts in accordance with Bank's requirements.

4.3 Permits & Approvals

Permits and approvals are required during the execution of the Project; these include but are not limited to those listed in Table 3 below:

Table 3: Permits & Approvals

Item requiring Approval and/or Permit required	Issuing Agency	Status	Timeframe
Building design Adherence to electrical	▪ Regional or Borough Corporation	To be obtained	Approvals to be obtained prior to start of works

Item requiring Approval and/or Permit required	Issuing Agency	Status	Timeframe
codes	▪ Town & Country Planning ▪ Electrical Inspectorate Unit ▪ Trinidad & Tobago Electricity Commission (T&TEC)		and upon completion of electricals
Potable water supply Water testing	WASA	N/A	N/A
Safety & health of workers	Occupational Safety & Health Agency	As required	As required
Disposal and Control of Non-Toxic, Non-Hazardous Garbage and other Solid Waste	▪ Solid Waste Management Company Limited (SWMCOL) ▪ Environmental Management Authority (EMA)	All non-toxic bulky waste will be disposed of at a SWMCOL approved facility Addressed under CEC issued for Projects	As required
Traffic Control & Management Plan	Traffic Management Branch of the Trinidad & Tobago Police Service	As required	As required
Certificates of Environmental Clearance	Environmental Management Authority (EMA)	Issued for the new well and interconnecting pipeline (CEC6588/2022)	At least 20 working days prior to the Project start date (for outstanding CECs)
Noise Variations	EMA	To be obtained on an as needed basis	Application must be submitted 4 weeks prior to the intended date of the activity
Lease/ownership of unoccupied land	N/A	N/A	N/A
Property leases/agreements (private lands)	Owners of property	Obtained agreement for sale	N/A
Permission to resume works following discovery of any archaeological/cultural material	Archaeological Committee through the Environmental Management Authority (EMA)	As required	To be determined/as indicated by EMA

5.0 Environmental & Social Setting

While a programmatic ESA & ESMP, with a framework approach were previously conducted by the IADB for this loan, preparation of this ESA and ESMP is an opportunity to describe the environmental and social setting based on field observations/surveys given that the exact site and area where the works will be undertaken have been determined. The proposed Chatham Well Project is limited to a land area of 400m^2 while the works for the Chatham Plant is within the existing facility boundaries. As such, the Wider Study Area (WSA) as it relates to the significant impacts, is limited to the municipality. The Immediate Study Area (ISA) however, is limited to a 1 kilometer (km) radius of the site.

5.1 Overview

Trinidad & Tobago is the southernmost, twin island republic of the archipelago of islands that constitute the West Indies. Trinidad and Tobago as a whole, has an area of 5,131 km^2 (1,981 sq. miles) Trinidad has an area of **4,768 km^2 (1,841 sq. miles)** and Tobago has an area of about 300 km^2 (120 sq. miles). The proposed projects will be executed on the larger of the islands, Trinidad, in the Siparia Regional Corporation. The total population in this Corporation is 86,898 persons - 44,375 males and 42,574 females according to the Central Statistical Office (CSO) 2011 Population and Housing Census.

The climate of Trinidad and Tobago is tropical; warm and humid with two major seasons: a dry season from January to May and a wet season from June to December. A short dry spell, 'Petite Careme,' typically occurs in the middle of the wet season in September or October. Climate change is expected to affect the island by resulting in reduced rainfall, increased rainfall intensity resulting in higher runoff and flash floods, increased temperatures, rising sea level and more frequent storms. Due to the islands geographical location, hurricanes rarely pass near/over the islands, with Tobago being more frequently affected by storms and lower category hurricanes (Category 1 - 3). However, in the recent past, a number of tropical storms have made landfall in Trinidad.

Trinidad is located along the south-eastern margin of the Caribbean Plate along the southern strike-slip boundary with the South American Plate and several major faults through the island. The region is therefore tectonically active with both shallow and deep earthquakes.

The study area for this project is determined by the extent of direct and indirect impacts on the physical, biological and social environments. This includes the proposed site, surrounding vegetation, roads, rivers and streams. It also includes surrounding communities that can be affected by noise, surface runoff and dust during construction and transportation of materials to and from the site.

The Wider Study Area (WSA) has been limited to the Chatham Village while the Immediate Study Area (ISA) is defined by a 1km radius around both the well site and Chatham WTP.

5.2 Site Conditions

5.2.1 Overview of the Land Acquisition Process

The proposed site for the Chatham #15 well is privately owned and will be acquired following and complying with Trinidad and Tobago's Land Acquisition Act. The Authority is currently in the process of purchasing the lands as the owner has agreed a price for sale. The lot is unoccupied and there is no physical or economic displacement, therefore IDB OP-710 is not triggered and does not apply in this case. The process for acquisition includes:

Private Lands

1. Determination and identification of land parcel size required for construction of specific component.
2. Permission of owner to conduct cadastral survey.
3. Conduct and approval of cadastral survey.
4. Approval of the Town and Country Division for any subdivision or class change that may be required.

5. Conduct valuation of property.
6. Formal offer made to owner based on valuation report.
7. Negotiations/acceptance by owner based on valuation report.
8. Board approval for purchase land at agreed price based on agreement with owner.
9. Payment to owner.
10. Preparation on certificate of title in WASA's name is made.

As previously indicated, the Authority obtained permission from the landowner, in 2016 to enter the said land to commission an approved licensed survey which was approved by the Director of Surveys in 2018. A valuation of the market value of the freehold interest in the land was prepared in 2019 by an independent valuator to which the owner has formally accepted. Arrangements are being made to prepare the cheque for payment.

5.3 Surface Hydrology

There are nine (9) major hydrometric units in Trinidad. The Chatham Well #15 and Chatham Water Treatment Plant both fall within the Cedros Peninsula Hydrometric unit (#6) and specifically the Guapo Watershed.

No surface water is used as a source of raw water by WASA with limited abstractions for agricultural uses primarily irrigation. No fishing (economic purposes) and/or recreational activities and sites in the ISA or WSA. Some watercourses may flood during intense rainfall events.

Expressed per capita, the surface water availability in Trinidad and Tobago is approximately 2,200 m^3/year/person. The international criterion for water scarcity is less than 1000 m^3/year/person. Thus, by international standards, Trinidad and Tobago is not a water scarce country (*NIWRMP, 2016*).

However, the Chatham area and the wider municipality has very little surface water to supply the population and thus, potable water in this Hydrometric Area is sourced solely from Ground Water Wells.

5.4 Groundwater

The Chatham Well #15 and the Chatham Water Treatment Plant are located within the Erin Formation in the southwestern part of Trinidad. This area falls within one of the four traditional aquifers of the Trinidad and Tobago called the Southern Sands. This formation contains lignite and bituminous oil residues, which are present in some shales. The Erin Formation is a confined aquifer, which is a part of the multi-sand aquifers within the Southern Sands. The Erin Sand aquifer consists of fine and very fine sands of the Pleistocene Age. The aquifers of the Erin Formation are confined aquifers as the area is heavily faulted causing discontinuous basins with the nearby Morne L'Enfer Formation. The water quality from the Southern aquifers generally is of good quality but may have high iron content.

5.5 Geology, Topography & Soils

5.5.1 Topography

The topography across Trinidad is characterized by three distinct east-west trending mountain ranges, The Northern Range, The Central Range and the Southern Range, separated gently rolling flatlands. The proposed Chatham Wells and Water Treatment Plant are located within the gently rolling flatlands that

lie west of the Southern Range, within the Southern Basin. It consists of undulating alluvial materials with a maximum elevation of 60 meters above mean sea level. The project area is within Chatham (Figure 1). Here, the terrain consists mainly of flatlands which can accommodate the establishment of both the well and water treatment plant.

5.5.2 Geology

The island of Trinidad lies within a 200 km wide tectonic plate boundary zone between the Caribbean Plate and the South American Plate. The island consists of three ranges of mountains and hills, including the Northern, Central and Southern Ranges. Its geology is dominated by rocks of sedimentary origin. Two deep sedimentary basins, the Northern Basin and Southern Basin, produced by the erosion of uplifted ranges, separate the mountainous areas. Surrounding the uplifted ranges, are also other low-lying areas known as the GOP Pull Apart Basin and Caroni Plains.

As stated in Section 5.5.1 above, the proposed Chatham Wells lie within the Southern Basin, which is characterized as an intensely deformed basin consisting of Oligocene to Pliocene clastic rocks. This basin has been the main site of petroleum exploration with abstraction from the clastic deep water and paralic formations. Specifically, the areas of the proposed Chatham Wells and Water Treatment Plant lie within the Erin Formation. This formation has a “clastic succession of sands, silts, clays and lignites predominantly of coastal and transition zone, to lower delta plain origin” (GSTT, 2018). As depicted in Figures 2 & 3, there are also a series of fault zones around the country. In particular, the Los Bajos Fault Zone is nearest to Chatham.

5.5.3 Soils

The soil types across Trinidad are extremely varied as can be observed on the soil map depicted in Figure 3. The central and southern parts of Trinidad have very notable soil formations present in the lower lying areas known as the 'sapote' or 'heaving clays'. Typical soils in the Southern Basin are mixed, but is dominated by soils of intermediate uplands with restricted internal drainage. There are also other types of soil present, including those of the intermediate uplands with free internal drainage, deep cultivated beach sand near the coast and some deep alluvial soils. For the Chatham area in particular, the soil has been more recently classified as fine-loamy, siliceous, isohyperthermic Typic Kanhaplustults (Ditzler, 2017).

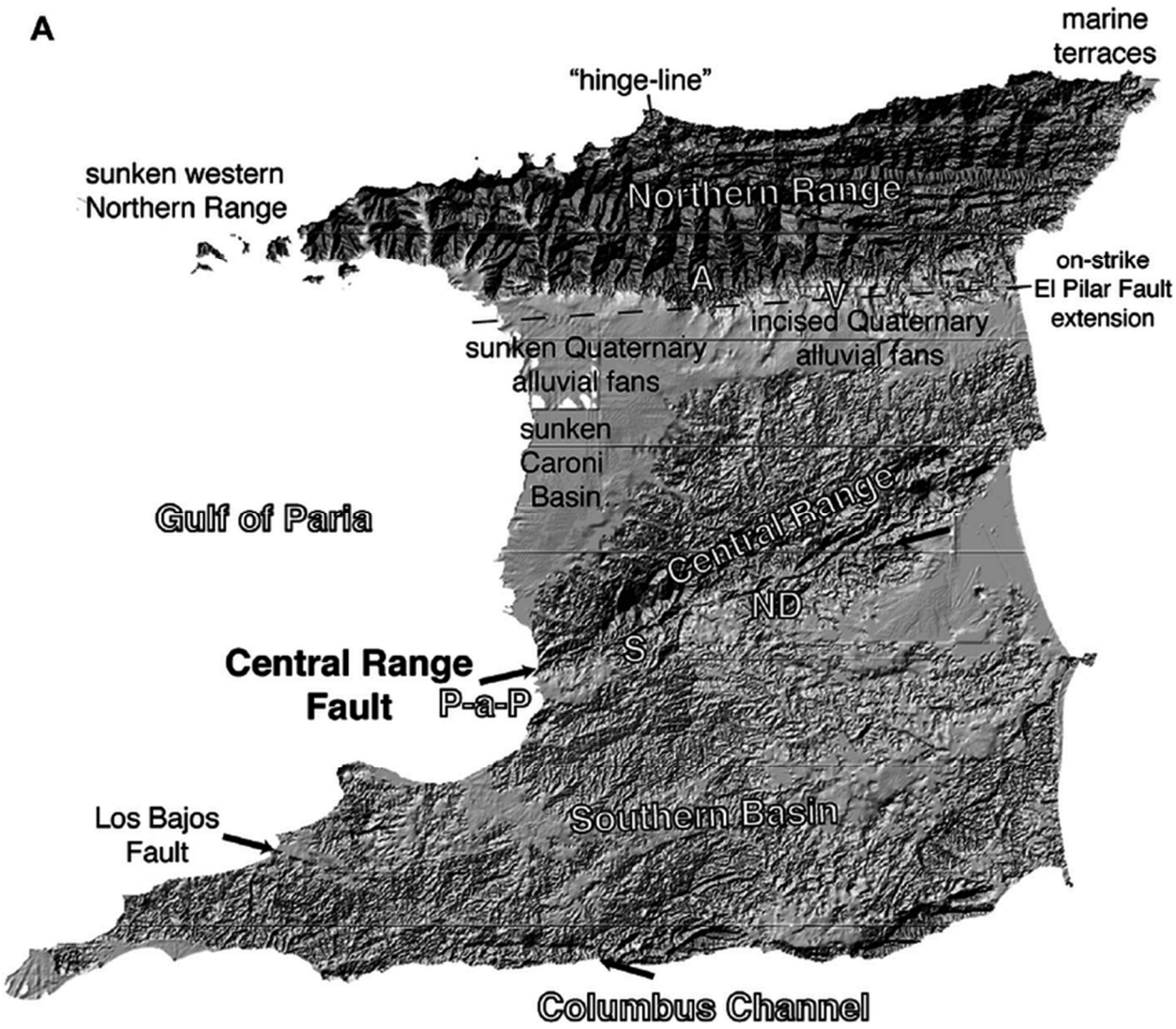

Figure 1: Sun-shaded Digital Elevation Model of Trinidad and Tobago (Weber et. al 2011).

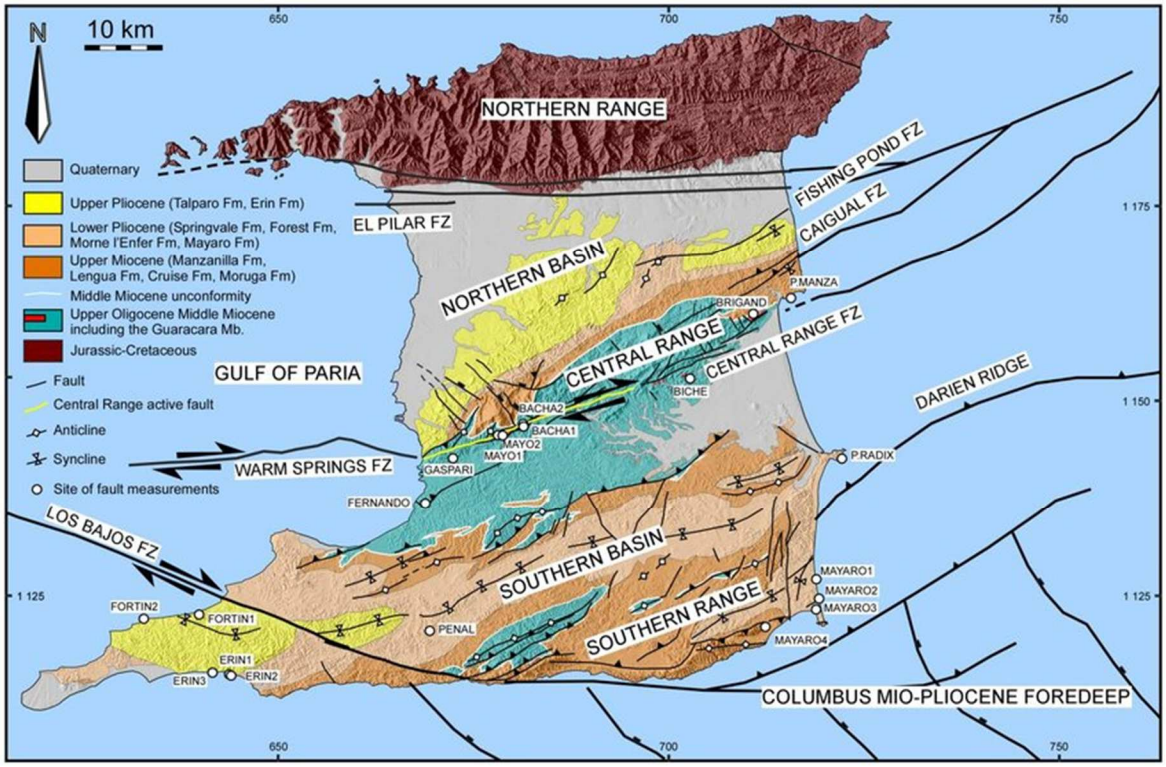

Figure 2: Geologic Map of Trinidad modified from earlier geologic maps (Hippolyte & Mann, 2021)

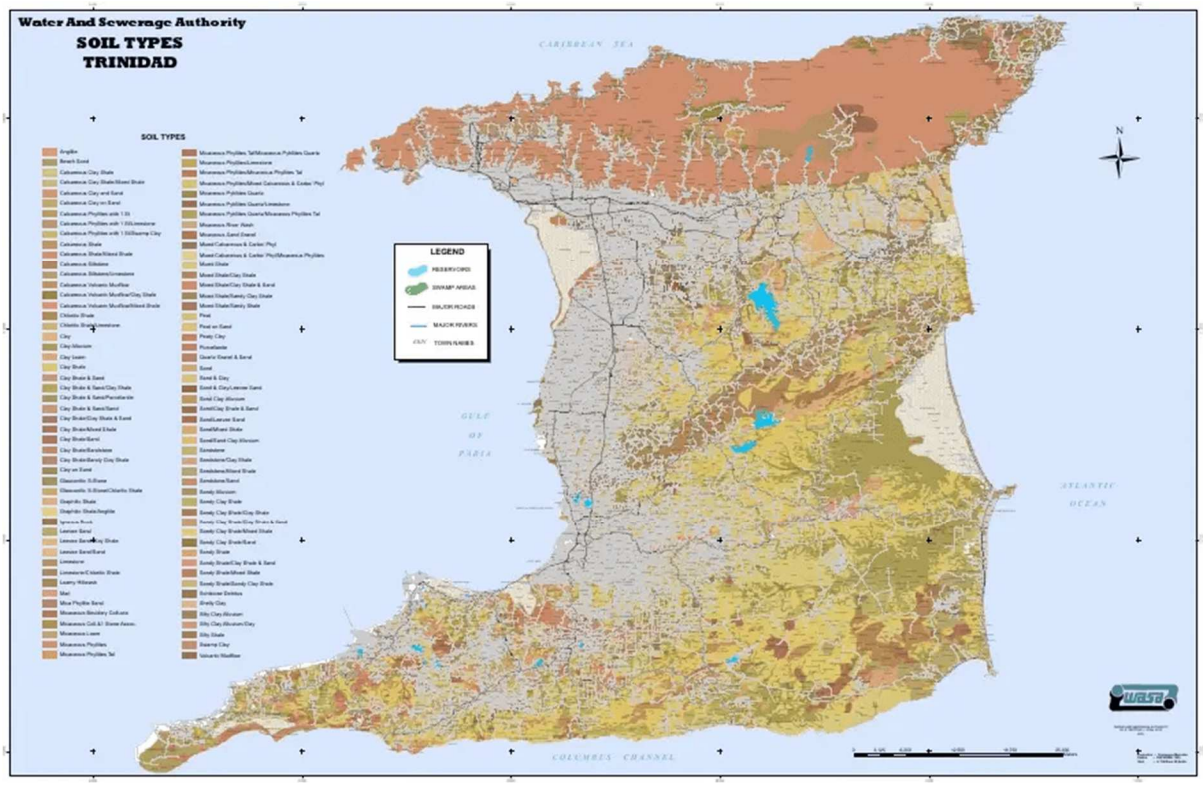

Figure 3: Soil Map of Trinidad (Water and Sewerage Authority)

5.6 Climate & Climate Change

As stated in the ESA with Framework Approach developed by the IADB, the climate of Trinidad and Tobago is tropical, warm and humid with two major seasons: a Dry season from January to May and a Rainy season from June to December. A short dry spell, 'Petite Careme,' typically occurs in the middle of the wet season in September or October.

The average annual temperature is approximately 26^0 C with minor diurnal variations, however daily temperatures in urban areas have been recorded at >35^0C. The average annual rainfall is approximately 2,200 mm with over 78% of the mean annual rainfall occurring during the wet season (DHV Consultants, 1999). Intense periods of rainfall can and often leads to severe flash flooding, however, in the recent past (2018), Trinidad has experienced riverine flooding events in the latter part of the Rainy Season that resulted in extensive damages to property. Although both the Chatham #15 well and Chatham Water Treatment Plant are located in the Guapo Watershed, the specific sites are not prone to flooding.

In general, the eastern half of the island receives more rainfall than the western half. Maximum amounts of precipitation occur in the northeast of Trinidad where orographic effects dominate. The mean annual rainfall for Trinidad varies with maximum values as high as 3,800 mm on the eastern peaks of the Northern Range, slightly north-east of the Caroni basin, in response to the orographic effects of the North-East Trade winds; and minimum values of 1,200 mm in the north-western Peninsula and southwest of the island. Evapotranspiration is significant and averages over the island from 34% of the total precipitation in the wet season to 70% in the dry season (DHV Consultants, 1999). Evapotranspiration also varies considerably with physiography and with rainfall event quantities. Relative humidity ranges from 65-70% at the end of the dry season to 80- 85% in the wet season. In coastal areas, the range is less with relative humidity between 70% and 80% (DHV Consultants, 1999).

5.6.1 Climate Change

As a Small Island Developing State (SID), the effects of climate change can have far reaching impacts on water supply and quality. As stated in the ESA with Framework Approach developed by the IADB, this includes but is not limited to:

- reduced rainfall in the dry season and increased rainfall which has the effect of reduced available water, a decline in surface runoff, reduced groundwater and increased risk of droughts.
- increased rainfall intensity which has the effect of increased surface water runoff and increased risk of flooding and flash floods. Flooding could contribute to higher turbidity and sediment load in rivers.
- increased temperature would have the effect on the availability of water resources as evaporation rates would increase and water consumption per capita would increase. Warmer temperatures would also cause sea level rise and increased salinity in coastal aquifers and streams which will reduce fresh water supplies.
- sea level rise and more frequent storms which will have the effect of increased risk on coastal areas. Sea level rise will also decelerate wetland renewal and change the salinity distribution and productivity of mangroves. (Crichlow, 2008 and Asian Development Bank, 2016)

5.7 Socio-economics

This section is based on data gathered mainly from the Central Statistical Office (CSO) as well as a desktop review from other secondary sources. It describes the existing land use and infrastructure within the study area as well as other socio-economic conditions such as demographics/population growth, education, services etc. The area of study (AOS) is Chatham, within which the proposed rehabilitation of the Chatham Water Treatment Plant and New Well project will take place. Chatham falls within the Siparia Regional Corporation.

5.7.1 Population

The overall population in the Siparia Regional Corporation (SRC) was recorded in 2011 census as 86,898. Table 4 shows the age/sex demographics for the area of Chatham, while Table 5 shows the population demographics for Chatham where the WTP and proposed new well are located. Based on the CSO 2011 Census, the community has been classified as Rural. Approximately 51 % of the population are males with males also representing a slight majority within all of the age groups with the exception of ages less than 9 and over 70. Approximately 60% of the population are of working age with 13.1% at pensionable age and expected to be more at home. It is therefore expected that while the community may not be too affected while pipeline works are ongoing, attention must still be made to homes where there may be elderly persons inhabiting during the day.

5.7.2 Economy & Economic Activity

According to the CSO 2011 Census, within the SRC, the percentage of households with one (1) person working was 69.72%, while the percentage of households with two (2) persons working was 33.95%. as per Table 6, this pattern was reflected in Chatham as well.

From field observations, Table 7 shows that economic activity within the ISAs comprised mainly of agricultural activities and some commercial activities such as roadside parlours, groceries, green grocers/fruit/vegetable stalls, food vendors, restaurants and bars, automotive garages and service companies.

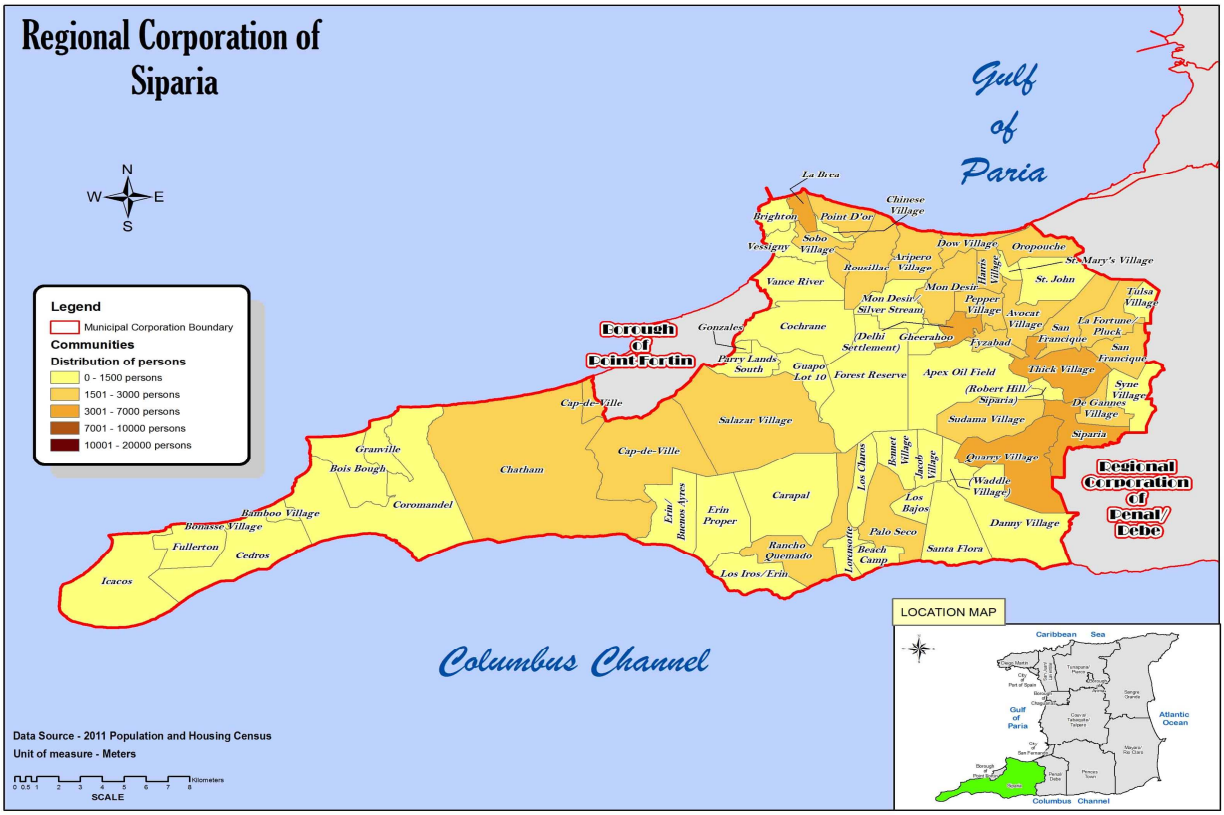

Figure 4: Distribution of Persons in Siparia Regional Corporation

Table 4: Age Sex Demographic Table for Chatham, SRC

Age (10 year groups)	Sex		
	Male	Female	Total
Up to 9 years	94	114	208
10 to 19 years	120	116	236
20 to 29 years	158	138	296
30 to 39 years	102	120	222
40 to 49 years	135	108	244
50 to 59 years	124	96	220
60 to 69 years	74	59	133
70 to 79 years	20	33	54
80 to 89 years	8	14	22
90 years and over	2	5	7
	839	**801**	**1640**

Table 5: Population Demographics and Urban/Rural Classification of site locations in Chatham

Asset/s	Municipality	Classification	No. of Males	No. of Females	Total Population
Chatham Water Treatment Plant and Chatham Well #15	Siparia	Rural	839	801	1640

Table 6: Economic activity

Asset/s	Municipality	Classification	% households with 1 person working	% households with 2 persons working
Chatham Water Treatment Plant and Chatham Well #15	Siparia	Rural	65.95	29.57

Table 7: Observations of economic activity in Chatham, SRC

Asset/s	Municipality	Classification	Observations
Chatham Water Treatment Plant and Chatham Well #15	Siparia	Rural	Along Southern Main Road (SMR) – Mini marts, supermarkets, barber shop, health centre, places of worship, a print shop, bars, AR Hardware & General Store, D&K Poultry Depot and Meat Shop, Chatham Youth Camp North of the SMR, along North Trace – Trinity Exploration and Production PGB Facility, KATTICK electrical services, Michelle Kitchen and Household Supplies, Nursey, religious institutions, barber shops South of the SMR – Chatham Government Primary School,

Asset/s	Municipality	Classification	Observations
			Palo Seco Agricultural Enterprises Limited (PSAEL), religious institutions, Chatham Beach/ Erin

5.7.3 Education

According to CSO, 2011 Census, the overall percentage population in the SRC with a secondary school level of education is 61.19, while the percentage population in the SRC with tertiary level education is 11.90. Table 8 presents the data available for Chatham area within which the WTP and proposed well are located.

Table 8: Percentage population with secondary and tertiary level education in Chatham

Asset/s	Municipality	% population with secondary level education	% population with tertiary level education
Chatham Water Treatment Plant and Chatham Well #15	Siparia	61.03	14.78

5.8 Social Infrastructure

5.8.1 Housing

Based on information from CSO 2011 Census, owner occupied households dominate the housing type in Chatham at 86.86%. Households renting and/or leasing lies at 12.92% with an average monthly rent of TT$571.08. Overcrowded households defined as ≥3 persons per bedroom was only 6.92%. Table 9 presents the data according to communities in which the proposed Well and Chatham Water Treatment Plant, to be rehabilitated, are located.

Table 9: Housing type

Asset/s	Municipality	Overcrowded households (≥3 persons per bedroom) %	Owner occupied household (%)	Households renting or leasing	Average monthly rent (TT$)
Chatham Water Treatment Plant and Chatham Well #15	Siparia	6.92	86.86	12.92	571.08

5.8.2 Buildings & Other Infrastructure

Table 10 below presents the type of buildings/structures that can be found within the Siparia Regional Corporation. Within Siparia Regional Corporation, residential buildings make up most of the buildings (95.97%) followed by commercial buildings (3.63%) and professional offices (0.09%). Given this data from CSO's 2011 census, it is likely that the most popular building type in Chatham is residential. More specifically, as at 2011 Chatham has 533 buildings of which 95.6% are dwelling units (510), 4.7% are business places (24) and 0% are institutions.

Table 10: Housing Community Register

Asset	Municipality	No. of Residential	No. of Commercial	No. of Professional (Office)	No. of Industrial	No. of Community Service	No. of Other
Chatham Water Treatment Plant and Chatham Well #15	Siparia	313,259	11,840	289	184	276	576

5.8.3 Services

This section describes the services that are accessible in the Chatham areas within which the well will be established and existing treatment rehabilitated.

5.8.3.1 Utilities

According to a 2016 area economic profile published by the Ministry of Rural Development and Local Government (MRDLG), all areas within the SRC, including Chatham, have access to a regular electricity supply, provided off the national power grid from the Trinidad & Tobago Electricity Commission (T&TEC). Only a few households do not have access to electricity because of extreme poverty (KAIRI Consultants Limited, 2016). Telephone/communication services are also available in this community as well as mobile and internet services, however in some areas along the pipeline route for the Chatham Water Treatment Plant, mobile services tend to be disrupted/poor in low-lying areas.

Although water supply and distribution has improved in Siparia over the past years with Chatham North, Chatham South and Point Coco receiving a 24/7 supply, some citizens still do not receive a 24/7 water supply, with other areas receiving a one in nine (9) days' supply. Wastewater management and solid waste management require development in the Region. Siparia is largely underserved in terms of a central sewer system with much of the area utilizing septic tanks and latrines. The lack of development in wastewater management and solid waste management has implications for the area's primary economic activities, i.e. agriculture and fishing.

5.8.3.2 Transportation

The majority of the main roads in the ISA and WSA are paved and accessible by vehicles. Transportation options in the WSA based on field observations are stated in Table 11 below:

Table 11: Modes of transport available

Asset/s	Community	Taxi (H)	Private Hire (PH)	Maxi Taxis	PTSC
Chatham #15 and Chatham WTP	Siparia	Yes	Yes	Not observed	Yes

Taxis (H) and private hire (PH) modes of transport appear to be more predominant in this rural community with no direct maxis and PTSC buses to Chatham observed. However, this may be due to the

limited scheduled buses on the particular route, with the closest bus running through Buenos Ayres. Maxi taxis, PTSC buses as well as taxis frequently traverse the SRC roads, with the following most convenient PTSC Routes and Schedules for Chatham commuters:

- Buenos Ayres/ POS (via Fanny Village) at 3:40am, 4:00am, 4:15pm & 4:30pm
- Point Fortin/ Erin via Buenos Ayres at 5:00am, 7:00am, 9:00am, 11:00am, 1:00pm, 3:00pm, 5:00pm & 7:00pm
- San Fernando/Erin via Siparia at 4:00am, 6:00am, 8:00am, 10:00am, 12noon, 2:00pm, 4:00pm & 6:00pm

5.8.3.3 Health Services

National Ambulance services operate, for the most part, throughout the island, inclusive of the communities within Siparia. Both the Point Fortin Area Hospital and the Chatham health centre are public health care services that are available to persons in the ISA and WSA with the Point Fortin Area Hospital's Emergency Department operating on a 24/7 basis. There are also a number of private medical centres and diagnostic testing centres, in the Siparia Region and Point Fortin Borough, that are accessible to Chatham's residents. These typically adhere to the working hours of 8:00 am to 6:00pm and may not all operate on weekends, particularly Sundays.

5.9 Project Specific Environmental & Socio-economic Setting

5.9.1 Chatham Well #15

The Chatham #15 Well will be located along Bobby Trace off Chatham North Trace, Chatham (Figure 5). As previously indicated, the intended site is privately owned and the area of land to be acquired is 400m^2 or 1% of a larger parcel of four (4) hectares.

The terrain/gradient of the project area is rolling/undulating with no rivers, ponds or drainage systems in or adjacent to the proposed site. The site itself contains no trees and is covered with thick underbrush. It is bounded on the north and east by an area of mixed vegetation consisting of trees and thick underbrush, to the south by Bobby Trace, to the west by an area of land that is fenced and occupied by a resident.

The interconnecting pipeline as shown in Figure 6 proceeds west from the well site on Bobby Trace and then southwards along the Chatham North Trace Road eventually interconnecting with the existing WASA raw water transmission pipeline that runs along the Southern Main Road. The only resident on Bobby Trace is the same owner who has agreed to sell a portion of the property for the establishment of the well. Bobby Trace is a single lane secondary road with asphaltic surface of reasonable condition while the Chatham North Trace Road is also a secondary road with asphaltic surface but it can accommodate dual lane traffic.

The primary land use in the project area is forest and residential confined mainly to along the major roadways. Air quality in the area is likely to be negatively impacted by bush fires and Sahara Dust primarily as there are no industrial areas/activities in close proximity. The area is not sewered with on-lot septic systems in use which may present a risk of surface water contamination where these systems are malfunctioning, however there are few clustered residential properties scattered along sections of the Chatham North Trace Road. There is a Hindu mandir along the North Trace Road with the only

significant business activity being a small grocery and bar at the junction of the Chatham North Trace Road and Southern Main Road.

A review of the Heritage Sites designated by the National Trust of Trinidad and Tobago indicates that there are no Cultural Property or Resources within or along the route from the Chatham #15 well to the Chatham Water Treatment Plant.

The soil type is primarily sands with the aquifer being classified as Erin Sands. The proposed Chatham #15 Well will have an abstraction rate of 1000m3/day in keeping with the WRA recommendations. The abstracted water will be sent to the Chatham WTP for treatment prior to distribution as raw water from wells in this area have a high iron content.

Figure 5: Google Image showing proposed Chatham #15 Well site and surrounding land use.

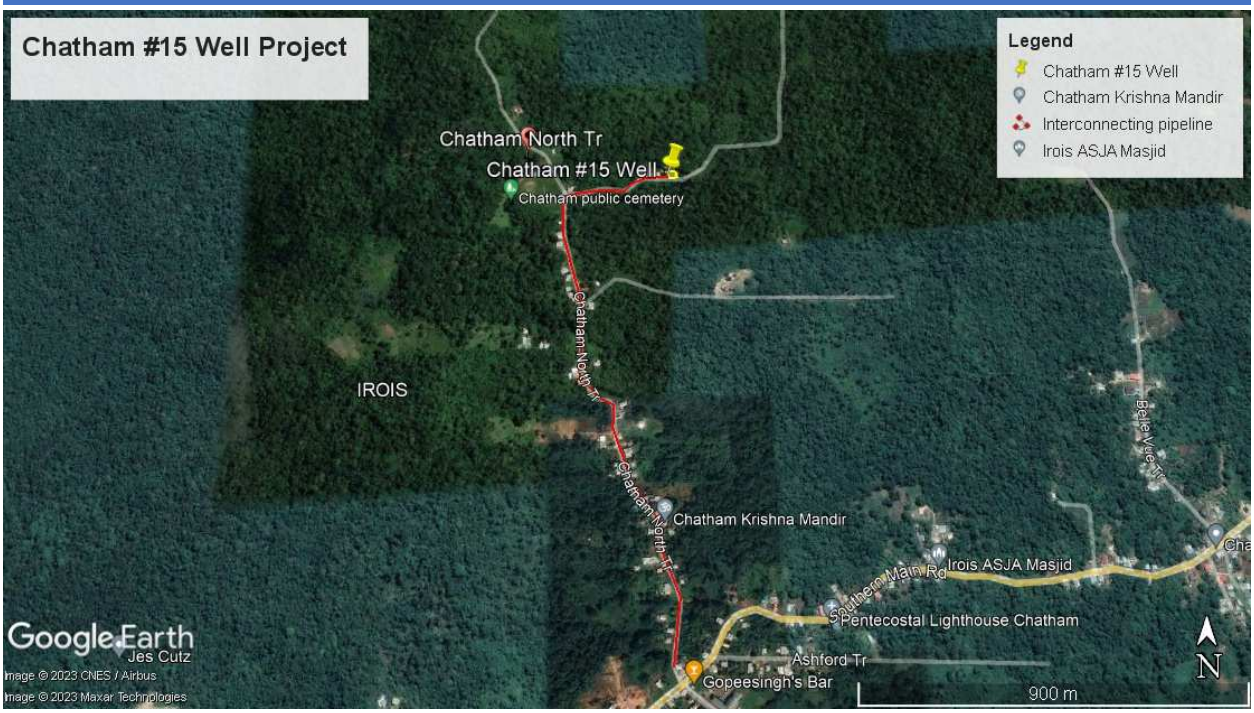

Figure 6: Google Image showing proposed Chatham #15 Well & interconnecting pipeline

5.9.2 Chatham Water Treatment Plant

The Chatham Water Treatment Plant (figure 7) is located along the Southern Main Road in Chatham on approximately 1.96 acres of land. The project area slopes downward from the front of the plant to the back, with no rivers or ponds adjacent to the proposed site. It is bounded on the south, east and west by vacant areas of land that is overgrown with tall grasses, trees and scrub vegetation. Approximately 1km to the east of the plant is a fairly developed area with a health center and approximately 2.15km to the east lies a more densely populated area that houses three (3) religious institutions and a school. Approximately 0.5km to the west is a youth camp with surrounding residences. Air quality in the area is likely to be negatively impacted by bush fires and Sahara Dust primarily as there are no industrial areas/activities in close proximity. The area is not sewered with on-lot septic systems in use which may present a risk of surface water contamination where these systems are malfunctioning.

The Chatham Water Treatment Plant treats approximately 1.8 IMGD of ground (well) water that is transported through a 16” main running easterly to the plant along the Southern Main Road. The raw water enters through the aerators after which lime is dosed before it enters the Clarifiers. Chlorine is dosed both as the clarified water enters the filters, and when the filtered water exits the filters and enters the Clearwell Tank (refer to figure 8). The treated water is then distributed through an 8” transmission main that runs to the east of the plant and a 12” and 6” main that runs to the west of the plant.

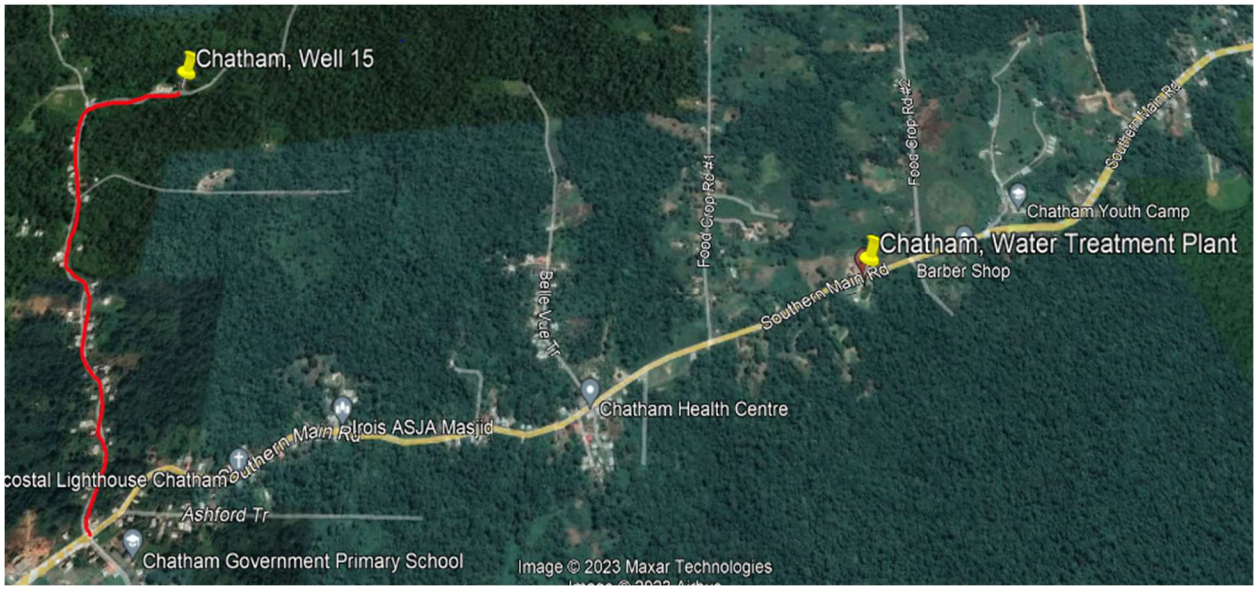

Figure 7: Google Image showing proposed Chatham #15 Well & interconnecting pipeline

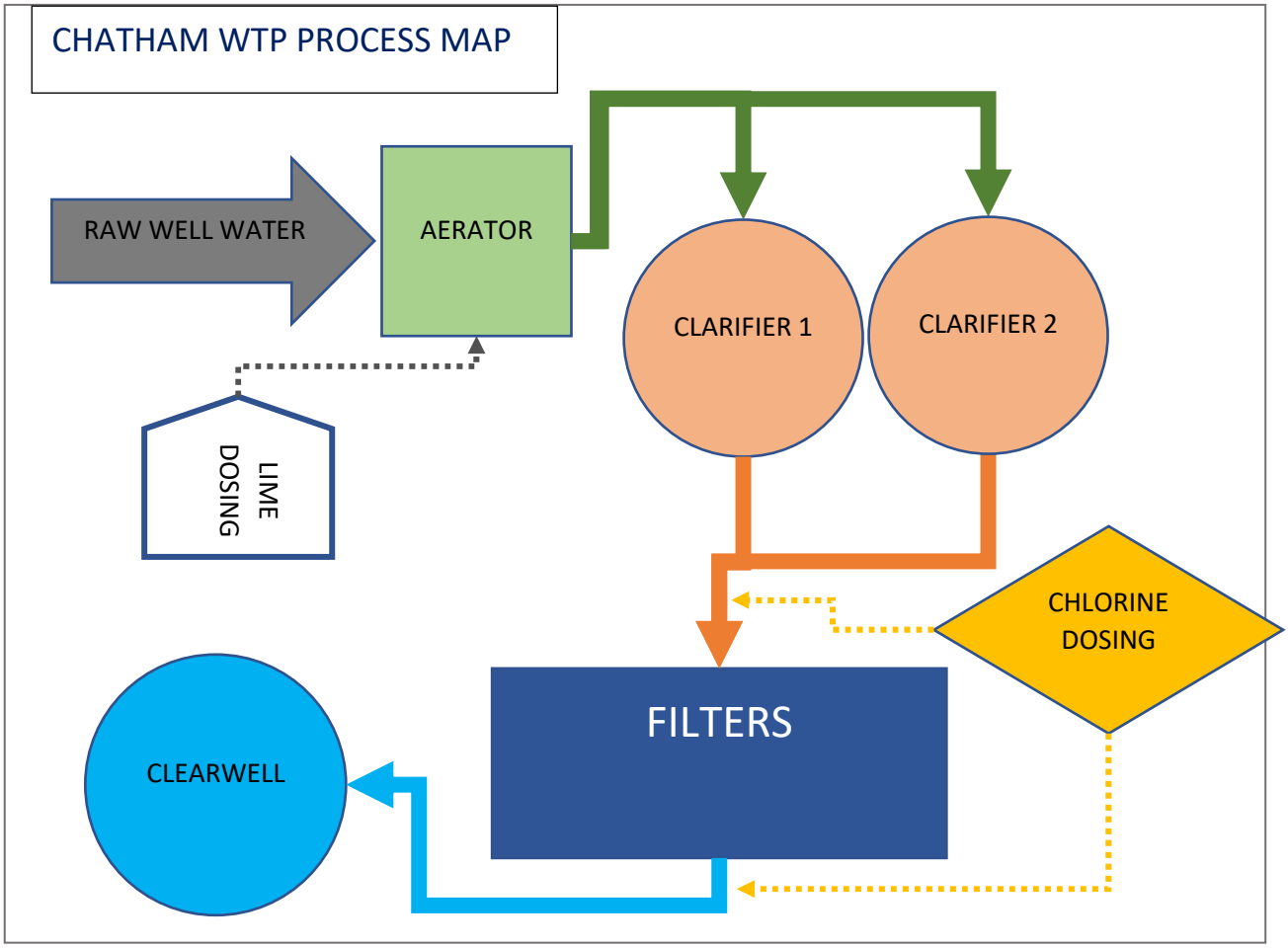

Figure 8: Process Layout of Chatham WTP

5.10 Disaster Risk Assessment & Management

A hazard is a generic term for any situation or state of events which has the potential to cause harm or threaten the surrounding natural and human environment. Environmental hazards can be chemical, physical, mechanical, biological, or psychosocial and include natural hazards such as storms and earthquakes. Risk is defined as the likelihood that damage, loss or injury will be caused by a hazard and how severe the outcome may be.

The proposed Well project does not involve high temperature systems, nor does it involve the handling of hazardous explosive or flammable materials. Credible health and safety risks identified for this project are thus those associated primarily with its construction phase and have been subjected to a Qualitative Risk Assessment only.

A Qualitative Risk Assessment considers the hazards, the impacts of the construction and the operation phase of the proposed project on life, health, property, and environment. The assessment addresses the occurrence of potential hazards including:

- Passage of traffic,
- Use of heavy equipment,
- Accidents (e.g., fires and explosion)
- Fuel/Chemical spills and leaks, and
- Hazards associated with Acts of God - earthquakes, storms, storm surges and floods.

5.10.1 Facility Risk Management Process

The Facility Risk Management (FRM) Process is governed by the 'Guideline for Hazard Evaluation Procedures' established by the Centre for Chemical Plant Safety (CCPS), 1985. This approach focuses on the main issues and provides a framework for quantifying and mitigating risks. Risk is defined as the product of the likelihood and the severity of the consequence of a hazardous event.

(Risk = Likelihood x Severity of the consequences)

The FRM approach seeks to quantify and mitigate risks from identified hazards through five basic steps as follows:

6 **Hazard Identification** - The identification of physical situations with the potential for damaging humans, property or the environment, or a combination of these. Excluded are acts of war and terrorism since the probability of these events is difficult to quantify.

7 **Frequency Analysis (Likelihood)** - The estimation of the likelihood of the hazard occurring within a specific time period or in specified circumstances.

8 **Consequence Analysis** - The identification of the effects of a hazard on humans, property or the environment.

9 **Risk Estimation and Ranking** - The estimation of the consequences of a hazard and the frequency with which it is likely to occur (Risk = Consequence x Frequency of Occurrence).

10 **Risk Management** - The development of risk mitigation and risk reduction plans for unacceptable risks.

Likelihood

Likelihood is defined using a qualitative ranking of the frequency of occurrence of a hazardous event. Frequency ranking of credible scenarios is shown in the Table 3 below.

Table 12: Frequency Ranking Definitions

Likelihood Ranking		Frequency
Index	**Description**	
5	Almost certain	Possible to occur frequently (1/year)
4	Very probable	Possible to occur occasionally (10^{-1} / year)
3	Probable	Possible to occur under unusual circumstances (10^{-2} / year)
2	Reasonably possible	Possible to occur over the lifetime of the phase/plant (10^{-3} /year)
1	Remote	Could occur however not likely over the lifetime of the phase/plant life (10^{-4}/year)

Severity Ranking

Qualitative severity ranking is used to rank the magnitude of the probable consequences. The consequence of each scenario includes dimensions such as human health, economics, and plant operation. The magnitude of consequence which ranges from none (no measurable consequence) to catastrophic is shown by a severity ranking index. Table 4 indicates an example of severity ranking.

Table 13: Consequence Ranking Definition

Severity		Frequency
Ranking Index	**Consequence**	
5	Catastrophic	On-site/off-site fatality; process outage >1 month; significant off-site consequence (property damage, environmental & social impact, public health and safety)
4	High	On-site lost-time accident; process outage >1 week, and <1 month; offsite alert or response required
3	Moderate	On-site reportable injury; reportable environmental release; process outage >1 day and <1 week
2	Low	Below reportable environmental impact; process outage 1 day
1	None	No consequence to work safety, public health, or environment

Risk Ranking Process

As indicated previously, (a) likelihood and (b) severity of consequence are the two factors contributing to the risk of a hazardous event. A risk ranking matrix is an effective method of ranking the potential risks of hazard scenarios. Likelihood and consequence ranking form two dimensions of the risk ranking matrix. Figure 9 indicates the risk-ranking matrix used in this risk assessment. Ultimately the product of the likelihood and consequences will produce a ranked quantitative risk outcome which corresponds to the priority, the level and urgency of the mitigation strategies required. A hazard risk of 25 represents a very high risk that requires immediate mitigation, and hazard risk of 1 represents an insignificant risk that requires no specific mitigation.

A professional judgment indicates that a hazard scenario with risk ranking equal to or greater than 9 requires some level of risk management measure to either reduce the likelihood of the event and/or reduce the severity of the consequences of event.

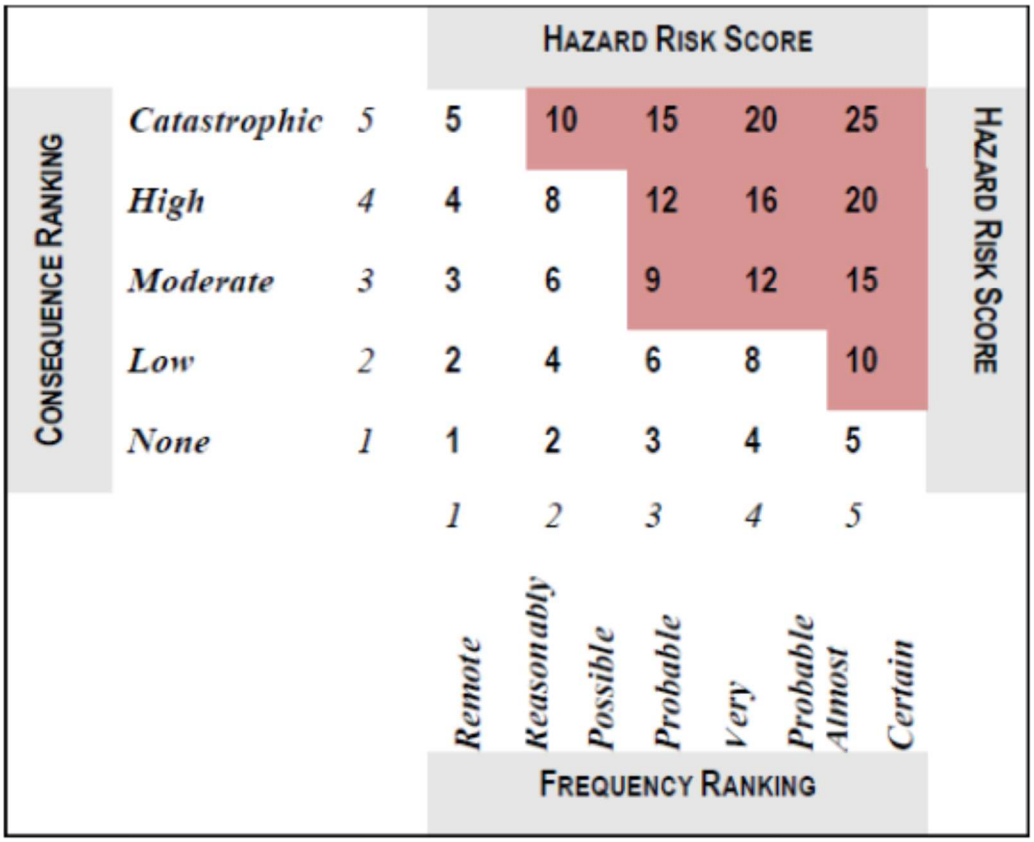

Figure 9: Risk Ranking Matrix

5.10.2 Risks and Hazards associated with the Project

Construction

5.10.2.1 Accidents (Fires & explosions)

The use of high temperature or pressurized systems, and handling of hazardous explosive or flammable materials are not intrinsic to the project. Risks identified are associated with the use of heavy equipment in the construction phase and associated use of fuel or electrical power. Fires and explosions are associated with accidents involving heavy equipment and machinery. Severity of consequences of personal injury can be minimized by adherence to the operating standards of the equipment and by the prevention of smoking in refueling areas and during the use of equipment and machinery.

5.10.2.2 Traffic

The installation of interconnecting pipeline (transmission mains) is likely to cause a measure of inconvenience to road users, commercial activities, agricultural activities and residents during the construction phase. Such inconvenience and increase of traffic presents an increased possibility of vehicular accident and injury due to accident.

While it is possible for the consequences of injury due to accident to be significant, it is also possible to reduce the overall risk by minimizing the likelihood of the occurrence. This can be done by effecting adequate traffic management plans and close control of construction works at all times. Detailed

construction staging and traffic management plans for the installation of works, including public relation/information plans, will be produced and submitted by the Contractor via the Special Purpose Company (SPC) for review by Project Executing Unit (PEU) of the Ministry of Public Utilities (MPU), and other relevant authorities such as the Fire Services and Ambulance services prior to the commencement of work in any community. Traffic management in relation to the various stages of construction works will be monitored throughout the construction phase.

5.10.2.3 Fuel or Chemical Spills & Leaks

Project construction and operation do not involve hazardous or toxic substances of concern; drilling muds and dispersants are non-toxic in nature as the proposed well is intended for use as a source of raw water for treatment to potable water standards. The main concern with the use of heavy equipment is a fuel spill or leak. Mitigation measures stated in later sections will be implemented to minimize this risk.

Natural Disasters

5.10.2.4 Earthquake

Earthquake activity should be considered a hazard associated with the Chatham Projects. Since earthquake activity is likely, overall risk associated with the event can be minimized by the reduction of the consequences associated with the hazard. The well structures and associated transmission pipeline systems will be constructed/installed so as to withstand earthquakes. Hazards associated with earthquake activity include breaks in transmission pipeline, and damage to well kiosk leading to spill or leak of raw water. In such an event, isolation and repairs to the necessary infrastructure effected in the shortest possible time.

5.10.2.5 Hurricane/Storm

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 and flood damage present potential hazards to the well. While the likelihood of a storm affecting Trinidad is a relevant one, the consequences and overall risk of the hazard can be reduced by employing appropriate design criteria.

While Trinidad and Tobago is not located within the direct of tropical cyclones in the North Atlantic (Figure 10), it has been impacted in the past. The last hurricane to directly hit was in 1963 when Hurricane Flora passed over the island of Tobago and in 2017 Tropical Storm Bret made landfall on the SE part of Trinidad causing widespread flooding and damages in the southern part of the island.

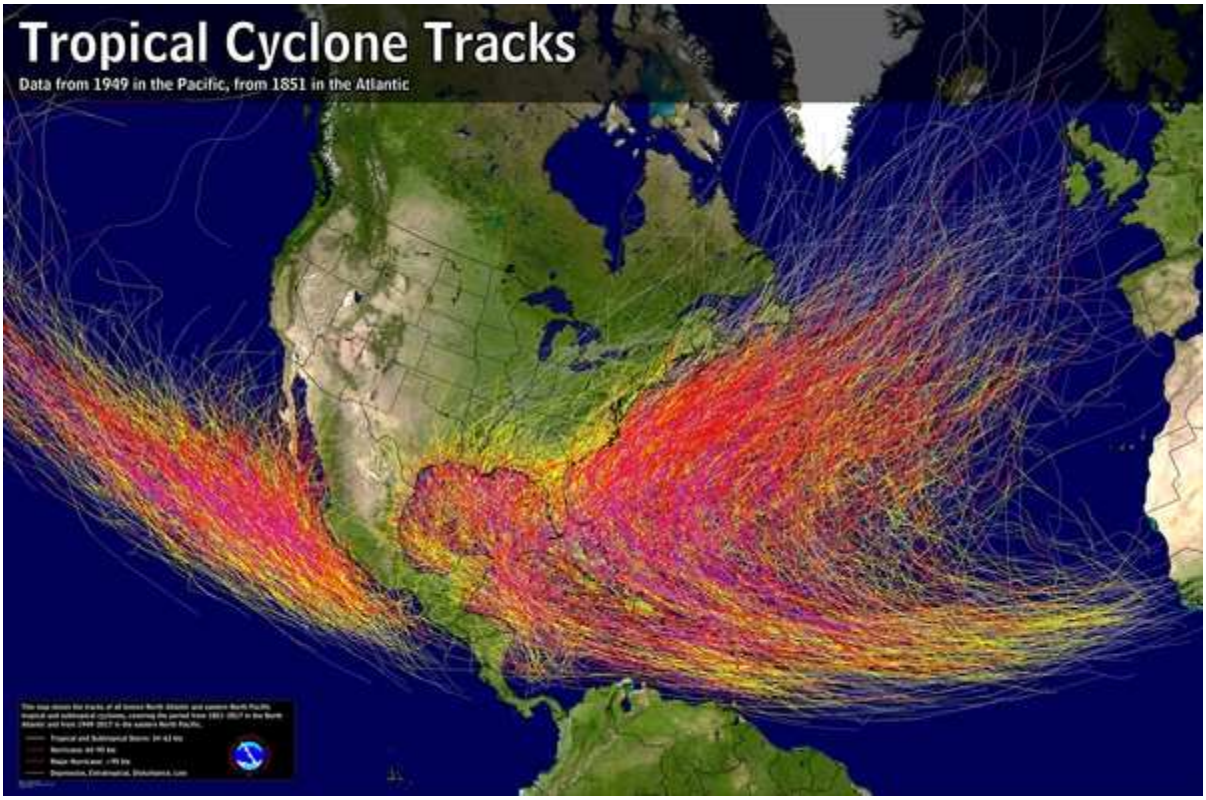

Figure 10: Tracks of Tropical and Sub-tropical Cyclones in the North Atlantic 1851-2017 (NOAA, 2023)

5.10.2.6 Wind Activity

Storm model data from the 'Atlas of Probable Storm Effects in the Caribbean Sea' predicts hurricane force winds of 70 knots (129.8 km/h) to have a return interval of 50 years and winds of 75 knots (139 km/h) to have a return interval of 100 years for the island of Tobago only, however the storm model data showed no hurricane force winds affecting the island of Trinidad with maximum winds at 50 knots in both the 50 year return interval and the 100 years return interval. Despite the low probability of the proposed well being impacted by hurricane force winds, the appropriate building codes will be utilized so as to ensure the protection of life and reduction of economic loss, and prevention of building collapse caused by wind activity including storms and hurricanes. Hurricane force winds although unlikely are not expected to render appreciable damage to the facility and consequences to such damage are not expected to threaten the human or environmental health and well-being.

5.10.2.7 Flooding

Flooding in the WSA can be of concern to the proposed project as it may impede access to the Well sites. According to the ESA prepared by the IADB, the main types of floods that are applicable experienced in Trinidad and Tobago are:

- River (or fluvial) Floods which are overbank flooding that occur when water rises and overflows the edges of a river or stream. They are usually caused by excessive precipitation and are climatologically driven.

- Flash Floods which are intense, high velocity torrents of water that occur in a river channel. In addition to excessive rainfall and/or intense rainfall over a short duration, they are usually caused by Urbanization and poor land use practices in the watershed. These issues create more impervious surface areas resulting in reduced infiltration and more runoff.

However, based on Flood Susceptibility Map (Figure 11) prepared by the ODPM, the project area has a low susceptibility of flooding.

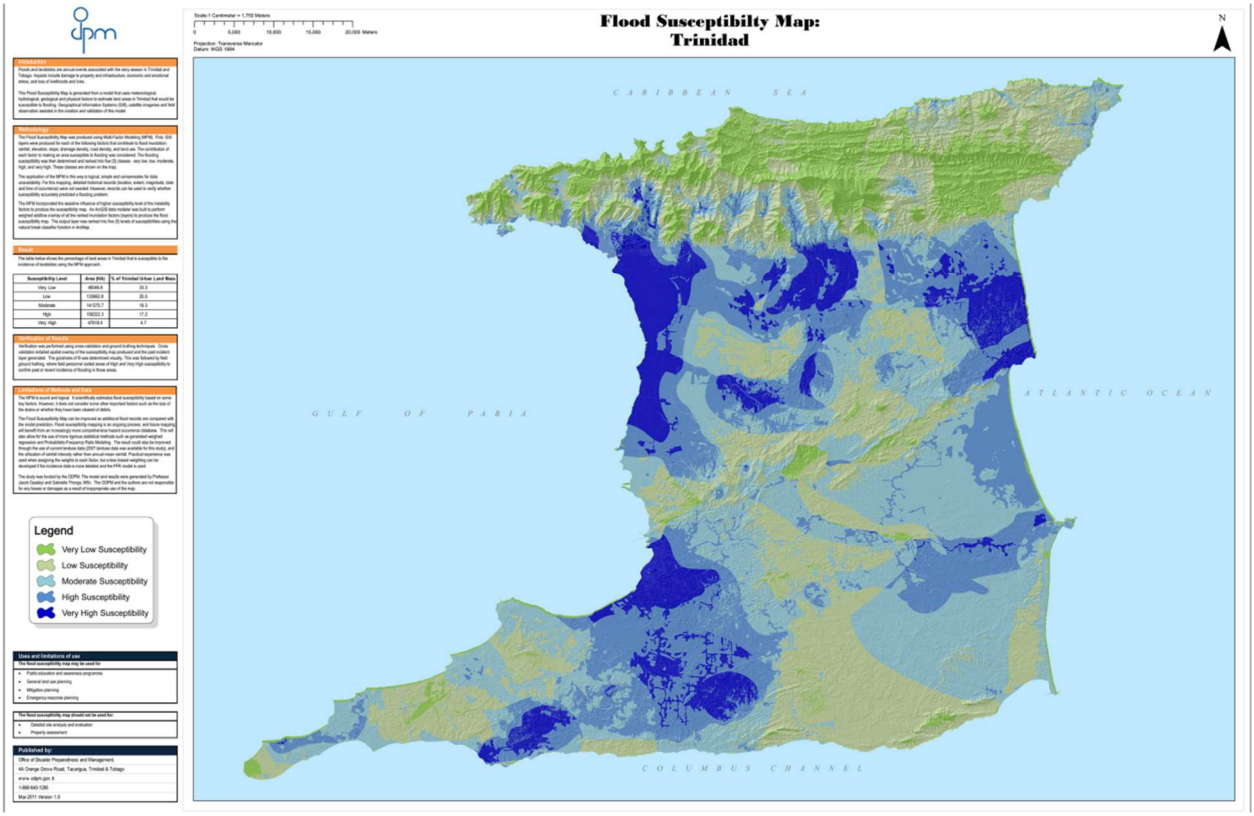

Figure 11: Flood Susceptibility Map of Trinidad

5.10.2.8Landslides

In the Southern Ranges, landslides occur in unconsolidated sands, soils, and muds/clays. These slides occur when clays become over saturated, swell, and begin to slip on gentle slopes (sometimes with gradients less than 5 degrees). Slips have been known to occur from over saturation or have been triggered by heavy vehicular traffic and earthquakes. The proposed project areas are primarily flat with gently undulating slopes where inclines are present. Landslides are unlikely to directly impact upon the proposed wells and the interconnecting pipelines. If they do occur however, they may impede access to the site by vehicular traffic if the road has 'caved-in'. Figure 12 obtained from the ODPM, indicates that the projects are located in an area that has a very low risk of landslides.

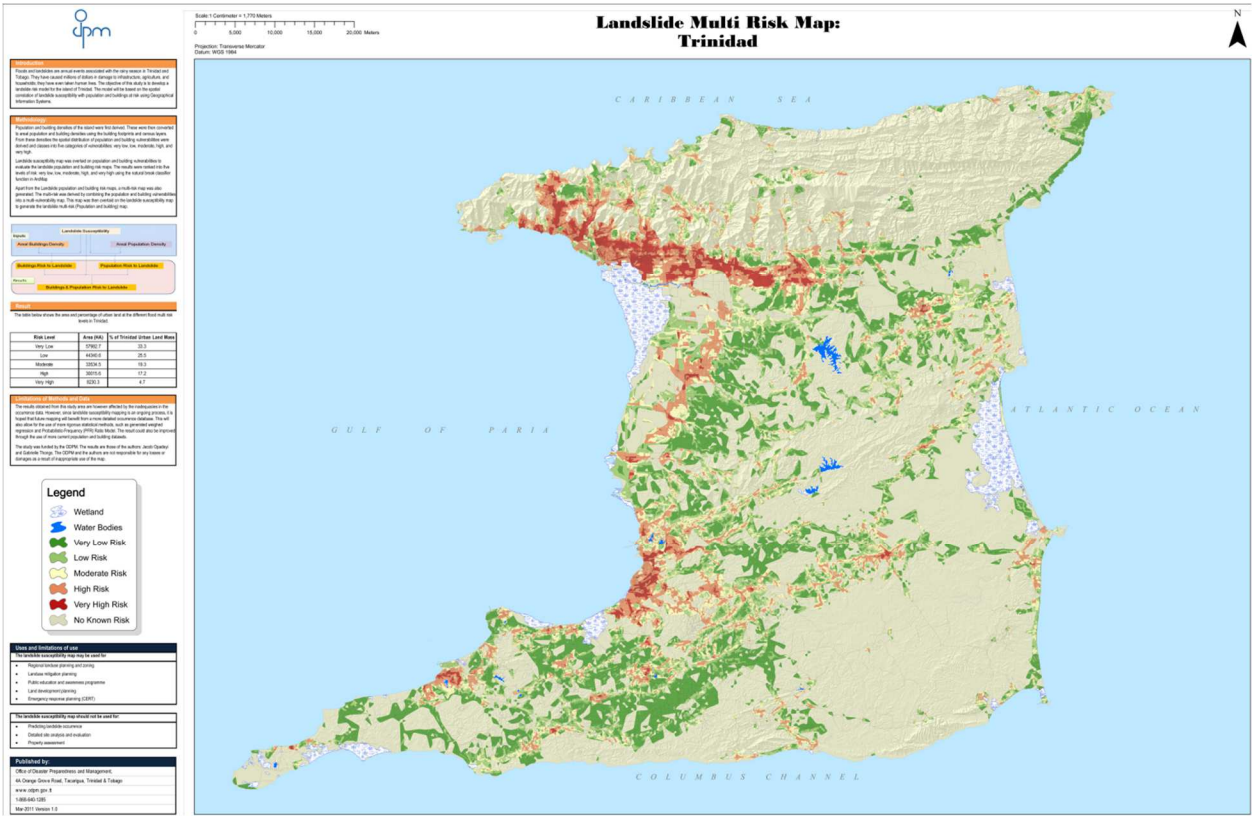

Figure 12: Landslide Multi Risk Map of Trinidad

Table 14: Summary of Credible Potential Hazards associated with the Project

Potential Hazard Scenario	Description
Accident (fire/explosion)	Accident associated with the use of heavy equipment and machinery in construction, resulting in fire or explosion
Land Based Traffic Accident	Accident and associated possibility of injury as a result of increased vehicular traffic
Fuel/Chemical spill or leak	Spill or leak of petroleum fuel or oil from the anchored vessel into the marine environment
Earthquake & landslides	Raw water leaks due to break in transmission pipeline or damage to well /well head
Flooding	Physical damage to well by debris, access impeded
Hurricane force winds	Structural damage to Well infrastructure

Table 15: Risk Ranking of Credible Potential Hazards associated with the Project

Potential Hazard Scenario	Likelihood Ranking	Consequences	Consequence Ranking	Risk Ranking
Accident (Fire/explosion)	1 - Remote	Potential for impact on public/worker health and safety in the event of personal injury	5	5
Land based traffic accident due to increased vehicular	1 - Remote	Potential for impact on public/worker health and safety in the event of personal injury.	5	5

Potential Hazard Scenario	Likelihood Ranking	Consequences	Consequence Ranking	Risk Ranking
traffic				
Fuel/chemical spill or leak into the environment	1 – Remote	Potential significant impacts to water quality, aquatic fauna and habitats	3	3
Earthquake & landslides	2 – Reasonably possible	Leak along transmission pipeline route Leak at well site. Damage to roadway (erosion/landslip)	3	6
Flooding & landslides	1- remote	Potential damage to physical infrastructure (debris carried by flood waters collision with above ground well equipment) Damage to roadway (erosion/landslip)	3	3
Hurricane force winds	2 – Reasonable possible	Minor structural damage to well	2	4

6.0 Environmental & Social Impacts and Risks Identification

Environmental issues should be considered prior to the start of each phase and each planned activity. The purpose of the screening is to determine the potential impacts, mitigation measures, project design, etc. The following section describes the main environmental and socioeconomic impacts and ranks the magnitude or significance of each impact. These are also summarised and identifies the respective mitigation and management plans needed to reduce the impact.

6.1 Impacts Identification

6.1.1 Environmental Impacts

6.1.1.1 Preconstruction

No negative impacts are expected during the preconstruction phase. Preconstruction activities include the acquisition of required permits, definition of alignments, and layout of construction limits, location and establishment of equipment storage of staging areas. This phase also includes ground surveys, public consultation and communication with stakeholders and the general public on the scope, and possible impacts and proposed mitigation measures.

Documents to be prepared in this phase include:

- Utilities location and clearance maps
- Project Phasing Programme and Drawings
- Procurement Plan
- Community Relations and Consultation Plan
- Environmental and Safety Management Plans
- Project Information Packets for distribution

6.1.1.2 Construction

The expected negative environmental impacts and risks are generally the same with the three components i.e. drilling of the well, pipeline installation and refurbishment works at the facility.

These projected environmental & social impacts include:

- Air quality – smoke and nuisance exhaust fumes from the operation of equipment and machinery; dust generated by land clearing/excavation activities and transport of materials to and from the site.
- Water quality – turbid runoff from site following intense rainfall, dewatering of trenches, pump testing of well, washing of roads and site wetting activities. In addition, there can be spills of hydrocarbon during refuelling of vehicles or from leaking equipment.
- Noise – nuisance noise from the operation of machinery and equipment especially during the well drilling and pipeline installation works.
- Disturbance of traffic and public utilities during the transportation of equipment and pipeline installation works– partial closure of roads, detours, limiting traffic, increased traffic congestion along Southern Main Road and Chatham North Trace Road.
- Socio-economic – employment opportunities
- Disruption to Gopiesingh Bar during pipelaying activities
- Underrepresentation of women in the workforce

- Management of materials and construction wastes and storage – debris generated from storage sites, refurbishment works at the Chatham Plant, aesthetics of the area
- Management of sludge from cleaning of the sludge ponds
- Management of cuttings from well drilling activities
- Handling and disposal of spoil from excavation of roadway during pipeline installation
- Environmental risks to soils as a result of excavations & trenching – erosion, loss of topsoil due to wind erosion, compaction of soils.
- Community and Public Safety to pedestrians due to operation of heavy equipment in public spaces

6.1.1.3 Operation

There are no projected major negative environmental impacts during the operation phase. The impacts are projected to be minor, most of which can be readily mitigated. The Impacts are related to operational upsets at the treatment plant, over abstraction from the aquifer, discharge of effluent from the sludge ponds, equipment malfunctions supply and disruptions due to damaged transmission pipelines.

6.1.2 Social Impacts

There are no major or significant negative social impacts in any phase of the proposed project. The project will require land acquisition but will not necessitate resettlement as lands are currently unoccupied. There will be conversion of just under one (1) lot (400m^2) of four (4) hectares of freehold land (currently not in active use) for the establishment of the Chatham Well #15. The associated transmission pipeline will be installed along the verge of a public roadway. There are also no known or registered Cultural Property or Resources along the specific sites or areas of potential impact as well as wider area of impact.

Traffic congestion and road closures/detours could impact businesses, schools and other institutions; but these are short-term inconveniences and delays that may affect a few socioeconomic activities because these projects are in a rural area where traffic flow is limited as well as there are few businesses and/or institutions. While there may peak periods during the early morning and later afternoon where road users may be affected, this impact can be mitigated by scheduling heavy equipment movement on weekends or during “off peak” periods of the day. As with other pipeline installation projects, road reinstatement and disruption to business are social concerns of the stakeholders along with opportunities for employment. However, because the pipeline will be laid on the eastern side (road verge) of Chatham North Trace Road, any potential short-term disturbance to resident driveways will be limited to the approximately twenty (20) properties. Typically, trenches are excavated no more than 2 lengths of pipeline which are then backfilled and temporary reinstated as the works progress. Where there may be disruption to driveways, steel sheets are laid to facilitate residents.

There are no roadside vendors and only one (1) business (Gopiesingh Bar) located along the pipeline route from the well and that is at the junction of Chatham North Trace Road and Southern Main Road. The interconnection works will have minimal disruption and will not require the Bar to close as the main entrance into the property is directly off the Southern Main Road. Therefore, will be no loss of livelihood.

6.1.3 Classification of Impacts

6.1.3.1 Objective

The main intention is to provide a structured method of classification of environmental impacts related to the proposed Projects.

6.1.3.2 Application

It is recognized that there may beneficial environmental impacts that can also arise from this development, this classification system will be used to classify both the significant positive and adverse environmental impacts.

6.1.3.3 Parameters

In this system, environmental impacts are related on the basis of three (3) parameters:

1. Extent
2. Intensity
3. Duration

6.1.3.4 Extent

"Extent" describes the geographical area likely to be impacted by the project. In this classification system, four classes of extent have been defined:

DESCRIPTOR	EXPLANATION	RATING
On-site	Within the Well site, route of the pipeline or WTP compound	1
Localized	Within the immediate Catchment	2
Regional	Within the Siparia Region	3
National	Outside of the defined Regions stated above	4

6.1.3.5 Intensity

"Intensity" describes the degree of change that may result from the potential impact.

DESCRIPTOR	EXPLANATION	RATING
Very Small	No significant effect on the functioning or sustainability of social groups, specific ecosystems or services.	1
Minor	Limited effects on the functioning or sustainability of social groups, specific ecosystems or services.	2
Medium	Significant effects on the functioning or sustainability of social groups, specific ecosystems or services.	3
Major	Serious impairment of the functioning or sustainability of social groups, specific ecosystems or services.	4

6.1.3.6 Duration

“Duration” considers the length of time that the potential impact is expected to last.

DESCRIPTOR	EXPLANATION	RATING

Short Term	Limited to the construction phase of the proposed project	1
Medium Term	Extending from the end of the construction phase into the operation phase but not more than 5years into operation	2
Long Term	Extending beyond 5 years of the operational phase	3

6.1.4 Pre-Mitigation Rating of Potential Impacts

The following Table 18 presents the qualitative pre-mitigation rating of the potential impacts associated with the project. The final overall rating is a sum of the factors (duration, intensity and extent).

Table 16: Summary Rating of Potential Impacts (pre-mitigation)

Environmental & socio-economic aspect	Impact	Duration	Intensity	Extent	Rating
Air quality	Residents and community members Reduced air quality due to increased vehicular traffic (exhaust fumes) and dust from construction activities	Short term (1)	Minor (2)	Localized (2)	5
Water quality	Surface and groundwater contamination through ▪ spills and leaks of oils, hydrocarbons and chemicals ▪ silt loading due to soil erosion ▪ sewage from portable toilets ▪ sedimentation of water courses during desludging of ponds	Short term (1)	Minor (2)	Localized (2)	5
Noise	Increased nuisance noise from the operation of machinery and equipment and from increased vehicular traffic	Short term (1)	Very Small (1)	Localized (2)	4
Over Abstraction of Ground Water	Excessive extraction of groundwater can lead to saltwater intrusion and possible aquifer mining, and potential depletion	Long term (3)	Medium (3)	Localized (2)	8
Traffic	Members of public may experience increased movement of haulage vehicle, road closures and detours which can lead to traffic delays and damage to road surface	Short term (1)	Minor (2)	Regional (3)	6
Waste	Improper disposal of construction wastes and excavated materials Improper disposal of waste cuttings from well drilling	Short term (1)	Minor (2)	On-site (1)	4
Chemical usage	Risk of contamination	Short term (1)	Very small (1)	On-site (1)	3
Soil	Loss of topsoil, soil erosion due to wind and raindrop activity where surfaces are left bare for prolonged periods of time, soil compaction due to operation and movement of equipment. Slope instability and potential increased risk of landslides	Short term (1)	Minor (2)	Localized (2)	5

Environmental & socio-economic aspect	Impact	Duration	Intensity	Extent	Rating
Employment	Contractors and unemployed members within the community may have opportunities for employment of local labour for temporary posts of both skilled and unskilled work	Short term (1)	Minor (2)	Localized (2)	5(+)[1]
Business/Economic Activity	Workers and contractors may rely on local services and patronise vendors, shops and businesses	Short term (1)	Minor (2)	Localized (2)	5(+)
Service Disruption and damage to properties	Service disruptions due to damage of infrastructure associated with other utilities and services and interruptions during laying and interconnection of pipeline from well.	Short term (1)	Very small (1)	Localized (2)	4
Underrepresentation of women in the workforce	Employment opportunities may only be beneficial for men seeking employment in the unskilled and semi-skilled categories; Low employment opportunities for women as they traditionally may be reluctant to seek employment in the construction sector.	Short term (1)	Very small (1)	Regional (3)	5
Community road safety	Construction works may disrupt people's walking patterns and create unsafe and risky conditions for pedestrians. Sensitive receptors include children and he elderly.	Short term (1)	Minor (2)	Localized (2)	5

Table 17: Impact Rating Guide

Rating	***Descriptor***
3 – 5	Minor – short term, localized or onsite, easily reversible
6 – 8	Moderate – short to medium term, localized or regional, reversible with moderate effort and resources
9-11	Major – long term effect, regional or national scale, difficult to reverse, requiring significant resources or irreversible.

ESMF Checklist 3: Identification of Environmental Social Risk and Status Checklist and ESMF Checklist 4: Management Plan Trigger Checklist Environmental and Social Management Framework (ESMF) developed by the IADB were utilized to summarise the potential impacts associated with the construction and operation phases as well inform the number of environmental and social management plans required. These are further elaborated in Part 2- Environmental and Social Management Plan as well as supporting annexes.

[1] (+) denotes that impact is positive rather than adverse

Table 18: ESMF Checklist 3 – Identification of Environmental & Social Risks and Status Checklist

Project Name: *Chatham Water Supply*			
Brief Description of Project: *Drilling of Chatham #15 Well and Rehabilitation of Chatham WTP*			
Will the project have impacts on the following criteria? Check all that apply.			
	Construction Phase	Operation Phase	Mitigation Measures needed
Physical Environment			
Will project involve land excavation?	☐	☒	☒
Will project involve modification of habitats (mangrove forests, coral reefs, seagrass, beaches)?	☐	☐	☐
Will project contribute to habitat degradation?	☐	☐	☐
Will project generate solid wastes, including toxic wastes?	☐	☒	☒
Does project generate effluents that:	☐	☐	☐
a. Are different than currently discharged and would therefore require a new permit	☐	☐	☐
b. Violate effluent standards of Trinidad and Tobago	☐	☐	☐
c. Result in an impact on water quality standards for Trinidad and Tobago	☐	☐	☐
d. Contaminate public drinking water resources	☐	☐	☐
e. Harm fish of aquatic ecosystems	☐	☐	☐
f. Contaminate a natural habitat or protected area	☐	☐	☐
g. Are difficult, expensive or hard to control	☐	☐	☐
h. Are inconsistent with IDB's Environment and Social Safeguards	☐	☐	☐
i. Alter downstream river basin characteristics	☐	☐	☐
j. Contain hazardous materials (including petroleum products etc.)	☐	☐	☐
Does project generate air emissions that are: a. Are different than currently discharged and would therefore require a new permit	☐	☐	☐
b. Violate Trinidad and Tobago air emission standards	☐	☐	☐
c. Result in a long-term violation of Trinidad and Tobago air quality standards	☐	☐	☐
d. Release pollutants that affect downwind sensitive receptors (hospitals, schools, etc.)	☐	☐	☐
e. Harm sensitive ecosystems	☐	☐	☐
f. Impact a natural habitat or protected area	☐	☐	☐

Project Name: *Chatham Water Supply*

Brief Description of Project: *Drilling of Chatham #15 Well and Rehabilitation of Chatham WTP*

Will the project have impacts on the following criteria? Check all that apply.

	Construction Phase	Operation Phase	Mitigation Measures needed
g. Are difficult, expensive or hard to control	☐	☐	☐
h. Are inconsistent with IDB's Environment and Social Safeguards	☐	☐	☐
Is project located in or near sensitive areas? a. protected areas or areas under consideration by the Government for official protection status?	☐	☐	☐
b. forested areas	☐	☐	☐
c. coastlines, wetlands, or other bodies of water	☐	☐	☐
d. river valleys where well-preserved vegetation still exists	☐	☐	☐
Will project involve introduction of or proliferation of alien species?	☐	☐	☐
Will project contribute to the spread of weeds, pests or animal / plant diseases?	☐	☐	☐
Will project contribute to sedimentation of waterbodies?	☐	☐	☐
Will project generate noise levels that: a. Violate Trinidad and Tobago noise standards	☐	☐	☐
b. Impact particularly sensitive receptors (natural habitats, schools, hospitals, etc)	☐	☐	☐
c. Are inconsistent with IDB's Environment and Social Safeguards	☐	☐	☐
Will project consume, store, produce or utilize hazardous materials (HazMat's can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; asbestos; radioactive material; and corrosive substances) that: a. require special permits or licences	☐	☐	☐
b. require licenced or trained personnel	☐	☐	☐
c. are outlawed or banned	☐	☐	☐
d. are difficult, expensive, or hard to manage	☐	☐	☐
e. are inconsistent with IDB's Environment and Social Safeguards	☐	☐	☐
f. has a high risk of explosion, fire, or danger to workers	☐	☐	☐

Project Name: *Chatham Water Supply*			
Brief Description of Project: *Drilling of Chatham #15 Well and Rehabilitation of Chatham WTP*			
Will the project have impacts on the following criteria? Check all that apply.			
	Construction Phase	Operation Phase	Mitigation Measures needed
g. is vulnerable to seismic, flood, terrorist attack, or other danger	☐	☐	☐
Socio-economic Environment			
Will the project impact assure non-deterioration of human health, occupational safety, and non-disturbance or persons involved? a. identification of hazardous tasks and training as required?	☒	☒	☒
b. use of personal protective equipment (e.g., construction related equipment etc.) as required?	☒	☒	☒
c. first aid and emergency plans?	☒	☒	☒
d. supervision and enforcement of rules and regulations regarding health and safety?	☒	☒	☒
e. road safety, safe ingress and egress to the property for delivery and equipment?	☒	☒	☒
f. accident and incident reporting, investigation and resolution?	☒	☒	☒
Does the project require public consultation to consider local people, environmental concerns and inputs?	☒	☒	☐
Have there been any complaints raised by local community or affected groups?	☐	☐	☐
Will the sub-project potentially impact areas of known local, regional or national cultural heritage significance? These may include: a. historical structures	☐	☐	☐
b. archaeological sites	☐	☐	☐
c. buildings or areas not officially protected but recognized by the local population as significant	☐	☐	☐
Will project reduce other people's access to their economic resources, like fishing grounds, agriculture, water, public services or other resources that they depend on?	☐	☐	☐
Will the project likely impede the normal flow of traffic?	☒	☐	☒

Project Name: *Chatham Water Supply*			
Brief Description of Project: *Drilling of Chatham #15 Well and Rehabilitation of Chatham WTP*			
Will the project have impacts on the following criteria? Check all that apply.			
	Construction Phase	Operation Phase	Mitigation Measures needed
Will the project likely impede livelihood activities?	☐	☐	☐
Does project have the potential to increase community tension or dispute?	☐	☐	☐
Will project result in permanent or temporary resettlement of individuals or families?	☐	☐	☐
Will the project result in the temporary or permanent loss of property, crops, fruit trees and household infrastructure (such as granaries, outside toilets and kitchens, etc.)?	☐	☐	☐
Might the project adversely affect vulnerable people and underserved groups (e.g., elderly poor pensioners, physically challenged, women, particularly head of households or widows, etc.) living in the area?	☐	☐	☐

Table 19: ESMF Checklist 4 - Management Plan Triggers

ESMF Checklist 3 – Management Plan Trigger Checklist	**Construction Phase**	**Operation Phase**	**Management Plan Required**
Will the project result in air emissions or dust nuisance?	☒	☐	Environmental Health and Safety Management Plan for Contractors. WASA has HSE Policy as well as Safe Operating Procedures for tasks associated with operations.
Will the project result in noise nuisance?	☒	☐	
Will the project result in negative impacts on Flora and Fauna?	☐	☐	
Will the project result in the generation of waste including hazardous waste?	☒	☐	
Will the project impede the flow of normal traffic?	☒	☐	
Can the project impact negatively the health and safety of workers?	☒	☒	
Can the project impact negatively the health and safety of community members?	☒	☐	Environmental Health and Safety Management Plan
Will the project result on the generation of wastewater?	☐	☐	
Will the project result in impacting access to communities?	☒	☐	Traffic Management Plan

ESMF Checklist 3 – Management Plan Trigger Checklist	Construction Phase	Operation Phase	Management Plan Required
Will the project be impacted by natural or manmade hazards?	☒	☒	
Will the project result in aggravated impacts associated with natural or manmade hazards?	☐	☐	
Is the project activity likely to result in social conflict?	☐	☐	Consultation and Engagement Plan Grievance Procedure
Will the project involve the installation of household metering?	☐	☐	
Does the project have the potential to result in the under-representation of women in the project workforce?	☐	☐	
Can the project activities result in the disruption in water supply?	☒	☐	
Can the project activities result in damage to property?	☒	☐	
Can the project activities result in institutional conflict?	☐	☐	
Is the project likely to impact on the safety and security of personnel and equipment?	☒	☐	Security Management Plan
Will the activity require the hiring of a Contractor?	☒	☐	Contractor Management Plan
Will the project activity likely disrupt livelihood activities?	☐	☐	
Will the project require communication to stakeholders?	☒	☐	Stakeholder Engagement Plan (including Grievance Mechanism)
Will the project require the acquisition of land or resettlement of persons?	☒	☐	The project will require the acquisition of vacant land to a private owner who has already agreed to sell the needed lot (400 sq.m) from a total of 4 ha. No physical or economic resettlement is expected.

7.0 PUBLIC CONSULTATION PLAN

In an effort to ensure that the proposed projects do not have adverse impacts on the stakeholders in the ISA and WSA, consultations and public engagement during the pre-construction and construction phase of the project cycle is necessary. In this way, concerns and issues that may affect the stakeholders can be raised and addressed while their input with suggestions and recommendations can support the project execution. Additionally, by providing the stakeholders with the information as it relates to the proposed projects it will serve to reduce any misconceptions that the stakeholders may have with regards to the proposed works. In that regard, in compliance with the Bank's OP-703, B-6 directive, a Public Consultation Plan has been developed in accordance a Stakeholder Engagement Plan (Annex K). Both of these will be supported by a Grievance and Redress Mechanism (Annex G) which will be implemented during the project cycle. The following provides a summary of the Public Consultation Plan with further details provided in Annex O.

7.1 Objectives and Scope

The stakeholder consultation process is an inclusive process conducted throughout the project's life cycle. The objectives of this Consultation Plan are:

a) To capture the views and perceptions of people who may be affected or have an interest in the project, which can be used as inputs to improve the project design and implementation;
b) To assist in validating and verifying the data obtained elsewhere for use in the ESA/ESMP;
c) To enable people to understand their rights and responsibilities in relation to a project, by providing appropriate information on environmental and social risks and impacts of the project in a timely, understandable, accessible manner and format;
d) To provide greater transparency and involvement of stakeholders, in order to build trust and project acceptance;
e) To provide stakeholder with accessible and inclusive means to raise grievances and allow for their appropriate response and management.

7.2 Stakeholder Identification and Analysis

Stakeholder identification and analysis is an essential component of effective, targeted and meaningful stakeholder engagement. The objective of this step is to provide a general overview of all stakeholders associated with the Chatham Cluster of projects.

7.2.1 Stakeholder Identification

The project stakeholders are persons who have a role in the project, could be affected by the project, or who are interested in the project. The stakeholders for the Chatham Cluster of projects can be divided into the following categories:

a) Project Affected Parties (PAP)

These are the primary stakeholders who are likely to be impacted directly or indirectly, positively or adversely by the project and who are most likely to be susceptible to change associated with the project. The project's directly impacted stakeholders include residents, women and small business owners. While stakeholders will be positively impacted by the projects, they will also experience some degree of temporary nuisance and risks. The project's beneficiaries are all customers (approximately 23,333 persons) within the Chatham Water Treatment Plant supply zone who will experience an improved level

of service. Although all customers within the zone will experience an improved level of service, only 134 households and 13 businesses are expected to experience some form of short-term disruption and inconveniences. Given that Chatham is a rural community with limited economic activity, the most vulnerable group within the Chatham area are the women who are primarily homemakers who spend the majority of time within the home. The data reflects that these women are of predominantly low-mid socio-economic status. As such, particular emphasis will be placed on ensuring that women are included in the consultation process.

There is little to no risk identified for residents and businesses due to the project works associated with development of the new Chatham Well #15, as these works will take place in a remote area away from the populated areas. The rehabilitation of the Chatham Water Treatment Plant will be of low risk to stakeholders as the active project works will be confined to within the facility. The low risk to be encountered will be due to the increased movement of equipment along the Southern Main Road to the Plant. However, this route is a main thoroughfare that already caters for relatively high traffic volume with vehicles of varying sizes and types. However, there will be moderate risk to residents and business along the pipeline route which will connect the new well to the existing pipeline network along Chatham North Trace. This will be due to the inconveniences of traffic, access, noise and dust/runoff associated with pipeline installation works.

b) Interested Parties or Influencers

These are stakeholders whose interest may be affected by the project and who have the potential to influence the project outcomes in any way, but who may not experience the direct impacts of the project. As it relates to the Chatham Cluster of projects this may include unemployed persons in the community, who may wish to be employed by the project, as well as the Parliamentary Representative and Local Government Representatives at the Point Fortin Regional Corporation, along with community groups such as Chatham Village Council, and Chatham Youth Development & Apprentice Centre.

7.2.2 Stakeholder Mapping

A Stakeholder Mapping exercise was undertaken in the Chatham Cluster project area to identify the categories stakeholders who would be impacted and with whom the executing agency would need to consult for project design, development and implementation.

Table 20 identifies the stakeholder categories and subcategories of the Chatham community with the Chatham WTP Rehabilitation and the Chatham Well #15 and associated pipeline installation, represented separately. The table highlights the aspects of the projects for which stakeholders will experience varying levels of risk as well the expected project impacts/interests against the level of risk and Influence of various stakeholders

Table 20: Stakeholder Identification Analysis

Project	Stakeholder Category	STAKEHOLDER DETAILS	Expected or Potential Project Impact/Interest	*Level of Risk (Low, Moderate, High)	Level of Influence (Low, Moderate, High)
PROJECT AFFECTED PARTIES					
Chatham Cluster *(Chatham WTP Refurbishment* **and** *Chatham Well 15)*	**Women**	**Women –** 134 Approximately one per household	▪ Will experience improved water service. ▪ Possible impact by dust/runoff, noise emissions, increased traffic. ▪ Possible damage to road infrastructure within community	Low	low
Chatham Water Treatment Plant Rehabilitation	**Residents**	**Residents** – 94 Along Southern Main Road to the Plant)	▪ Possible noise emissions and increased traffic.	Low to no risk	low
Chatham Well #15 Chatham		**Residents** – 40 Along Chatham North Trace in vicinity of Pipeline Installation	▪ Possible impacted by dust/runoff, noise emissions, increased traffic. ▪ Possible damage to road infrastructure within community.	Moderate	Moderate
Chatham Water Treatment Plant Rehabilitation	**Businesses**	**Businesses** – 13 Located along Southern Main Road to the Plant (1 Food Shop, 6 Mini Marts, 1 Barber Shop, 1 Car Care Shop, 1 Plant Shop, 1 Bar) **Roadside Vendors** - 2 Vegetable stalls	▪ Will experience improved water service. ▪ Possible impacted noise emissions.	Low	Low
Chatham Well #15 Chatham		**Business** – 1 Bar (Gopeesingh's Bar) Along Chatham North	▪ Will experience improved water service. ▪ Possible impacted by	Moderate	Low

Project	Stakeholder Category	STAKEHOLDER DETAILS	Expected or Potential Project Impact/Interest	*Level of Risk (Low, Moderate, High)	Level of Influence (Low, Moderate, High)
		Trace	dust/runoff, noise emissions, increased traffic. ▪ Possible damage to road infrastructure within community.		
INTERESTED PARTIES					
Chatham Cluster	**Unemployed members**	Unemployed members of the community	▪ May obtain temporary employment during pipeline construction works in particular.	Moderate	Low
	Local Contractors	Contractors interested or living in the community	▪ Will benefit from improved water service. ▪ Will be interested in pursuing work on project sites.	Low	Moderate
	Political Representatives	1 - Member of Parliament, Kennedy Richards;	▪ Will benefit from improved water service to residents within their jurisdiction. ▪ Can provide input on key components of the project, including recommendations on the implementation. ▪ Monitor the presence and activities of the contractors.	Low	High
	Local Government	Point Fortin Regional Corporation; Councillor Arlene Ramdeo	▪ Will benefit from improved water service to residents within their jurisdiction. ▪ Can provide input on key components of the project,	Low	High

Project	Stakeholder Category	STAKEHOLDER DETAILS	Expected or Potential Project Impact/Interest	*Level of Risk (Low, Moderate, High)	Level of Influence (Low, Moderate, High)
			including recommendations on the implementation. ▪ Monitor the presence and activities of the contractors.		
	Community Based Organizations;	▪ Chatham Village Council; ▪ Chatham Youth Development & Apprentice Centre	▪ Will experience improved water service. ▪ Can be impacted by dust/runoff and noise emissions. ▪ Can be affected by an increase in traffic. ▪ May represent citizens and monitor project activities in area.	Low	Low

***Low** – little to no risk to stakeholder and/or exercises no material influence over the project*

***Moderate** – has potential risk to the stakeholder that warrants clear mitigation measures; can temporarily delay project execution. Mitigation methods reside in the consultation process by ensuring representation by these stakeholders.*

***High** – major risk to the stakeholder and has the capacity to halt the project. This stakeholder must be kept informed regularly*

7.3 Prior Information

It is important to note that information regarding all aspects of the project be shared in a timely manner with all stakeholders. As such, the MPU PIU and WASA PEU will collaborate to ensure that all stakeholders have adequate time to discuss the information among themselves and develop informed opinions prior to the consultation events including the Community meetings and the Key Informant, House to House Awareness Exercise.

Prior to the hosting of Community Meetings and other interactive sessions, stakeholders will be informed in a timely manner of at least 14 days of details such as date, time, location and agenda. Further, stakeholders will be provided with the project information a minimum of 14 days before, which includes a summary of the project scope, objectives, expected benefits, potential environmental & social impacts as well as mitigation strategies. The following methods will be utilized to provide this prior information:

- MPU & WASA websites & social media platforms at least 14 days prior to the Community Meeting
- Key Informant House to House engagement to begin 14 days prior to the Community Meeting
- Loud speaker public announcements in the project affected area five (5) days prior to the meeting.

7.4 The Consultation Event

The Consultation Process for the Chatham Cluster will involve multi-dimensional stakeholder consultation aimed at providing in-depth information to a wide range of stakeholders while ensuring adequate mechanisms for receiving feedback which can be used to amend, update and enhance project design and delivery.

The consultation process will begin prior to meeting community persons face to face at the community meetings. These consultation process will begin immediately after IDB approval and will disclose the Draft ESA/ESMP, inclusive of details on the project scope, stages, potential issues, risks, impacts and mitigation methods associated with its implementation. This process will familiarize community stakeholders with the project details and provide adequate opportunity to prepare for the planned community meeting engagement to be held at the centrally located Chatham Community Centre, along Chatham South Trace. The public consultation event has been planned for July 12th, 2023 at 5pm. Given the proposed meeting time of 5:00 p.m., it is anticipated that the meeting will be attended by representatives from all stakeholder groups including stay-at-home mothers, working men and women, business people, political and civil representatives and unemployed persons.

Visual and verbal presentations will be delivered at the stakeholder meeting that will further clarify and enhance the written information previously disseminated to community persons. The facilitators will be members of the MPU/WASA project teams, who are experienced in community consultations and who have a demonstrated ability to employ appropriate communication skills such as active listening, clear and empathetic explanations and encourage open feedback on matters raised. These personnel inclusive of a Communications Specialist, who will chair the meeting, will conduct the meeting using the proposed agenda:

- Objectives and Structure of event – Meeting Chairman
- Identification of Key Project Personnel – Meeting Chairman

- Outline of ESA/ ESMP including project details, and possible impact on community stakeholders – Project Leader (PowerPoint presentation)
- Details of Grievance and Redress Mechanism (GRM) – Project Leader
- Questions/Queries/Recommendations from Community Stakeholders on Project – Project Team Lead
- Project Contact and Communication Channels – Meeting Chairman
- Closing Remarks

Printed handouts which summarize the critical project information will be provided to stakeholders in attendance. The consultation meetings will have an attendance register to record attendees and note takers to ensure that critical details are recorded and can be addressed subsequent to the sessions.

In addition to the community meetings, the project consultation process will also employ a secondary two-way direct consultation method by using key informants to conduct a house-to-house sensitization exercise. This exercise will be undertaken at least 30 days before the start of the Chatham Well #15 pipeline works. Given that the pipeline route for Chatham Well #15, runs along Chatham North Trace to the corner of the Southern Main Road and may adversely affect the 40 residents on Chatham North Trace, these key informants from the MPU/WASA project teams (Communications Specialists and Project Leads) will go house-to-house, to further sensitize residence about the project and gather feedback on stakeholder concerns or inputs. The teams will also provide project details, impacts and address perceptions and expectations, information on GRM and how to contact and engage the project in the future. This information will be provided verbally and through printed information packages that will be left with stakeholders. It is believed that this method will ensure none of this specific stakeholder group and in particular stay-at-home persons such as women, the elderly and people with disabilities are not left out of the consultation process. This method will provide an additional opportunity to effectively engage residents who on their specific concerns.

The other methods of information sharing such as Internet/ Digital/ Social Media (MPU & WASA websites & social media pages); Direct Mail Delivery; and Loud Speaker Public Announcements will be utilized throughout the consultation process to provide information on project updates, community relations, employment and procurement, environmental and social aspects of project.

7.5 Stakeholder Feedback, Documentation and Public Disclosure

It is important that stakeholders receive timely and relevant feedback on how issues/concerns raised during the consultation process are being addressed. To ensure that this is achieved a record of the following will be taken during the consultation process and a final report will be prepared:

- Location, time, and participants (Recorded by sector and gender)
- Agenda
- Key issues discussed or asked by participants
- Any agreements reached due to consultation
- Recommendations made for amending project design and/or implementation
- Environmental/Social concerns/impacts and how they were addressed
- Decisions made based on stakeholder inputs to improve project design and implementation

- Areas of disagreement or diverging views and reasons why some recommendations cannot be accommodated
- Agreements on preferred methods and selected persons through which community stakeholders may wish to be notified.
- Videos/Photos of event in progress.

Where applicable, immediate feedback will be provided during the consultation process, or via the Disclosure and Consultation Report, which will be subsequently available on MPU and WASA websites. The Project Team Lead in consultation with the Communications Specialist, will determine any other required engagement method.

7.6 Grievance and Redress Mechanism

The Grievance Mechanism (GRM) is aimed at providing an open and transparent system for complaints and grievances to be resolved regarding any project related matter. The process must be timely, effective and efficient with clearly outlined steps that are shared with all stakeholders. The GRM is a critical tool in building trust and collaboration with the community and as a means of enabling remedial actions. During the consultation event of the ESA/ESMP, the GRM will be disclosed to the public and subsequently, all public grievances will be documented.

8.0 CONCLUSION AND RECOMMENDATIONS

8.1 Conclusions

The main conclusions arising from the environmental assessment are outlined as follows:

1. The selected Well site, pipeline alignment and rehabilitation works to the Chatham WTP are intended to have the least negative impact on the natural and social environment during installation and operation while at the same time having a positive impact on the existing potable water supply and level of service to customers in the supply zone of the Chatham WTP.

2. Impacts associated with the construction phase are anticipated to be short term in duration, of very small to minor intensity and mostly localized in extent, with the greatest impact being disruption to traffic. There are however clear mitigation measures identified for these impacts in the Part 2 -Environmental and Social Management Plan, which would result in a reduction of the impact to acceptable levels and ensure the safe implementation of the proposed Project.

3. There is no relocation and or resettlement of persons required. Only one lot of 400m^2 out of 4 hectares of privately-owned land will be required for the construction of a new well. The owner has agreed to sell the lot and its acquisition is being done following Trinidad and Tobago's Land Acquisition Procedure. Similarly, there is no loss of livelihood associated with any component of the Chatham Projects cluster. Additionally, there will also be opportunities for employment of both skilled and unskilled labour for the duration of the Project.

8.2 Recommendations

1. As much of the background information was sourced from a desktop study of the existing documentation as it relates to the proposed project, additional reconnaissance site visits should be conducted closer to project start dates to ensure that there have not been any significant changes to the project area and the existing conditions in the study area that can impact upon the execution of the Project. Once public consultation are conducted, the ESA & ESMP should be updated if necessary to encompass any issues/impacts or recommendations that may be raised by the stakeholders to improve the projects or its mitigation measures.

Part 2 – Environmental & Social Management Plan (ESMP)

1.0 INTRODUCTION

1.1 Purpose

This Environmental and Social Management Plan (ESMP) supports and has been prepared based on the Environmental & Social Assessment (ESA) for both the construction and the operation phases of the proposed works associated with the Chatham Cluster of Projects; Chatham #15 well, the interconnecting pipeline and the Rehabilitation Works at the Chatham Water Treatment Plant. It presents the mitigation and monitoring plans that will be implemented in an effort to minimize the potential impacts identified in the ESA. Additionally, it is intended to form part of the Contractor Documents and will be continuously reviewed and updated where required during the execution of works.

The contractor is required to ensure that as part of their bid submission a Contractor ESMP is prepared which outlines their approach for implementation of the mitigation and monitoring requirements in addition to their own assessment of environmental, social and safety risks that may arise from their proposed methodology in execution of the works.

1.2 Organization of the ESMP

This ESMP is comprised of four (4) Sections and is supported by a number of additional management plans that have been included as Annexes to the main document. Section 2.0 presents the Institutional Arrangements that will be utilized for the management of the Project, clearly defining roles and responsibilities. Section 3.0 presents the Mitigation Plan to address the impacts identified in Section 6.0 of the Part 1 – ESA while Section 4.0 presents the proposed Monitoring Plan.

Supporting Annexes are as follows:

- Annex A – Certificates of Environmental Clearance
- Annex B – Site Drawings
- Annex C – Traffic Management Plan
- Annex D – Waste Management Plan
- Annex E – Emergency Response Plans
- Annex F – Health & Safety Plan
- Annex G – Grievance Response Plan
- Annex H - Cultural Resources & Archaeological Finds Procedure
- Annex I – Contractor Management Plan
- Annex J – Corrective Action Plan
- Annex K – Consultation & Stakeholder Engagement
- Annex L – Water Resources Assessment of Selected Sub-Aquifers in Trinidad
- Annex M – Security Plan
- Annex N – Soil Erosion and Storm Water Management Plan
- Annex O – Public Consultation Plan

1.0 INSTITUTIONAL ARRANGEMENTS & RESPONSIBILITIES

This Section outlines the institutional and management arrangements designed to effectively implement the proposed mitigation measures for the Project. Additionally, it is intended to provide some insight into the general organization of the Project.

The execution of the Projects will be done by individual Construction Contractor(s) under the supervision of the respective Special Purpose Company and Project Executing Unit (PEU) of the Ministry of Public Utilities (MPU).

The responsibilities and functions of the identified Groups are outlined subsequently.

1.1 The Government of the Republic of Trinidad & Tobago (GORTT)

The **Government of the Republic of Trinidad and Tobago (GORTT)** shall be represented on this project by key Government Ministries which have a special interest in the outcome of the project and lend assistance to project oversight and control. This group may act individually or collectively, as a vocal and visible project champion throughout their representative Ministries. These representatives will approve project deliverables, monitor the progress of the works, provide direction and support to the Project and assist in clearing any administrative bottlenecks.

1.2 The Ministry of Public Utilities (MPU)

The Ministry of Public Utilities (MPU) will serve as the Executing Agency (EA) which has oversight over the execution of the entire Program. In this regard, the MPU will be ultimately responsible for the technical /administrative management, monitoring, evaluation, reporting and environmental and social, management of the Program. The EA will act as the direct counterpart of the Inter-American Development Bank (IDB) with respect to all aspects of the Program.

In support of this function, the MPU will establish a dedicated Project Execution Unit (PEU), which will act as the vehicle through which the MPU will discharge its functions and responsibilities within the framework of the Program and serve as the liaison point with the Bank. Figure 13 illustrates the approved structure for the Ministry of Public Utilities (MPU) – Project Execution Unit (PEU).

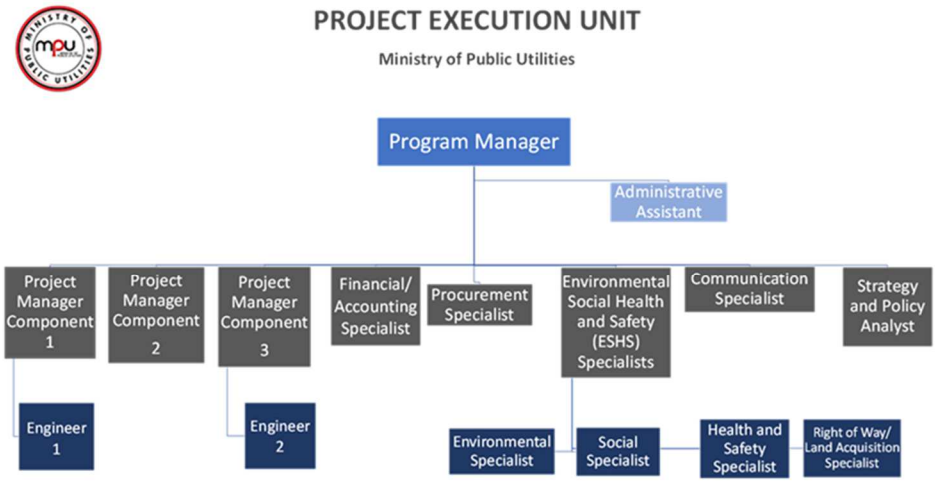

Figure 13: Organisational Structure of the MPU/PEU

Specific responsibilities of PEU/EA will include: (i) preparation, implementation and coordination of the Annual Operating Plans (AOP); (ii) financial administration, Project accounting and preparation of budgets and disbursement requests; (iii) preparation of the Project's annual procurement plan, the procurement of works, goods and services; (iv) coordination of the preparation of technical reports and financial statements; (v) monitoring of the progress of Project activities, environmental and social safeguards compliance, and analysis of variances of actual performance against plans; (vi) selection and hiring of the external auditors and ensuring that the relevant recommendations are implemented; (vii) hiring of consultants for the carrying out of external evaluations and ensuring that the recommendations are implemented; and (viii) serving as a liaison for the Project implementation with the IADB.

Roles and Responsibilities of the ESHS Specialists

As indicated previously, one of the primary functions of the MPU-PEU is Environmental and Social Management. This will be provided by the Environmental and Social, Health and Safety (ESHS) Specialists, responsible for implementing environmental/social aspects of the Program. The ESHS Specialists include the following personnel:

1. Environmental Specialist;
2. Social Specialist;
3. Health and Safety Specialist; and
4. Right of Way/Land Acquisition Specialist.

The ESHS Specialists will be responsible for preparing and supervising the project-specific ESMPs including auditing and advising on contractor EHS plans and performance through the ESA/ESMP

Framework. This includes inter alia, ensuring proper implementation of the mitigation measures, approving and providing guidance on aspects of Environmental Health and Safety (EHS) to the Contractor, and acting as a liaison between the MPU and various stakeholders including contractors.

The main responsibilities of the ESHS Specialists are:

1. Review and implement the Framework ESMP and project-specific ESA/ESMPs and Operations Manual;
2. Prepare according to national law and IDB Policies, and ensure adequate implementation of the project-specific ESA/ESMPs;
3. Develop and maintain relationships with all relevant stakeholders;
4. Prepare quarterly reports on the ESHS aspects of the Program to the IDB (i.e. preparation and implementation of ESA/ESMPs), and report immediately to MPU and IDB in case of accident, fatality or non- compliance. This last notification should include the proposed corrective action plan, timeline and costs;
5. Monitor implementation of works and contractor performance, and their implementation of mitigation measures;
6. Ensure compliance with IDB policies throughout the life of the Program;
7. Develop and write community updates and briefs from an environmental and social perspective;
8. Organize, facilitate, and moderate participatory events in the context of the Program.
9. Attend community meetings; and
10. Assist with the consultation processes based on project-specific ESA/ESMP and prepare its respective reports.

1.3 Water and Sewerage Authority (WASA)

The **Water and Sewerage Authority (WASA)** is considered the Implementing Agency/Client for this Project. The Water and Sewerage Authority (WASA) is a state-owned utility mandated by the Water and Sewerage Authority Act of 1965 to manage the water and sewerage sector of Trinidad and Tobago. WASA is responsible for the development and control of water supply and sewerage facilities in Trinidad and Tobago and promoting the conservation and proper use of water resources. WASA is intended to support the Project in an advisory role as WASA will have the experience and expertise in the water sector.

1.4 Special Purpose Company (SPC)

A firm will be retained in a contractual capacity in accordance with a specific Terms of Reference, approved tender and contractual procedure and shall perform as MPU's representative during the construction works – NIPDEC & NIDCO have been approached to fulfil this role. The NIPDEC & NIDCO will:

- Develop technical specifications and author technical memorandums and manuals to clarify and enhance the Contractor Control Plans recommendations or requirements to the Contractor;

- Review Method Statements, including technical drawings and specifications for performance of special crossings works generated by the Contractor.
- Coordinates with the Contractor on proposed protection, stabilization, restoration, or re-vegetation efforts (e.g., erosion-control structures, water-body crossings, slope stabilization, seeding plans, etc.);
- Prepare E&S components for the periodic reports;
- Meet with local authorities to find cause and resolution of risks and/or damages to communities.
- Manage all sub consultants and contractors on the project team, directing the flow of information between the Contractors, MPU/PEU and WASA;
- Oversee/monitor the Contractor's management of the environmental, health and safety aspects of its work activities on a regular, on-going basis;
- Ensure that he has sufficient and competent resources to perform duties and responsibilities.

1.5 Contractor(s) and Sub-Contractor(s)

The Construction Contractor will be responsible for all construction activities, communication, training, monitoring, and reporting associated with this Project. He will report directly to the Construction Supervisor and will be responsible for the development of the final site-specific Plans, implementation, monitoring, and corrective actions. Prior to commencement of activities, the Contractor has the responsibility to put together an efficient construction crew and the support staff as well as develop a Roles and Responsibilities matrix for his staff, to cover all aspects associated with the implementation, monitoring, and reporting. It is the Contractor's responsibility to supervise all the construction work during all stages of construction, update and effectively report to the Construction Supervisor.

These Contractors will be responsible for implementation of, and adherence to, all the mitigation measures. The costs associated with implementing the mitigation and monitoring programme are to be itemised by the Contractor. The contractor can propose alternative mitigation and monitoring strategies once it has been approved by the Construction Supervisor and Executing Agency.

3.0 MITIGATION MEASURES & CONTROLS

The impacts associated with the proposed Chatham Projects can be mitigated and the risks can be avoided by careful planning and a correct implementation of an Environmental & Social Management Plan (ESMP) which encompasses the mitigation measures stated in Tables 21 & 22. The implementation of an ESMP will be closely monitored by the respective Supervision Teams through well-defined monitoring and reporting procedures.

Crucial strategies to be implemented to manage the limited negative social impacts include the following:

- Identify a community relations officer (CRO) in the main project areas; the CRO will be the focal point and primary conduit for all communications with the Community and Stakeholders:
- Setting up of a complaints mechanism and appropriate response for conflict resolution;
- Continuous consultation and coordination with interested stakeholders.
- Adequate phasing of the works and strict respect of the project plan.
- Timely and adequate information dissemination all through the project execution period.

- Preparation and implementation of Public Consultation, Health and Safety and Emergency Response Plans.

It should be noted that the Contractor's cost associated with Table 21 are not individually identified within the Contractor's submission for the works; it is grouped under environmental and social mitigation. Additionally, the Contracts have not been executed to date and the specific cost are not available until final sign off of the Contracts. However, based on previous studies and similar type works on other projects, some of the costs have been estimated and included in the table.

The Bank also requires that the PEU ensure that all inspection logs/records, certification of equipment & personnel, training records, monitoring data prepared by both the Contractor and SPC HSE in conformance with the monitoring programme are kept and made available for auditing and verification.

Table 21: Summary of Mitigation of Environmental & Social Impacts and Risks associated with the Construction Phase of the proposed project.

Components	**Project Action**					
Environmental & Socio-economic Component	**Impacts**	**Mitigation Measures**	**Reporting**	**Schedule for implementation**	**Costs for implementation**	**Institutional Arrangement**
Air	**Dust Generation –** activities have the potential to cause nuisance to workers and local residents	**Objective:** To minimize dust generated during activities **Actions:** ▪ Wetting of site ▪ Equipment must be maintained in good-working condition to minimize emissions. ▪ Cover stockpile of fill and aggregate ▪ Ensure roads with a gravel or asphalt surface are properly constructed and maintained. ▪ Minimize duration between final restorations of roadways. Also ensure trenches are properly compacted. ▪ Dump trucks transporting fill or spoils are to be covered	A record/log of road wetting, equipment maintenance, equipment & tools certificates activities to be maintained.	To commence during mobilization and continue for the duration of the construction phase until completion.	Included in Contractor's costs	MPU appointed Site Operations Manager Contractor HSE
Water	**Surface and groundwater pollution –** A. Through oil/fuel/chemical leak/spill from storage area during installation B. Surface water pollution – i. From silt loading from soil erosion on-site ii. From sewage from potable toilets	**Objective:** To prevent pollution of groundwater and surface waters **Actions:** **A.** ▪ Pave ground surfaces in storage yards and take precautions to prevent leakages and spills ▪ Ensure fuel and oil storage areas have impermeable containment and spill control kits to mitigate potential fuel spills ▪ Refuel vehicles offsite as far as possible ▪ Remove contaminated soil to a bioremediation cell for treatment (if small spill, remediate onsite) **B.** ▪ Provide adequate facilities for collection and disposal of fecal waste and wastewater generated by the Contractor's Workforce ▪ Cover or confine temporary stockpiles of excavated material or fill material	Inspection reports for the stockpile yard, fuel and material storage areas. Reports from contracted firms hired for bioremediation purposes (as applicable). Disposal certificates issued by firms hired to maintain portable toilets.	To commence during mobilization and continue for the duration of the construction phase until completion.	Included in Contractor's costs <u>Portable Toilet Rental</u>: $1,800 per unit/month (est.)	MPU appointed Site Operations Manager Contractor HSE

Components	Project Action					
Environmental & Socio-economic Component	**Impacts**	**Mitigation Measures**	**Reporting**	**Schedule for implementation**	**Costs for implementation**	**Institutional Arrangement**
		▪ Use of silt traps or any other appropriate sediment retention measures during pipeline installation and desludging of sludge ponds ▪ Supernatant from mud pits to be directed through a silt trap ▪ Store fill material at designated lay down sites.	Inspection logs/reports for silt traps			
Noise	**Potential Increase in Noise Levels-** during pipeline installation works and increased road traffic particularly haulage traffic. During drilling phase of well establishment	**Objective**: To minimize noise generated during installation **Actions:** ▪ Adequate Equipment maintenance ▪ Adequate mufflers outfitted on all tools and equipment. ▪ Keep works between 7:00 a.m. -7:00 p.m. ▪ Acquire Noise Variation as needed.	Equipment maintenance Logs Copy of Noise Variation Permits	To commence at the start of construction.	Included in Contractor's costs	MPU appointed Site Operations Manager
Traffic	**Effects on road network**	**Objective:** To ensure that traffic does not adversely impact on existing road users or the environment. **Actions:** ▪ Co-ordination with the Traffic Branch of the Police Service to regulate traffic during haulage ▪ Haulage vehicles should minimize operation during peak hours ▪ Traffic signs, cones and caution tapes will be utilized ▪ Haulage operations to comply with the requirements of the Mines, Quarries and Borings Act (Ch. 61:01) ▪ Quarry vehicles to adhere to the requirements of the Motor Vehicles and Road Traffic Act (Ch. 48:50) ▪ Repave/Repair all damaged roads or bridges ▪ Provide vehicle wheel washing facility ensure all mud, dirt and other material are cleaned off the Contractor's trucks or	Traffic Plan	Traffic Plan to be developed and approved by the Traffic Branch of the Police Service at least 3 weeks prior to the start of works. Installation of wheel and vehicle washing facilities within the 2 weeks of start of works	Included in Contractor's costs (preparation of Traffic Management Plan Road reinstatement are included in the project design, planning and budget.	Contractor

Components	Project Action					
Environmental & Socio-economic Component	**Impacts**	**Mitigation Measures**	**Reporting**	**Schedule for implementation**	**Costs for implementation**	**Institutional Arrangement**
		other equipment prior to entering onto public Highways and roads.		Repairs to damaged roads, bridges or other infrastructure to be effected prior to completion of the Project		
Waste	**Waste Generation & Disposal**	**Objectives:** To minimize the amount of waste generated during refurbishment and construction including well drilling and desludging of sludge ponds. Reuse and recycle of any waste wherever possible would be done. Care to be taken to dispose of waste in a safe and environmentally sound manner. **Actions:** ▪ Recycle/Reuse all excavated materials where suitable; ▪ Collect spills with appropriate absorbent material and dispose appropriately; ▪ Store spent containers used for holding hazardous liquids separately for collection, stabilization and pre-treatment before disposal ▪ All non-hazardous solid waste will be collected and securely transported to an appropriate landfill ▪ Remove unused fill material and pipe and other material from site as soon as possible ▪ Any hazardous waste encountered will be removed and sent to an appropriate facility ▪ All sludge to be dewatered on site and silt fences erected to prevent silt laden water from running off into nearby water courses ▪ Mud cuttings to be sent to settling tank or mud pit; all supernatant water to be directed through silt trap before release	Log/record of waste removal, volume recycled. Incident reports with regards to spills and remediation actions. Waste disposal records for hazardous materials and excess fill materials	Development of Waste Management Plan at least 1 week prior to start of works on site	Included in Contractor's costs (preparation of Waste Management Plan - $35,000.00 (est.))	MPU appointed Site Operations Manager Contractor HSE

Components	Project Action					
Environmental & Socio-economic Component	**Impacts**	**Mitigation Measures**	**Reporting**	**Schedule for implementation**	**Costs for implementation**	**Institutional Arrangement**
Socio-economic	**Employment-** potential increase of unskilled labor opportunities for local people **Complaints against Project**	**Objectives:** To optimize employment opportunities for local community **Actions:** ▪ Identify any posts that could be filled by local people ▪ Provide advance notification of employment opportunities in the area; ▪ Brief site supervisors on the need to monitor and receive any complains to hazards and nuisances created by the Works.	Employment contracts Complaints procedures	Prior (at least 1 month) to commencement of works	$5,000 - $10,000 per scheduled public consultation	Contractor
Soils	**A. Soil erosion -** Through ground excavations leading to soil exposure to wind and surface runoff **B. Slope instability/landslides**	**Objectives:** To minimize soil erosion and instability during trenching for pipeline installation or repair **Actions:** ▪ Rapid backfilling and compaction of soil; ▪ Provision of drainage cut off ditches to prevent uncontrolled surface water runoff; ▪ Avoid unstable alignments at the bottom/"toe" of steep slopes thereby not affecting the stability of the slope; ▪ Provide adequate shoring to protect against slope failure/trench collapse: ➢ Provide temporary storm drainage diversion channels around trenches. ➢ Minimize the amount of cutting and filling required ➢ Employ slope stabilization measures such as retaining walls, replanting of slopes	Inspection reports	To commence during mobilization and continue for the duration of the construction phase until completion	Included in Contractor's costs	MPU appointed Site Operations Manager Contractor
	C. Soil Contamination	**Objectives:** ▪ Safe disposal and remediation of contaminated soil ▪ To avoid or minimize the potential for soil contamination **Actions:** ▪ Ensure good housekeeping practices of chemicals/fuels etc.	Inspection reports Chemical/waste disposal certificates	To commence during mobilization and continue for the duration of the construction	Included in Contractor's costs	

Components	Project Action					
Environmental & Socio-economic Component	**Impacts**	**Mitigation Measures**	**Reporting**	**Schedule for implementation**	**Costs for implementation**	**Institutional Arrangement**
		used and stored on site at all times during construction (e.g. using drip trays for standing plant storage of fuels and oils on containment bund); ▪ Implement appropriate procedures for: ➢ Handling, storage and disposal of chemicals/products used onsite during construction ➢ Spill prevention and emergency response	from selected service provider/firm	phase until completion		
Services & Resident Infrastructure	**Disruption to other Services including water supply**	Coordination between utilities and local governments to establish schedules to minimize inconveniences as well as mapping of any underground utilities (TSTT, T&TEC, WASA,). Notices to be sent to customers 1 week in advance of works. Sensitive receptors e.g. schools to be provided with Truck Borne Supply Interconnection to be performed on the "off schedule" or coordinated during any planned shut down works/maintenance works by WASA	Advertisements posted in local newspapers. Responses from various agencies with regards to the location of utilities	Prior to physical works or Ground breaking	Any relocation of existing utilities and road reinstatement are included in the project design, planning and budget.	MPU appointed Site Operations Manager Contractor
	Damage to property or restricted access	Steel sheets placed over trenches to allow for resident to access driveways Trenches are not to be left open overnight and not temporarily reinstated Record of all damages to be immediately assessed	Complaints from Residents Survey of all residents driveways and walls with working limits for equipment marked Coordination with residents	Notification of works at least 1 week in advance of start of physical works	Any reinstatement are included in the project design, planning and budget.	MPU appointed Site Operations Manager Contractor

Components	Project Action					
Environmental & Socio-economic Component	**Impacts**	**Mitigation Measures**	**Reporting**	**Schedule for implementation**	**Costs for implementation**	**Institutional Arrangement**
Chemical Usage	**Risk of chemical spill**	**Objective:** ▪ Safe usage of chemicals **Actions:** ▪ All chemicals will be handled in accordance with MSDS ▪ Implement appropriate procedures for: Handling, storage and disposal of chemicals used onsite during operation ▪ Develop spill prevention and emergency response ▪ Wear appropriate PPE and adhere to OSH Act	Inspection reports Toolbox meeting records (training) Training records	At least 1 week prior to start of works on site as part of Spill Response & Emergency Response Plans	Included in Contractor's costs	MPU appointed Site Operations Manager Contractor HSE
Health and Safety	Health and Safety accidents to the operating staff and/or the public.	▪ Implement proper Health and Safety plans and procedures. ▪ Ensure access to Well. is restricted to authorized personnel only. ▪ Signage and Traffic Mgt during pipeline works and rehabilitation works at the plant ▪ Regular maintenance and inspection of electrical and mechanical systems. ▪ All personnel and equipment are certified and competent	H&S Inspection Reports Log of incidents and near misses Copies of all Safety Permits and Job Safety Analyses	At the commencement of operations and continuing for the duration of operations	Included in Contractor's costs	MPU appointed Site Operations Manager Contractor HSE

Table 22: Summary of Mitigation of Environmental & Social Impacts and Risks associated with the Operation Phase of the proposed project

Components	**Action**					
Environmental & Socio-economic Component	**Impacts**	**Mitigation Measures**	**Reporting**	**Schedule for implementation**	**Costs for implementation**	**Institutional Arrangement**
Water	Over abstraction and salinisation	▪ Abstract only the recommended rate as provided by Water Resources Agency (WRA) Refer to Annex L, Water Resources Assessment of Selected Sub-Aquifers.	Production logs	When well is brought online	Included in WASA's routine maintenance & operations costs	WRA & Implementing Agency/WASA
Noise	**Potential Increase in Noise Levels-** operation of Well equipment	▪ Selection and use of quiet equipment ▪ Ensure that equipment is in good working order at all times ▪ Repair equipment that may be malfunctioning	Inspection reports Noise complaints	At the commencement of operations and continuing for the duration of operations	Included in WASA's routine maintenance & operations costs	WASA Roving Operator for area
Traffic	Damage to roadway during pipeline installation Uneven surface due to poor road reinstatement works Land slippage due to broken mains	▪ Ensure road reinstatement is in compliance with appropriate standards and approved by Ministry of Works and Transport ▪ Regular inspection of transmission pipeline route ▪ Repair leaks/broken mains in quickest possible time	Regular/Routine Inspection and incident reports	At the commencement of operations and continuing for the duration of operations	Included in WASA's routine maintenance & operations costs	WASA Roving Operator for area WASA maintenance Crews
Health and Safety	Health and Safety accidents to the operating staff and/or the public.	▪ Implement proper Health and Safety plans and procedures. ▪ Ensure access to Well. is restricted to authorized personnel only. ▪ Regular maintenance and inspection of electrical and mechanical systems.	H&S Inspection Reports Log of incidents and near misses Copies of all Safety Permits and Job Safety Analyses	At the commencement of operations and continuing for the duration of operations	Included in WASA's routine maintenance & operations costs	Operators and Maintenance Crews/ WASA
Public Concerns	Public nuisance	▪ Record and follow up with all complaints received from the general public regarding operation of the	Incident reports/complaints	At the commencement	Included in WASA's routine	WASA Customer

Components	Action					
Environmental & Socio-economic Component	**Impacts**	**Mitigation Measures**	**Reporting**	**Schedule for implementation**	**Costs for implementation**	**Institutional Arrangement**
		Well and associated transmission pipeline system	investigation reports	and continuing for the duration of operations	maintenance & operations costs	Service/ WASA

3.1 Overview of Supporting Plans

3.1.1 Traffic Management Plan

At a minimum, the Plan should meet the following specific objectives as it applies to the management of traffic created during the Construction Phase:

- To provide a safe route for site traffic to enter and leave the Project site.
- To identify any risks to the public and local traffic from construction vehicles and to put control measures in place to protect all members of the public, drivers & site workers, from any injury involving traffic travelling to and from the site.
- To place restrictions on heavy vehicles to use the selected route only.
- To provide measures to control the speed of construction traffic.
- To prevent parking within the local estates.
- To outline control procedures for all site vehicles during movement along the selected route and to provide traffic control measures limiting reversing and turning movements.
- To outline procedures for dealing with emergencies.
- To outline plans to keep the residents in the locality informed of intense truck movements.
- To consider the safety of all road users including pedestrians and cyclists and particular attention to the safety of children, the elderly, cyclists and the disabled.
- To provide control measures to reduce the speed of vehicles using the route.
- To prevent excessive off-loading on public roads or public areas.
- To take all necessary precautions to avoid damage to the existing road network.
- To provide details on plans to minimize mud nuisance problems arising on the existing road network.
- To maintain public park amenities where possible along the route.
- To outline a procedure to warn all site personnel and drivers of any hazards that may exist
- To allow pedestrians walk/access across the designated route in a safe manner.

See ***Annex C*** for the full Traffic Management Plan

3.1.2 Waste Management Plan

The Waste Management Plan is intended to address wastes generated by the project. These wastes are defined as follows:

Waste	Waste may be defined as a material that has no intended use or reuse. Contaminated chemicals/materials, chemicals/materials in deteriorating containers, and any other chemical(s)/material(s) that are no longer used or useful should be considered as a waste.
Hazardous Waste	Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes. The national Waste Management Rules further defines hazardous wastes.
Non-hazardous Waste	Any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including

	solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities which does not pose a significant threat to human health or the environment.
Universal Waste	Universal waste comes primarily from consumer products containing mercury, lead, cadmium and other substances that are hazardous to human health and the environment. These items cannot be discarded in household trash nor disposed of in landfills. Examples of universal waste are batteries, fluorescent tubes, and many electronic devices.
Unknown Wastes	Refers to wastes that cannot be identified typically as a result of improper labeling and/or labeling that is no longer legible. This waste must first be identified or its characteristics determined prior to its disposal so that it can be disposed of in an environmentally sound manner

Annex D presents the Waste Management Plan for the proposed Project. This plan is intended to be adopted and modified as needed by the Contractor.

3.1.3 Emergency Response Plans (ERP)

Emergency Response Plans (ERPs) were developed for the proposed Projects as part of the Certificate of Environmental Clearance (CEC) applications. These ERPs are presented in ***Annex E*** and form part of the CEC issued by the Environmental Management Authority (EMA) that must be complied with by the Contractor. The ERP is intended to ensure that in the case of an emergency there are clear procedures to be followed in an effort to minimize injury, loss of life and damage. All employees must be familiar with these procedures and use of emergency equipment.

3.1.4 Health & Safety Plan (HASP)

The health and safety of both employees and the public/communities are of particular importance. This HASP uses the Zero Incident management approach. The safety goal for this project is zero incidents, zero injuries. The Zero Incident philosophy originated with a study by the Construction Industry Institute (CII), which identified specific control measures shown to dramatically reduce the probability of incidents.

These control measures, known as Zero Incident Techniques, provide the framework for this HASP, and the Project Team's proactive approach to manage the interrelated areas of safety, health, environment, and risk management. The definition of an incident is any unplanned or unexpected event that results in or has the potential to result in (i.e., near-miss incident) a personal injury, property damage or environmental release.

To ensure the success of the HASP, the project safety culture must be dynamic and evolving. This begins with training all management personnel in the foundations and philosophy of the Zero Incident Techniques and through Supervisory Training in Accident Reduction Techniques, known as the START program. ***Annex F*** presents the complete HASP for the proposed Project.

3.1.5 Grievance Procedure

The purpose of the Grievance Procedure is to facilitate the formal registering of Stakeholder complaints/grievances about any phase or aspect of the implementation of the Project; this process is not limited to "environmental issues or concerns".

Grievance statements could be provided by emails, letters, phone calls oral reports addressed to the:

- Ministry of Public Utilities (MPU)
- Project Executing Unit (PEU)
- Special Purpose Company (SPC)
- Contractor
- Community Relations Officer or Livelihood and Gender Specialist

The PEU, with the support of the Special Purpose Company (SPC) and/or the Contractor will address the Grievance with the respective stakeholder(s) and document it in the Grievance and Complaints Records. ***Annex G*** provides further details.

3.1.6 Cultural Resources & Archaeological Finds Procedure

The Contractor and Executing Agency will be responsible for following measures to ensure the protection of any heritage resources during all phases of the project. Appropriate mitigation measures will be devised accordingly however ***Annex H*** provides guidelines and further details with regards to procedure to be followed in the event of a suspected cultural heritage or archaeological find.

3.1.7 Contractor Management Plan

Contractor(s) and sub-contractor(s) will be under the management of the Special Purpose Company (SPCs) – NIPDEC & NIDCO. They will be responsible for ensuring that works undertaken are in compliance with industry best practices, national and international laws, regulations and policies as well as IADB's Operating Procedures. ***Annex I*** provides further information with regards to mitigation measures and monitoring frequencies identified by the IADB.

3.1.8 Corrective Action Plan

A corrective action is a term that encompasses the process of reacting to product problems, stakeholder complaints or other nonconformities and fixing them. The process includes:

- Reviewing and defining the problem or nonconformity
- Finding the cause of the problem
- Developing an action plan to correct the problem and prevent a recurrence
- Implementing the plan
- Evaluating the effectiveness of the correction.

It is expected that the CONTRACTOR will follow a similar process to implement corrective actions. ***Annex J*** presents further details.

4.0 MONITORING

4.1 Construction Phase

The monitoring program evaluates the effectiveness of the management and implementation of the mitigation measures associated with the projected environmental and social impacts.

The proposed monitoring program is summarized in Table 23, Monitoring Program. The table lists the proposed mitigation measures, the related indicators, the items to be measured, the measurement frequency and the person/institution responsible for implementation of the mitigation measure.

The proposed monitoring program reflects the categories and classifications of the Environmental and Social Assessments and related Mitigation Measures. The Monitoring Program as presented in Table 23 has the following sections:

- Air – dust generation
- Water – surface and groundwater quality and pollution
- Noise – increased level of noise
- Traffic – effects on road network
- Waste – generation and disposal
- Socio-economic – employment opportunities and complaints
- Soils – soil erosion, slope instability and soil contamination
- Services – disruption to other services & utility relocations
- Health & Safety – accidents and injuries to contractor staff, WASA employees and members of the public

It should be noted that the Contractor's cost associated with Table 23 are not individually identified within the Contractor's submission for the works; it is grouped under environmental and social monitoring. Additionally, the Contracts have not been executed to date and the specific cost are not available until final sign off of the Contracts. However, based on previous studies and similar type works on other projects, some of the costs have been estimated and included in the table.

4.1.1 Air

Daily inspections are to confirm the use of PPE, dust suppression methods and related tasks. The monitoring will be conducted by the Construction Supervisory Team of the SPU with daily inspections.

4.1.2 Water

The indicators for the mitigation of the impacts on water quality include staff orientation in spill control and minimization, drainage control, materials storage, discharge of storm water in approved methods, application of controls during storms/extensive rains and flood conditions. Monitoring will be triggered by flood and storm conditions and routinely on a monthly cycle. Water Quality monitoring will be conducted by the Construction Supervisory Team of the SPU.

4.1.3 Noise

Monitoring will be conducted by Contractor Staff with daily inspections and monthly audits. The indicators include use of PPE, maintenance of equipment and machinery and limiting of work hours, as needed.

4.1.4 Traffic

Monitoring focuses mainly on the development and implementation of the Traffic Management Plan. Monitoring is provided by the Contractor Team with oversight by the Construction Supervisory Team. Indicators are evidence of the completion or implementation of the various tasks and systems. Monitoring is continuous with daily and weekly inspections and monthly audits.

4.1.5 Waste

The Contractor Staff will conduct the monitoring with a cycle of daily inspections, and monthly audits. The indicators include approvals for placement of wastes, volume of wastes recycled, disposal certificates.

4.1.6 Soils

Monitoring will be conducted by Contractor Staff with weekly and incidental inspections. The indicators include disposal certificates for excavated materials removed from site, length of time trench remained open, length of time bare soils left exposed, use of trench boxes (if needed).

4.1.7 Socio-economic

Monitoring will be conducted by the MPU PEU with weekly audits. Indicators include number of complaints received, resolved and outstanding, number of local persons employed.

4.1.8 Services

Monitoring is scheduled to be executed mainly by the Construction Supervisory Team utilizing onsite inspections and scheduled audits. The monitoring is continuous on a generally monthly cycle.

Table 23: Monitoring Programme – Construction

Component	Proposed Mitigation/Control Measure	Indicator	Institutional Responsibility		Cost Estimates
			Monitoring Responsibility	Frequency	
Air – Dust Generation	▪ Wetting of site ▪ Equipment must be maintained in good-working condition to minimize emissions. ▪ Cover stockpile of fill and aggregate ▪ Ensure roads with a gravel or asphalt surface are properly constructed and maintained. ▪ Minimize duration between final restorations of roadways. Also ensure trenches are properly compacted.	▪ Active dust suppression actions – log of activities ▪ Use of PPE ▪ Equipment maintenance logs ▪ No. of complaints received ▪ Air quality monitoring – TSP (as needed/incidental)	Contractor HSE	▪ Daily – active dust suppression & PPE use ▪ Weekly – equipment maintenance logs & complaints	Included in Contractor's costs
Water – surface and groundwater	**From spills & leaks** ▪ Pave ground surfaces in storage yards and take precautions to prevent leakages and spills ▪ Ensure fuel and oil storage areas have impermeable containment and spill control kits to mitigate potential fuel spills ▪ Refuel vehicles offsite as far as possible ▪ Remove contaminated soil to a bioremediation cell for treatment (if small spill, remediate onsite) **From silt loading & portable toilets** ▪ Provide adequate facilities for collection and disposal of fecal waste and wastewater generated by the Contractor's Workforce ▪ Cover or confine temporary stockpiles of excavated material or fill material ▪ Use of silt traps or any other appropriate sediment retention measures during pipeline and installation ▪ Store fill material at designated lay down sites	▪ Oil sheens on paved surfaces or floating on surface of water bodies ▪ Soil contamination with hydrocarbons ▪ Soil bioremediation certificates ▪ Personnel trained in proper handling and disposal of fuels, oils and chemicals ▪ Use and maintenance of spill kits/ Maintenance Logs ▪ Incident Logs ▪ Spill response plan ▪ Disposal certificates ▪ Personnel trained in stockpile management ▪ Active silt/sediment retention actions – log of activities <u>Water Quality Monitoring Programme – for at a minimum TSS and T&OG</u>	SPC HSE	▪ Daily inspections – site conditions ▪ Monthly audits – training records, disposal certificates, bioremediation certificates, sediment retention maintenance logs <u>WQ Monitoring:</u> Quarterly	Included in Contractor's costs Portable toilet maintenance: $400.00 - $1000.00 per unit/month WQ Monitoring: $6,000.00/sampling event (est.)
Noise –	▪ Adequate Equipment maintenance	▪ Equipment maintenance logs	Contractor HSE	▪ Daily inspections	Included in Contractor's

Component	Proposed Mitigation/Control Measure	Indicator	Institutional Responsibility		Cost Estimates
			Monitoring Responsibility	Frequency	
Increased noise level	▪ Adequate mufflers outfitted on all tools and equipment. ▪ Keep works between 7:00a.m -7:00p.m	▪ Hours of work ▪ PPE and proper hearing protection ▪ Noise complaints ▪ Noise Monitoring – LA_{eq}		– PPE ▪ Monthly audits – equipment logs ▪ Noise monitoring: weekly	costs Noise Monitoring: $20,000.00/site (est.)
Traffic – effects on road network	▪ Co-ordination with the Traffic Branch of the Police Service to regulate traffic during haulage ▪ Haulage vehicles should minimize operation during peak hours ▪ Traffic signs, cones and caution tapes will be utilized ▪ Haulage operations to comply with the requirements of the Mines, Quarries and Borings Act (Ch. 61:01) ▪ Quarry vehicles to adhere to the requirements of the Motor Vehicles and Road Traffic Act (Ch. 48:50) ▪ Repave/Repair all damaged roads or bridges ▪ Provide vehicle wheel washing facility ensure all mud, dirt and other material are cleaned off the Contractor's trucks or other equipment prior to entering onto public Highways and roads.	▪ Approved Traffic Management Plan ▪ Log of personnel exposed to induction training ▪ Schedule of materials deliveries to site ▪ Flyers and radio announcements ▪ Appropriate barriers and signage ▪ Flag and banks men in place ▪ Disruption of the physical environment	▪ SPC Team – Approval of Traffic Management Plan ▪ Contractor Team – schedule of deliveries, placement of signage, flag men and banksmen, repairs to damaged infrastructure ▪ MPU – liaison with Corporate Communications for advertisements on traffic disruptions	Traffic Plan: Once – prior to start of works; monthly reviews and updates as needed Materials Deliveries: Monthly reviews Barriers signage & flag men: Daily inspections Flyers & Announcements: At least one (1) week prior to start of the intended works	Traffic Plan – to be determined $300 per advertisement per day in a daily newspaper (est.)
Waste – generation & disposal	▪ Recycle/Reuse all excavated materials where suitable; ▪ Collect spills with appropriate absorbent material and dispose appropriately; ▪ Store spent containers used for holding hazardous liquids separately for collection, stabilization and pre-treatment before disposal ▪ All non-hazardous solid waste will be collected and securely transported to an appropriate landfill ▪ Remove unused fill material and pipe and other material from site as soon as possible ▪ Any hazardous waste encountered will be removed and sent to an appropriate facility	▪ Induction training of workers – log of personnel trained ▪ Approved spill response plan ▪ Approved secondary containment in place for hazardous liquids ▪ MSDS on site ▪ Designated sites for non-hazardous waste storage ▪ Disposal certificates for construction wastes removed from site ▪ Disposal certificates for hazardous materials encountered and removed from site ▪ Quantities of construction materials	Contractor HSE – induction training, secondary containment, MSDS, designation of waste storage sites, disposal certificates SPC - Spill Response Plan	Induction training: whenever new employees or sub- contractors are hired Disposal certificates, MSDS etc.: monthly inspections/audits Spill Response Plan: once prior to start of works	Included in Contractor's costs Spill Response Plan: to be determined

Component	Proposed Mitigation/Control Measure	Indicator	Institutional Responsibility		Cost Estimates
			Monitoring Responsibility	Frequency	
	▪ Ensure proper handling and disposal of asbestos material	and/or excavated waste recycled/reused			
Socio-economic – employment & complaints	▪ Identify any posts that could be filled by local people ▪ Provide advance notification of employment opportunities in the area; ▪ Brief site supervisors on the need to monitor and receive any complains to hazards and nuisances created by the Works.	▪ Local persons hired either by Contractor or sub-contractors ▪ Job opportunity announcements on site notice boards/community centres ▪ Established complaints/grievance procedure	Contractor Team	Monthly reviews and reports	Included in Contractor's costs
Soils – soil erosion, slope instability & soil contamination	**Soil erosion & slope instability** ▪ Rapid backfilling and compaction of soil; ▪ Provision of drainage cut off ditches to prevent uncontrolled surface water runoff; ▪ Avoid unstable alignments at the bottom/"toe" of steep slopes thereby not affecting the stability of the slope; ▪ Provide adequate shoring to protect against slope failure/trench collapse: ➢ Provide temporary storm drainage diversion channels around trenches. ➢ Minimize the amount of cutting and filling required ➢ Employ slope stabilization measures such as retaining walls, replanting of slopes	▪ Erosion control measures ▪ Use of trench boxes and shoring	Contractor Team	Daily Inspections	Included in Contractor costs
	Soil contamination ▪ Ensure good housekeeping practices of chemicals/fuels etc. used and stored on site at all times during construction (e.g. using drip trays for standing plant storage of fuels and oils on containment bund); ▪ Implement appropriate procedures for: ➢ Handling, storage and disposal of	▪ Designated and approved storage areas ▪ MSDS available ▪ Disposal certificates ▪ Approved spill response plan	Contractor Team SPC Team	Monthly Inspections	

Component	Proposed Mitigation/Control Measure	Indicator	Institutional Responsibility		Cost Estimates
			Monitoring Responsibility	Frequency	
	chemicals/products used onsite during construction ➢ Spill prevention and emergency response ➢ Provide cut off drains lined with impermeable material and soak away with bales of grass to lift and hold small amounts of hydrocarbon in surface run off				
Services: disruption to other services & utilities	Coordination between utilities and local governments to establish schedules to minimize inconveniences as well as mapping of any underground utilities (TSTT, T&TEC, WASA,)	▪ Site location maps ▪ Utility coordination ▪ Record of disruptions ▪ Number of complaints	SPC Team	Weekly reviews	Included ion Contractor's costs
Health and Safety	▪ Implement proper Health and Safety plans and procedures. ▪ Ensure access to Well is restricted to authorized personnel only. ▪ Work zones within Chatham Plant is demarcated and restricted to authorized personnel only. ▪ Use of signage and Lock Out/Tag Out ▪ Permit to Work System implemented and compatible with WASA's system ▪ Regular maintenance and inspection of electrical and mechanical systems. ▪ Ensure availability and accessibility of Emergency Supplies	▪ H&S Inspection Reports ▪ ▪ H&S Incident Reports ▪ Daily Tool Box Meetings ▪ JSA and Safety Permits Reviewed and Signed off	Contractor Team SPC Team	Monthly Daily Daily	Included in Contractor's costs

Table 24: Monitoring Programme - Operation Phase

Components	Proposed Mitigation/Control Measures	Indicator	Institutional Responsibility		Cost Estimates
			Monitoring Responsibility	Frequency	
Water	▪ Abstract only the recommended rate as provided by Water Resources Agency (WRA) to ensure adequate recharge as well reduce potential for desalinisation ▪ Discharges from pond comply with EMA Water Pollution Standards	Production logs (Quantity & quality) Static water levels in observation wells Effluent Samples for TSS, pH, Residual Chlorine, COD, Fe. Visual Inspection of any discharge from pond	WRA & Implementing Agency/WASA Quality Control & HSE Plant Operations	Monthly Monthly Daily	Included in WASA's routine maintenance & operations costs
Noise	▪ Selection and use of quiet equipment ▪ Ensure that equipment is in good working order at all times ▪ Repair equipment that may be malfunctioning	Inspection reports Noise complaints (public and employees)	WASA Roving Operator for area HSE	Daily Incidental/upon receipt of complaint Annual Noise Audit of Equipment	Included in WASA's routine maintenance & operations costs
Traffic	▪ Ensure road reinstatement is in compliance with appropriate standards and approved by Ministry of Works and Transport ▪ Regular inspection of transmission pipeline route ▪ Repair leaks/broken mains in quickest possible time	Regular/Routine Inspection and incident reports	WASA Roving Operator for area WASA maintenance Crews	Daily Incidental/upon receipt of leak report	Included in WASA's routine maintenance & operations costs
Health and Safety	▪ Implement proper Health and Safety plans and procedures. ▪ Ensure access to Well. is restricted to authorized personnel only. ▪ Regular maintenance and inspection of electrical and mechanical systems. ▪ Ensure availability and accessibility of Emergency Supplies	H&S Inspection Reports H&S Incident Reports JSA and Safety Permits Reviewed and Signed off # of High Risk Non-Compliances from Safety Inspection	Operators and Maintenance Crews/ WASA H&S	Monthly	Included in WASA's routine maintenance & operations costs
Public Concerns	▪ Record and follow up with all complaints received from the general	Incident reports/complaints investigation reports	WASA Customer Service/ WASA	Incidental	Included in WASA's routine

Components	Proposed Mitigation/Control Measures	Indicator	Institutional Responsibility		Cost Estimates
			Monitoring Responsibility	Frequency	
	public regarding operation of the Well and associated transmission pipeline system				maintenance & operations costs

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CERTIFICATE OF ENVIRONMENTAL CLEARANCE

[Pursuant to the Environmental Management Act, Chapter 35:05, section 36 (1), and the Certificate of Environmental Clearance Rules, Rule 7 (1) (a)]

THE ENVIRONMENTAL MANAGEMENT AUTHORITY (EMA) OF TRINIDAD AND TOBAGO HEREBY CERTIFIES THE ISSUE OF A CERTIFICATE OF ENVIRONMENTAL CLEARANCE (CEC)

CEC6568/2022

TO THE **WATER AND SEWERAGE AUTHORITY** FOR THE SPECIFIC PURPOSE OF ***"THE DRILLING, DEVELOPING AND EQUIPPING OF THE CHATHAM #15 WELL FOR PRODUCTION STATUS AND THE INSTALLATION OF 1.5 KILOMETRES OF A 100-MILLIMETRES, POLYVINYL CHLORIDE (PVC) PIPELINE, INCLUSIVE OF ASSOCIATED APPURTENANCES"*** ALONG ***BOBBY TRACE, OFF CHATHAM NORTH TRACE, CHATHAM.***

Date of Issue: **February 23, 2023**

MANAGING DIRECTOR

Please Note:

1. The issuance of this Certificate is not authorization to commence any works related to the project unless all other approvals from statutory, regulatory and relevant agencies are obtained.
2. The Certificate shall cease to have any validity, force or effect if the activity for which the Certificate was granted, does not commence within three years from the date of issue.

CERTIFICATE OF ENVIRONMENTAL CLEARANCE

Pursuant to the Environmental Management Act, Chapter 35:05, section 36 (1), and the Certificate of Environmental Clearance Rules, Rule 7 (1) (a)

The **Environmental Management Authority (EMA) of Trinidad and Tobago** hereby certifies the issue of a Certificate of Environmental Clearance (CEC), subject to the terms and conditions set forth in this CEC:

CEC No.: 6568/2022

To the:	**Water and Sewerage Authority** (hereinafter referred to as the CEC Holder)
of Business Address:	**Farm Road** **Valsayn** **ST. JOSEPH**
for the specific purpose of:	**The drilling, developing and equipping of the Chatham #15 Well for production status and the installation of 1.5 kilometres of a 100-millimetres, polyvinyl chloride (PVC) pipeline, inclusive of associated appurtenances**
at the following geographic location:	**Bobby Trace, off Chatham North Trace, Chatham**

Under the following designated activities of the CEC (Designated Activities) Order (as amended):

ACTIVITY		DEFINITION
38	**Catchment, abstraction or treatment of potable/process water**	(b) The establishment, modification, decommissioning or abandonment of waterwells or other infrastructure (inclusive of associated works) to make available potable or process water.
40	**Establishment of water distribution systems**	(b) The laying of water and sewage mains (inclusive of associated works) along an existing or a new right of way for distances of more than 1 kilometre during a two-year period.

TERMS AND CONDITIONS:

1. GENERAL

1.1 The CEC Holder shall take notice that the issuance of this certificate is **not authorisation** to commence any works related to the project. Works related to the project shall only commence when all approvals from other statutory, regulatory and relevant agencies are obtained. These include but are not limited to:

- The Town and Country Planning Division of the Ministry of Planning and Development (TCPD);
- The Occupational Safety and Health Authority and Agency of the Ministry of Labour and Small Enterprise Development (OSHA);
- The Siparia Regional Corporation of the Ministry of Rural Development and Local Government (SRC); and/or
- The Trinidad and Tobago Fire Service of the Ministry of National Security (Fire Service).

1.2 The CEC Holder shall take notice that the grant of the CEC with conditions does not exempt the CEC Holder from the requirement to ensure compliance with all other relevant legislative provisions having the force of law;

1.3 The CEC Holder shall take notice that the project design, description and scope, as well as the prevention, mitigation and monitoring measures for the anticipated impacts presented in the application for this certificate and any other additional information provided in writing, form part of the conditions to which the CEC Holder shall adhere, unless modified by a listed condition within this certificate;

1.4 The CEC Holder shall submit a finalised scope of works and a detailed scheduling for such, to the EMA at least 20 working days prior to the commencement of any works related to the project;

1.5 The CEC Holder shall ensure that all proposed supporting infrastructure, facilities and management systems, required to maximise the effectiveness of mitigation measures, are installed/implemented and functioning prior to the commencement of any related works;

1.6 The CEC Holder shall ensure the fulfilment of the following requirements for all written reports, plans or notifications, submitted to the EMA in respect of this certificate:

a. The CEC number and the relevant CEC condition(s) are stated in the title or cover letter of the document;

b. One (1) digital copy (PDF format) of each report, plan or notification;

c. All reports, plans or notifications shall be addressed to the **Office of the Manager – Permit Monitoring and Complaints, Environmental Management Authority, #8 Elizabeth Street, St. Clair, Port-of-Spain** and submitted via email to PMC@ema.co.tt.

1.7 The CEC Holder shall designate a primary and secondary officer who will be responsible for compliance monitoring and communicating with the EMA in respect of this certificate. The CEC Holder shall provide the name and contact details of the designated officers to the EMA at least 20 working days prior to the commencement of any works related to the project. The CEC Holder shall notify the EMA of any changes to the contact officers/persons at least five (5) working days of such change;

1.8 The CEC Holder shall facilitate any Inspector duly appointed under the Environmental Management Act, Chapter 35:05 to enter the premises of the proposed project at any time to make observations, inspect or copy documents, interview personnel and take samples and/or photographs as these relate to meeting the requirements of this CEC;

1.9 The CEC Holder shall be required to apply for and obtain a new CEC before proceeding with decommissioning or abandonment of the activity approved under this Certificate.

2. MODIFICATIONS

2.1 The CEC Holder shall seek the approval of the EMA for any proposed variations to the design, layout and scope of works in circumstances where:

a. Modifications are required by other regulatory, statutory and other relevant agencies and which do not result in any increased adverse environmental impact and risk and/or change the nature or main characteristics of the project. These include, but are not limited to the TCPD, OSHA, SRC, and/or Fire Service.

In the event that jurisdiction or authority for any approvals or modification requirements relevant to the activities approved by this CEC changes, the CEC Holder shall identify, liaise and comply with the requirements of the new holder of said jurisdiction or authority.

b. The CEC Holder wishes to make a modification or modifications.

Requests for modification(s) under the circumstances above must be submitted to, and approved by, the EMA prior to the commencement of any works related to such modification(s);

2.2 The CEC Holder shall be required to apply for and obtain a new CEC before proceeding with the project where modifications to the project scope are such that the associated works result in an increased adverse environmental impact and/or bring it within the description of any designated activity of the CEC (Designated Activities) Order (as amended).

3. WATER

3.1 The CEC Holder shall ensure that hydrostatic testing and maintenance related discharges are released at a controlled rate so as not to cause erosion and/or flooding in the receiving drainage system;

3.2 The CEC Holder shall ensure that setback distances from natural watercourses are made in consultation with the relevant authorities including the Drainage Division and the Municipal Corporation. Written documentation of all such consultations shall be made available to the EMA upon request;

3.3 The CEC Holder shall ensure that backwash water is directed to a storage tank for sediment settling prior to discharging to the receiving environment;

3.4 The CEC Holder shall ensure that areas are cleared in accordance to the final scope of works and that cleared areas are immediately revegetated/landscaped after serving the purpose for being cleared. The natural contours and gradients of the land shall be preserved, as far as practical. This shall not apply to areas for which cutting and grading are necessary to facilitate construction activities;

3.5 The CEC Holder shall ensure that equipment, aggregate and other raw materials are stored on-site in specially designated areas and not along any public roadway. The area allocated for storage of aggregates shall be bermed and placed at a location to prevent aggregate runoff into any municipal drain or natural surface watercourse;

3.6 The CEC Holder shall implement measures to ensure that all approach roads are kept clear of mud, debris, gravel, sediments or other materials generated from construction activities, at all points of site ingress and egress for vehicles;

3.7 The CEC Holder shall ensure that drainage systems are designed and maintained to prevent accumulation of water on the project site. Such drainage system designs shall ensure that there is no net increase in runoff from the pre-development to the post-development phase. Drains/roadway ditches shall be well maintained and kept clear to allow an unobstructed flow of water at all times;

3.8 The CEC Holder shall ensure that access roads follow the natural contour of the land as far as practical to prevent enhanced surface runoff and unwanted channelling of water during and after periods of rainfall;

3.9 The CEC Holder shall ensure that sediment-retention measures are utilised prior to the commencement of any earthworks, so as to prevent migration of sediment off-site. These shall include, but not be limited to:

- Establishment of berms at the boundaries of the development;
- Establishment of sediment sieves or silt traps within drains exiting the site;
- The protection of stockpiles of erodible material (e.g. excavated material or fill) using geo-textiles and/or geo-membrane materials.

3.10 The CEC Holder shall conduct weekly inspections of the sediment-retention measures, and within 24 hours of, or as soon as practical after, periods of intense rainfall (more than 10 mm per hour of rainfall), to verify functionality of such control measures and facilitate necessary maintenance works or upgrading.

The CEC Holder shall document each inspection. Documentation shall include, but not be limited to, the following:

- Date the inspection was conducted;
- Prevailing weather conditions and rainfall events;
- Name(s) of person(s) who conducted the inspection;

- Observed site conditions to determine whether containment measures were breached, including, but not limited to, oily stains, turbid runoff, etc.

Copies of all inspection reports shall be made available to any Inspector upon request;

3.11 The CEC Holder shall ensure routine dewatering of accumulated water within trenches as a result of rainfall and/or groundwater seepages, so as to minimise instability of trenches/excavations. Water extracted from trenches shall be passed through sediment sieves or traps to remove sediments and debris, prior to the release to the surrounding drains/watercourses.

4. AIR

4.1 The CEC Holder shall ensure that cleared areas and any stockpiled aggregates are maintained in a damp condition, especially during periods of dry conditions, to alleviate the impacts of dust on ambient air quality. Excessive application of water shall be avoided to reduce the potential for the generation of turbid runoff.

Other dust-reduction measures that should be utilised, where applicable, include, but are not limited to:

- Use of dust screens in areas near to sensitive receptors;
- Location of stockpiles downwind of built development or receptors;
- Adoption of a speed limit for vehicles on unpaved surfaces;
- Use of non-toxic dust-suppressant chemicals.

Dust-control measures shall be monitored and maintained to ensure effectiveness;

4.2 The CEC Holder shall, for the purposes of air-conditioning, refrigeration, pest control, soil fumigation, or use as solvents, in fire extinguishers, in dry cleaning or for any other intention, use refrigerants, fumigants, foams, aerosols or other products which:

- Are non-ozone depleting;
- Have low global warming potential;
- Are alternatives approved by the United States Environmental Protection Agency (USEPA) Significant New Alternatives Policy (SNAP) Programme.

5. NOISE

5.1 The CEC Holder shall, pursuant to the Noise Pollution Control Rules 2001 (as amended) (NPCR), apply for, and obtain, a Noise Variation from the EMA before proceeding with any works which are expected to produce noise levels that exceed the Prescribed Standards except in the following circumstances:

- Construction activities conducted on a construction site between the hours of 7:00 a.m. and 7:00 p.m. of any day;
- The installation, repair or replacement of public utilities in a public place outside of the period between the hours of 7:00 a.m. and 11:00 p.m. of the same day.

5.2 The CEC Holder shall ensure that tools, machinery and equipment employed for all works are fitted with noise emission control systems, where applicable, to minimise impacts to nearby receptors. The CEC Holder shall conduct regular inspection and maintenance on these systems to ensure their proper function. Records of such inspection and maintenance shall be retained by the CEC Holder and made available to any Inspector upon request.

6. SOLID AND HAZARDOUS WASTES/MATERIALS MANAGEMENT

6.1 The CEC Holder shall ensure that any uncontaminated excavated material removed for infrastructural works are stockpiled and re-used, to the extent practical, for backfilling and landscaping on-site. Any uncontaminated material that is not re-used shall be removed from the site for recovery or disposal at a facility operated by the relevant Municipal Corporation or a person with the licenses, permits, trained/certified personnel, facilities, equipment and insurance to handle such material;

6.2 The CEC Holder shall ensure that at the end of the site preparation and construction phases, the project site is cleared of all scrap material and debris;

6.3 The CEC Holder shall ensure that there is no open burning of refuse, brush and other planted or felled vegetation. These shall be recycled onsite, or collected for recycling or disposal offsite by the relevant Municipal Corporation or a person with the licenses, permits, trained/certified personnel, facilities, equipment and insurance to handle such material;

6.4 The CEC Holder shall ensure that washings from premix concrete trucks, associated with the project; are not discharged into any municipal drains or surface watercourses;

6.5 The CEC Holder shall ensure that non-hazardous solid waste such as, but not limited to, domestic garbage, inert construction/demolition materials and refuse including metal scrap and empty containers (except those previously used to contain hazardous materials) generated from all phases of the proposed project, is collected, sorted into recyclable and non-recyclables, and stored in receptacles which are clearly labelled, durable and sturdy, fitted with covers and of adequate capacity, until ready for recovery or disposal. As far as practical, such waste shall not be left easily accessible to pests and vermin, or allowed to litter the ground. The recovery or disposal of non-hazardous waste shall take place at a facility operated by the relevant Municipal Corporation or a person with the licenses, permits, trained/certified personnel, facilities, equipment and insurance to handle such waste;

6.6 The CEC Holder shall ensure that hazardous wastes [as defined in the Waste Management Rules, 2021 (WMR)] are segregated from non-hazardous waste. Wastes shall be clearly labelled to include the name, quantity and hazardous characteristics, dated and securely stored in receptacles designed for such waste. Commingling of incompatible wastes shall be prevented and the storage area shall allow for inspection to monitor integrity of receptacles and spills or releases. Inspection of stored waste onsite shall be conducted on a weekly basis and inspection reports maintained by the CEC Holder and made available to any Inspector upon request;

6.7 The CEC Holder shall ensure that hazardous waste is not stored onsite for more than 90 days from the time the waste receptacle is full. The recovery or disposal of hazardous waste shall be handled by a person with the licenses, permits, trained/certified personnel, facilities, equipment, and insurance to handle such waste;

6.8 The CEC Holder shall ensure that contaminated materials and substances generated from spill response and spill clean-up are handled as hazardous waste;

6.9 The CEC Holder shall ensure that empty chemical containers that possess one or more of the characteristics classified as hazardous under Schedule 2 of the WMR are handled as hazardous waste. Partially used or unused chemicals discarded as waste shall be secured in their original containers, where practical, and returned to the supplier for recovery or disposal or transferred to a person with the licenses, permits, trained/certified personnel, facilities, equipment, and insurance to handle such waste;

6.10 The CEC Holder shall ensure that a waste manifest accompanies the hazardous waste from its movement from the site on which it was generated to its final destination where it is subjected to treatment for recovery or disposal. Manifests shall be in accordance with Part VI of the WMR.

Certificates of recovery or disposal shall be maintained by the CEC Holder and made available for review, upon request by the EMA;

6.11 The CEC Holder shall ensure that process chemicals and liquid wastes are stored in containers equipped with secondary containment which are designed, constructed and operated to collect or contain any releases. Safety Data Sheets (SDS) for chemicals shall be kept on-site in a readily accessible area and communicated to its users. Measures shall be taken to prevent contact between incompatible substances in the event of a release;

6.12 The CEC Holder shall ensure that a waste management report is submitted within 30 working days of completion of the site preparation and construction works. The report should include the following information:

- The type, characteristic and quantity of each type of waste generated at the project site during site preparation and construction works;
- The type and quantity of each type of waste sent for offsite disposal, and the identification of the facility which received the waste;
- The method of treatment, recovery or disposal for each type of waste generated;
- A list of each transporter used for transporting waste from the project site;

- A description of spills, releases or any incidents arising from waste generation at the project site;

- A description of measures implemented to reduce the hazardous characteristic(s) of waste generated.

6.13 The CEC Holder shall ensure that its Emergency Response Plan (ERP) is reviewed and updated to reflect any significant changes in the project and response personnel and the CEC Holder shall ensure that the EMA and other relevant agencies are informed within ten (10) working days of such changes. The ERP shall be maintained by the CEC Holder and made available to any Inspector upon request;

6.14 The CEC Holder shall maintain a Spill Response Kit in a readily accessible area on-site with suitable and sufficient sorbents and other related supplies which will aid containment and clean-up of spills or releases. Personnel who are expected to use the Spill Response Kit shall be provided training on its use. Training records shall be maintained by the CEC Holder and made available to the EMA upon request;

6.15 The CEC Holder shall bear all costs associated with the investigations related to adverse environmental incidents, spills and emergencies and the response to such incidents, spills or emergencies arising out of all phases of the proposed project. Leaks and spills of potential contaminants shall be cleaned up immediately upon detection. Leaks and spills in excess of ten (10) litres of hydrocarbons or spills of any other chemical in quantities that would render it hazardous as defined within the SDS for the chemical, shall be treated as described by conditions of this certificate.

7. PUBLIC HEALTH AND SAFETY

7.1 The CEC Holder shall take all necessary safety precautions for the duration of the project to reduce the likelihood of accidents and prevent unauthorised access to the project area. Such precautions shall include, where applicable, but not be limited to:

- Posting of visible warning signs and hazard notices, such as signs indicating any exclusion area(s) to prevent unauthorised access and activities;

- The provision of lighting measures to ensure illumination of all potential hazards, warning signs and notices;

- Establishment of construction hoardings and/or fences at the site perimeter that will be consistent with the nature of the site, project, and its surroundings;

- Proper maintenance of all measures to ensure functionality for the duration of the project.

7.2 The CEC Holder shall ensure that trench walls are sloped and shoring provided in accordance with sound engineering techniques to safeguard against cave-ins. The pipeline trench shall be backfilled immediately following pipe-laying activities. Legible warning signs and appropriate lighting/reflectors shall be placed in the vicinity of open trenches to minimise the risk of potential accidents;

7.3 The CEC Holder shall ensure excavated materials are not stockpiled at the edge of trenches/excavations, so as to prevent instability and caving of the trench walls.

8. PUBLIC ENGAGEMENT

8.1 The CEC Holder shall coordinate its activities with all other entities that own/operate pipelines, utilities and other infrastructure as well as any facility that can be affected by the project's activities. Setback distances shall be developed and implemented or any requirements for relocation identified and agreed upon, in consultation with such entities, and prior to commencement of any works, so as to reduce the likelihood of rupture or damage to such infrastructure/facilities during project works. Written documentation of all such consultations shall be made available to the EMA upon request;

8.2 The CEC Holder shall designate a Community Relations Officer or Officers who will be responsible for interacting with stakeholders (e.g. neighbouring residents, institutions and/or businesses) affected by works related to the project. The name(s) and contact details of the officer(s) shall be made available to the EMA and to the stakeholders at least ten (10) working days prior to the commencement of any works related to the project. The officer(s) shall be responsible for relaying information to, and receiving and addressing the concerns of the affected stakeholders. The CEC Holder shall receive, address and discuss such concerns with the EMA, as it relates to the scope of this CEC;

8.3 The CEC Holder shall notify the potentially affected stakeholders (as identified above) of the proposed activity at least five (5) working days prior to the commencement of any works related to the project. Notification shall be via a combination of, but not limited to, the use of the digital and social media, mobile information units and the distribution of flyers to the affected stakeholders.

Such notification shall include, but not be limited to, the following information:

- Precise location of the activity;
- Activities to be conducted;
- Project scheduling and duration;
- All associated logistics, including use of resources and infrastructure;
- Roadways that will be affected by haulage vehicles;
- Notice of any detours and traffic restrictions if traffic disruption is expected to be significant;
- Health and safety measures to be taken by the public;
- The name(s) and contact information of the Community Relations Officer(s).

8.4 The CEC Holder shall notify the relevant authorities, including the EMA, of the intended date of commencement at least ten (10) working days prior to the commencement of any works related to the project.

9. OTHER

9.1 The CEC Holder shall design its lighting system for the proposed project site to minimise any adverse impacts to nearby receptors in the vicinity of the site. The design shall ensure that the location of the artificial lighting source is located as far away as practical from these receptors and directed away from such receptors. Measures implemented shall be documented and maintained and made available to the EMA upon request;

9.2 The CEC Holder shall ensure that the discovery of archaeological material or other evidence of past human habitation, during activities for which this certificate has been granted, is reported to the EMA and the Archaeological Committee via the Archaeological Centre of the University of the West Indies within 48 hours of discovery. Works shall be suspended until such time as the site may be attended to by suitably qualified personnel, approved by the Archaeological Committee. Resumption of on-site works shall require the consent of the EMA on the advice of the Archaeological Committee, in terms of their scope and proximity to the location of the find;

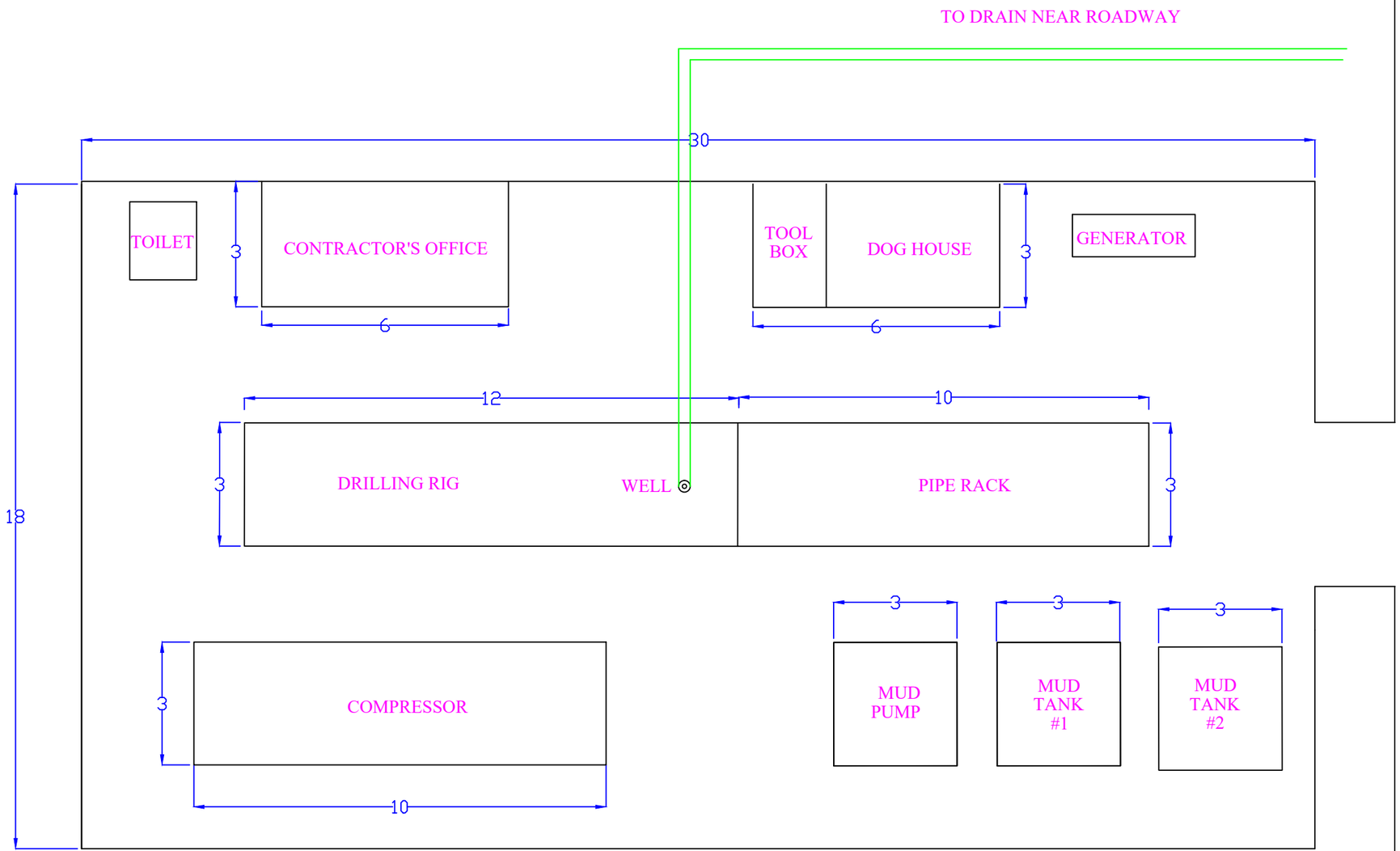
9.3 The CEC Holder shall ensure that a Monitoring Checklist that outlines all the precautionary and mitigation measures listed within this certificate is established and retained by persons with relevant positions of responsibility/authority. The Checklist shall be used to demonstrate adherence to all the requirements during the proposed activity. This Checklist shall be made available to any Inspector upon request.

Date of issue: **February 23, 2023**

Environmental Management Authority
MANAGING DIRECTOR

PLEASE NOTE:

1. Under section 85(3) of the Environmental Management Act Chapter 35:05, an appeal may be made to the Environmental Commission by the CEC Holder against the grant of a Certificate of Environmental Clearance with conditions.
2. The issue of this certificate does not release the CEC Holder from any responsibility or requirements under other environmental statutes or regulations or any other applicable written law or policy of Trinidad and Tobago prior to proceeding with the activity.
3. The issue of this certificate does not convey to the CEC Holder any property rights of any sort, nor does it authorise the CEC Holder to conduct the subject activity on any location which is not under the legal control or ownership of the CEC Holder.
4. This certificate becomes effective from the date of issue, but shall cease to have any validity, force or effect if works, forming part of the scope of works, for which the certificate was granted do not commence within three years of the date of issue;
5. The CEC Holder must inform the EMA of any new or relevant information related to this activity regarding adverse environmental effects.
6. Implementation of or adherence to the conditions specified in this certificate must be done in a way that ensures public health and safety.
7. This certificate must be displayed in public view at the place from which the CEC Holder carries on the designated activity for which the certificate was issued.



BOBBY TRACE

SYMBOL KEY

CR	CHLORINE ROOM
CSR	CHLORINE STORAGE ROOM
ECR	ELECTRICAL CONTROL ROOM
●	UTILITY POLE
	RIVER
	CHAIN LINK FENCE
	BRIDGE
◎	WELL
	DISCHARGE / WASHOUT
	EXISTING MAIN
	PRODUCTION LINE

DATE	REVISIONS	INIT.

PROJECT TITLE:
CHATHAM #15

JOB TITLE:
Pre-Drill Site Layout

DRG #

SHEET #
1
OF 9

DATE: JUL 1ST, 2019

DRAFTED BY:

DESIGNED BY:

CHECKED BY:

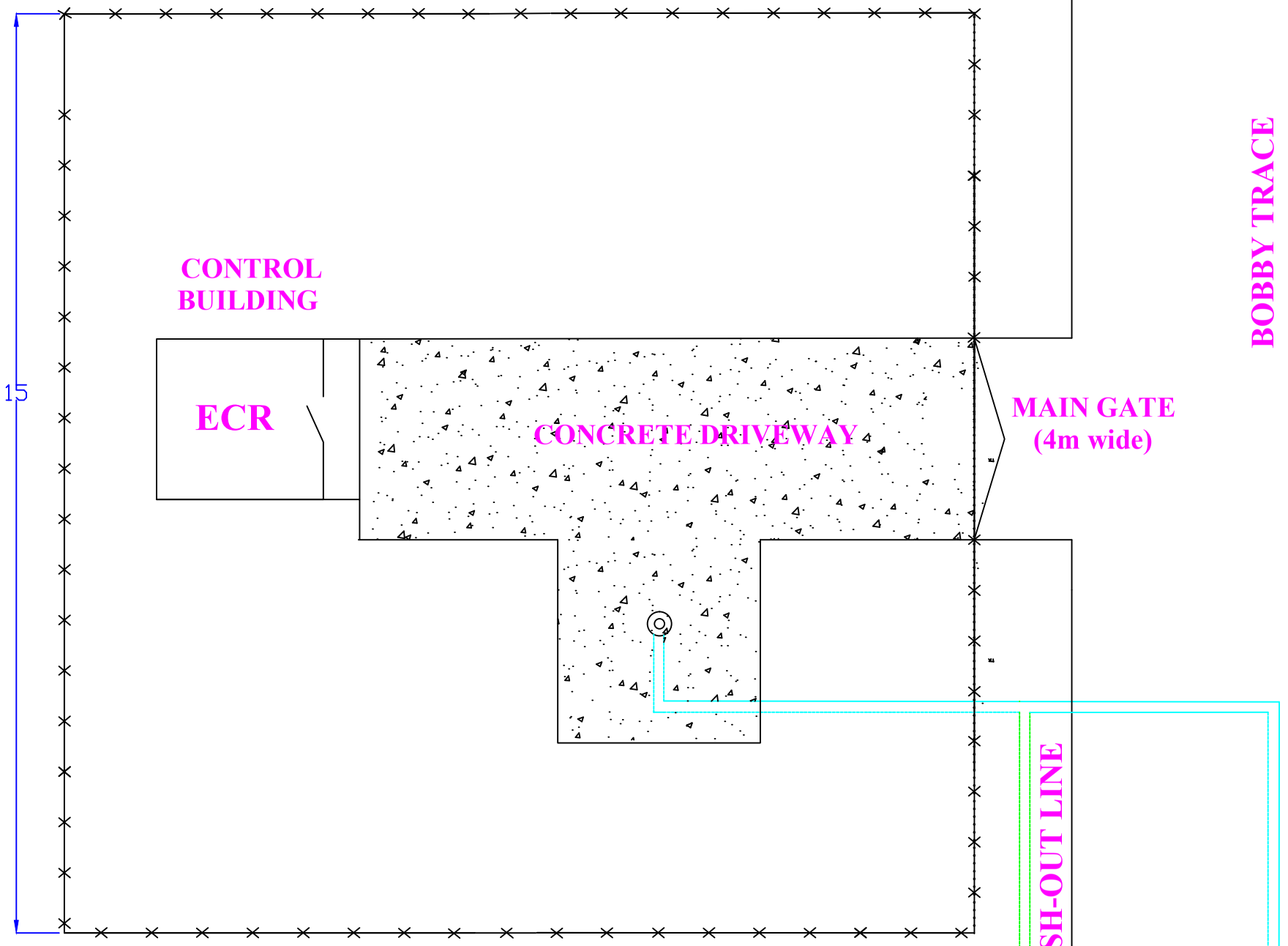
APPROVED BY:

JOB FILE #

SCALE 1: 1

DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE

WATER AND SEWERAGE AUTHORITY
WELLS UNIT
PHONE: (868) 662-2302-7, EXT: 5260-2



SYMBOL KEY

CR	CHLORINE ROOM
CSR	CHLORINE STORAGE ROOM
ECR	ELECTRICAL CONTROL ROOM
●	UTILITY POLE
	RIVER
	CHAIN LINK FENCE
	BRIDGE
◎	WELL
	DISCHARGE / WASHOUT
	EXISTING MAIN
	PRODUCTION LINE

DATE	REVISIONS	INIT.

PROJECT TITLE:
CHATHAM #15

JOB TITLE:
Post-Drill Site Layout

DRG #

SHEET # 2 OF 9

DATE: JUL 1ST 2019

JOB FILE #

DRAFTED BY:

DESIGNED BY:

CHECKED BY:

APPROVED BY:

SCALE 1: 1

DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE

WATER AND SEWERAGE AUTHORITY
WELLS UNIT
PHONE: (868) 662-2302-7, EXT. 5260-2

Annex C – Traffic Management & Control

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Table of Contents

List of Acronyms

CCP	Contractor Control Plan
CIPP	Contractor Implementation Plan & Procedures
ESMP	Environmental & Social Management Plan
IDB	Inter-American Development Plan
SPC	Special Purpose Company
WASA	Water & Sewerage Authority

1.0 Introduction

This document is the Contractor Control Plan ("CCP") for traffic management for the projects under the National Water Sector Transformation Project. It forms part of the Environmental and Social Management Plan ("ESMP") for the project. The Contractor will be required to develop their own site-specific Contractor Implementation Plan and Procedures ("CIPP") document for traffic control and management as appropriate to meet the requirements of this plan. The site-specific CIPP will need to be approved by the Executing Agency prior to implementation. Additionally, it is expected that the CIPP will be reviewed and revised (if required) at least every six months and re-submitted to the Authority for approval prior to implementation.

1.1 Purpose

The CCP is a management control document that fulfils the following purposes:

- Serves as a key tool by which the Executing Agency can check the CIPPs and specifically the procedures and method statements that specify how the activities described in their contracts will be carried out in compliance with project commitments.
- Provides transparency to the IDB that commitments for the Construction Phase are being met and are being translated through to the Contractor who is responsible for implementation.

It presents:

- References to control guidelines and standards;
- Responsibilities for the implementation of the plan;
- Best Management Practices to be implemented by the contractor during construction and/or installation works to meet the project commitments and eliminate or reduce potential impacts;
- References emergency procedures
- Checklists for verification that various site activities are in compliance with requirement of the plan

1.2 Objectives

1.2.1 Objective of the Contractor Control Plan

The broad objective of this CCP is to describe the approach and procedures to be followed by contractors for the management of wastes generated during the Construction Phase. The CCP also assists the Executing Agency in ensuring that the intended outcomes of the proposed traffic management strategies are achieved and assures compliance with legal and policy obligations and lender requirements.

1.2.2 Objectives of Contractor Implementation Plan & Procedures

At a minimum, the Contractor CIPP should meet the following specific objectives as it applies to the management of traffic created:

- To provide a safe route for site traffic to enter and leave the site.

- To identify any risks to the general public and local traffic from construction vehicles and to put control measures in place to protect all members of the public, drivers & site workers, from any injury involving traffic travelling to and from the site.
- To place restriction on heavy vehicles to use the selected route only.
- To provide measures to control the speed of construction traffic.
- To prevent parking within the local estates.
- To outline control procedures for all site vehicles during movement along the selected route and to provide traffic control measures limiting reversing and turning movements.
- To outline procedures for dealing with emergencies.
- To outline plans to keep the residents in the locality informed of intense truck movements.
- To consider the safety of all road users including pedestrians and cyclists and particular attention to the safety of children, the elderly, cyclists and the disabled.
- To provide control measures to reduce the speed of vehicles using the route.
- To provide a safe route for pedestrians crossing the temporary roads.
- To prevent off loading on the public road or public areas.
- To take all necessary precautions to avoid damage of the existing road network.
- To provide details on plans to minimise mud nuisance problems arising on the existing road network.
- To maintain public park amenity where possible along the route.
- To outline a procedure to warn all site personnel and drivers of any hazards that may exist
- To allow pedestrians walk/access across the designated route in a safe manner.

1.3 Policy Statement

All aspects of the Project will be managed in accordance with the Executing Agency's HSE policies, best management practices and international and local standards as well as the specific HSE Design Standards for the project. In addition, the Executing Agency is committed to conducting its business in a manner which:

- Ensures that all facilities are designed, constructed, commissioned, maintained and operated to high and consistent standards;
- Complies with the requirements of the EMA and IDB;
- Meets the Environmental & Social policy requirements of the IDB; and
- Is compatible with the balanced economical and environmental needs of the community.

1.4 Control Standards

At a minimum, the following control standards are applicable to the proposed project. Additional laws, policies, protocols, international treaties to which Trinidad & Tobago are signatories as well as IDB

regulations are also applicable. The following list is not meant to be exhaustive and as such additional applicable legislation may also be identified and applied during the generation of the Contractor CIPP.

1.4.1 National Legislation & Laws

- ✓ Environmental Management Act
  - ➢ Certificate of Environmental Clearance Rules
  - ➢ Water Pollution Rules
  - ➢ Noise Pollution Control Rules
  - ➢ Environmentally Sensitive Species Rules
  - ➢ Environmentally Sensitive Areas Rules
  - ➢ Air Pollution Rules
  - ➢ Waste Management Rules

- ✓ Mines, Quarries and Borings Act
- ✓ Motor Vehicles and Road Traffic Act
- ✓ Water and Sewerage Act (WASA Act)
- ✓ Occupational Safety and Health Act (OSH Act)

- ✓ Trinidad & Tobago Standard (TTS): TTS 558:2001

1.4.2 International Treaties

- ✓ LBS Protocol (Protocol Concerning Pollution from Land-Based Sources & Activities)
- ✓ RAMSAR Convention

1.4.3 Inter-American Development Bank & World Bank Group

- ✓ OP-703: Environmental and Safeguards Compliance Policy
- ✓ OP-704: Disaster Risk Management Policy
- ✓ OP-102: Access to Information
- ✓ International Finance Corporation Environmental, Health, and Safety Guidelines

2.0 Designated Routes for Heavy Vehicles

2.1 The Route

The on-site Contractor must communicate with the relevant authorities such as Borough/City/Regional Corporations, Trinidad & Tobago Police Service – Traffic Management Branch, and Ministry of Transport – Highways Division etc. to develop a detailed plan which outlines the proposed route for haulage vehicles travelling to and from the various construction sites, alternative routes where necessary and identify zones where there will be restrictions.

The Project Manager will review the Traffic Control & Management Plan and updates only for maintenance of adequate traffic patterns within and through construction areas.

a. Project Manager's review and acceptance shall not be construed as confirming adequacy of protection measures proposed.
b. Project Manager's will notify residents of construction schedules and traffic plans. Contractor shall be solely responsible for full protection of public and Contractor's own forces.

2.2 Traffic Volumes during Construction

The traffic volumes generated by the scheme during construction will include:

- Site worker's vehicles and WASA staff vehicles
- Sub-contractors vehicles
- Movement of earthworks plant by low loader
- Bulk supply trucks for delivery of concrete, aggregate, precast concrete, steel, process equipment.
- Bulk earthmoving trucks for removal of unsuitable material, rubble and surplus clay offsite.
- Street works plant and equipment
- Office Setup deliveries
- Fencing and hoarding deliveries
- Plant and Tool deliveries
- Operating equipment deliveries
- Visitors to site

The greatest impacts due to increased traffic volumes are noise, dust, dirt, increased frequency in turn increasing the risk of collisions and risks to the safety of pedestrians and cyclists.

The excavation works for the pipeline installation and the establishment of structures on the site are likely to have the greatest traffic impact but these works will be strictly controlled by the site team. Affected residents will be informed in advance of expected intense traffic movements and pipeline installation works.

The planning of major excavations on site causing intense traffic movements will be controlled by the site supervision to minimize impacts on the local community. Particular attention will be given to the following points:

- Avoidance of School peak times

- Trucks will travel below the stated speed limits.
- Trucks will adhere strictly to the designated route.
- Trucks will not be allowed leave the site in convoys.
- The number of trucks required will be carefully chosen based on the quantity of material to be moved, the length of the return journey and taking into consideration truck movements.
- Pointsmen will be positioned at key intersections as required to help the flow of traffic during intense heavy vehicular movement. They will only intervene where necessary, for example if a traffic light malfunctions.

2.3 Traffic Volumes Post Construction

Post construction the traffic to and from the sites will be very light and actually negligible.

3.0 Elimination of Dust from Construction Traffic

The following measures will be implemented to reduce dust associated with the construction traffic:

- A wheel wash system will be installed at the site entrance to clean wheels on trucks leaving the site
- The haul road from the site along will be cleaned regularly.
- All trucks carrying aggregate and other construction material will cover the load with tarpaulin sheeting.
- At all times measures will be implemented to reduce the potential of dust impacts.
- Drivers will be required to check their vehicles are clean prior to leaving the site.
- In the event of dust nuisance occurring outside the site boundary, procedures will be put in place to minimize the source of dust emissions.
- Roads will be cleaned as required to remove mud from the route.
- A water bowser will also be available as required to dampen any dust on the route.
- Trucks carrying soil from site will be covered to reduce dust.
- As appropriate a review of these measures will take place on a regular basis.

4.0 Emergency Procedures

4.1 General Emergency Plan

The emergency services including fire, ambulance and police service will be consulted. When the Traffic Plan is approved the emergency services will be provided with a copy of this traffic plan advising them of the designated construction traffic route. Fire tender and emergency services route to the site will be along the designated construction traffic route during working hours and access for the emergency services will be maintained throughout the contract works.

In the case of an emergency along the designated route the following procedure shall be followed:

- Emergency Services will be contacted immediately by dialling 999
- Exact details of the emergency must be given by caller to the emergency line to allow them to assess the situation and respond in an adequate manner.

- Report Emergency to the site team supervisors and the Contractor.
- Trained WASA first aiders to attend the emergency immediately.
- Contractor to ensure that the emergency services are on route.

5.0 Traffic Route Safety Control Measures

The following is a non-exhaustive list of control measures:

The Contractor will have a specific role to manage the route and he/she will walk the route regularly monitoring traffic and enforcing the site traffic rules. The Contractor will be obliged to monitor the traffic route to ensure the safety of the public. The Contractor will maintain records for the route including inspections, accidents, and breeches of the Executing Agency construction route rules. Site Security fencing and construction route fencing must be inspected on a daily basis, particularly after weekends and/or inclement weather by the Contractor and recorded as part of the general Health & Safety protocol.

There will be no off loading / loading of materials on the public roads adjacent to the site once the temporary lay down/stockpile yards are completed. WASA will provide a drop-off zone within the main site compound to accommodate construction deliveries. The provision of this will assist with ensuring that the existing main entrance and road network is kept clear and will not be subject to any blockage.

WASA will provide a turning area for trucks at the site. The provision of this turning area will help to avoid construction vehicles reversing from the site onto the internal road network. The temporary parking of delivery vehicles on any of the roads adjacent to the site is strictly prohibited. Great care must be taken to protect the public with regard to slips, trips and falls. It is the responsibility of all who carry out construction work to keep the public who interface with the works safe. Security personnel and site foreman will monitor conditions and report to the Special Purpose Company Project Manager (SPC).

Deliveries will be planned and controlled by Contractors and the sub-contractors.

Signage will be put in place informing construction workers of the dedicated construction traffic route. Pedestrians will be guided through the construction works safely using a combination of signage and barricades.

This Traffic plan will remain under review and will be revised as necessary to include any improvements that are necessary to make the route safer.

Site Team meetings will take place on a weekly basis. At this meeting Health and Safety will be the first item on the agenda. The construction traffic route will also be an item on the agenda. The Contractor will report to the meeting each week on the management of the route.

6.0 Public Liaison and Information

A designated telephone number that customers can call to lodge complaints or queries relating to specific projects will be provided; call details will be recorded and followed up as required. Alternatively,

complaints can be made via the Grievance Response Mechanism established by the MPU/PEU (see Annex G). The Contractor will liaise with local residents immediately affected by the works in relation to Construction Traffic movements. The Contractor will also keep the public informed by way of flyer notices and newsletters of progress on site and providing advance warning of particularly busy traffic periods during the project. As a requirement of the Certificate of Environmental Clearance, a Community Relations Officer will also be designated to inform residents of the proposed activities as well as act as a liaison between the public and the Project Team.

Additionally, the public can access the WASA, IDB or Ministry of Public Utilities (MPU) internet sites and/or social media sites gather information on the project as well as leave comments, queries or complaints.

7.0 Traffic Movements to and from the site

It will be the duty and responsibility of the Site Supervisors to maintain safe traffic movement onto and off site. Site security will also assist in controlling the movement of construction vehicles on / off site at the main gate to the site.

The Contractor Supervisor shall be responsible for providing information to relevant parties on the requirements of the site traffic access rules and delivery protocol. Traffic movement control will remain under constant review.

Subcontractors will be expected to carry out and provide written evidence of the following:

- Necessary training for operation of plant and equipment
- Crane Operator
- Banks man
- Teleporter Driver
- Tractor / Dozer Operator
- Mobile Crane Operator
- Articulated Dumper Operator
- Site Dumper Operator
- 180 / 360 degree Excavator Operator
- Road traffic management

All plant operators must wear appropriate PPE and will carry details of relevant required training.

The vehicle/equipment operator is responsible for the security of the equipment and its ignition key and/or immobilizer. Keys and/or immobilizers should only be delegated to a responsible person and under no circumstances should keys be given to anyone else. Keys should never be left in unattended vehicles/equipments.

The vehicle/equipment operator is responsible for the safe operation of the vehicle/equipment and must ensure that all daily and weekly checks are thoroughly executed. Additionally, he must ensure that all unsafe equipment is taken out of service immediately.

The following additional rules apply to all vehicles/equipment and will be implemented by the Site Team:-

- The use of mobile phones while driving or operating vehicle/equipment is strictly prohibited.
- Equipment will be fitted with auxiliary devices and visual aids as appropriate
- All moving equipment must be fitted with a flashing beacon and reversing siren.
- Articulated dump trucks must be fitted with rear-warning sensors.
- Passengers must not be carried on any site vehicle.
- Moving equipment must be fitted with seat belts, which must be worn by the driver at all times.
- If plant is to be used on a public road then the driver requires the appropriate valid licence and any additional documentation necessary
- All loads being carried by trucks, teleporters or forklifts should be secured.
- A clear field of vision must be maintained at all times.

8.0 Route Signage

Appropriate signage will be erected and maintained by the Contractor as required along the chosen traffic route.

Signage will be erected as required to comply with relevant road works regulations and best practice.

9.0 Parking On-site

The SPC Project Manager will have designated parking at the site for the use of its employees, inclusive of a limited number of subcontractors during construction phase. The number of cars will be monitored on an ongoing basis to ensure that there is no parking in privately owned property unless prior permission has been granted by the owner.

The Contractor will monitor the parking of all vehicles associated with the site works for breeches of the site rules in relation to parking in prohibited areas.

Depending on the stage the project is at and the number of employees on site, other options such as car pooling, alternative parking will be utilized if parking becomes a problem.

When subcontractors are appointed to the project they will be advised that there is minimum parking on site and they will be advised of the parking prohibitions.

Subcontractors will be required to provide a minibus or alternative forms of transport for their employees if places cannot be allocated by the SPC inside the site compound. Parking by employees or subcontractors is prohibited in privately owned properties unless prior permissions or arrangements have been made with the owner of said property.

Adequate parking for visitors will be allocated as required.

Cones and/or barriers will be used where necessary to prevent parking adjacent to the construction site and along the access roads towards the site. If required cones/barriers will be used to assist in the free flow of traffic on the surrounding road network to enhance traffic and pedestrian safety at all times.

10.0 Site Traffic Rules

The following are basic site traffic rules that will be adhered to:

- Goods vehicles carrying abnormal loads must ensure they have a delivery plan in place with an escorting vehicle and have prior approval from the SPC and other relevant statutory bodies if required before starting out on the journey.
- Caution must be exercised entering and leaving the site due to pedestrian crossings.
- All vehicles must stop at security point.
- All instructions from security/site management must be obeyed.
- All vehicles leaving the site must do so only at an appropriate break in the traffic and must not force their way into traffic.
- All heavy vehicle drivers must check their wheels for lodged stones, and remove them prior to returning to the public road system.
- The designated route speed limit must be complied with.
- Vehicles/equipment may not to use residential roads for turning purposes.
- Project employees or subcontractors are strictly prohibited from parking on privately owned property
- It is forbidden for Project employees or subcontractors to park within any local business premises or roadways.
- Drivers must check that their vehicle is road worthy, clean and loads stacked safely and tied down.
- All delivery vehicles must have flashing beacons and reversing vehicles and must be equipped with rear warning sensors and visual aids to assist in line of sight.
- Construction vehicles shall use the wheel wash as appropriate.
- The site rules will be implemented by the SPC Project Manager and the Contractor.

11.0 Enforcement of Site Traffic Rules and disciplinary Procedures

Any driver who breaches the rules shall have their licence plate noted and reported to their employer.

The driver will be spoken to by the SPC Project Manager and the disciplinary procedures applied and they will be supervised by Contractor.

- The first offence may imply a one day ban from site. If it is a minor breech as determined by the project management a warning will be given.
- Second offence will imply a one week ban from site.
- A third offence by any driver who consistently or knowingly breaks the rules shall be refused further access to the site.
- There are no exceptions to these rules.

12.0 Traffic Control & Management Plan – Specification/Framework

A site specific Traffic Management Plan that meets the specifications stated in this CIPP must be developed by the Contractor. This Plan must be regularly reviewed and updated as the Construction progresses to ensure that Traffic disruption as a result of the proposed works is minimized.

The following **Checklists** and **Actions to be Taken** should be used to evaluate the efficacy of the Traffic Management Plan and modifications/adjustments made accordingly following the approved procedure.

12.1 Pedestrian Route Checklist

	Yes	No	NA
1. Are pedestrian routes clearly separated from vehicular routes by fencing or another appropriate means? If 'no' see action 1.			
2. Are pedestrian routes wide enough to safely accommodate the number of people likely to use them at peak times? If 'no' see action 2.			
3. Do pedestrian routes allow easy access to work areas? If 'no' see action 3.			
4. Are pedestrian routes kept free of obstructions? If 'no' see action 4.			
5. Are pedestrian routes clearly demarcated? If 'no' see action 5.			
6. Can pedestrians safely cross the main vehicular route? If 'no' see action 6.			
7. Do pedestrians have a clear view of traffic movements at the crossings that lead to traffic routes? If 'no' see action 7.			
8. Do pedestrian routes provide safe access to welfare facilities? If 'no' see action 8.			

12.2 Actions to be taken – Pedestrian Routes

Recommended Action	Action taken
1. Ensure routes are clearly designated and protected.	
2. Base plan on peak numbers	
3. Plan routes to allow safe access	
4. Ensure plan includes need to keep access route clear	
5. Ensure sufficient signage	
6. Ensure sufficient crossing points are planned for and designated	
7. Ensure that blind spots are eradicated during planning process	
8. Provide safe routes at parking areas. Plan site set up to avoid need for pedestrians to cross routes	

12.3 Vehicle Routes Checklist

	Yes	No	NA
1. Are routes clearly separated from pedestrian routes using suitable means e.g. fencing etc.? If 'no' see action 1.			
2. Are routes wide enough to accommodate the number of vehicles likely to use them at peak times? If 'no' see action 2.			
3. Do routes allow easy access to delivery areas? If 'no' see action 3.			
4. Are routes kept free of obstructions? If 'no' see action 4.			
5. Are routes clearly and suitably signed? If 'no' see action 5.			
6. Can pedestrians safely cross the main vehicle route? If 'no' see action 6.			
7. Do pedestrians have a clear view of traffic movements at crossings and at gates which lead onto traffic routes? If 'no' see action 7.			
8. At the final point of exit, can the driver clearly see pedestrians on the pavement? If 'no' see action 8.			
9. Are temporary structures protected from vehicle impact? If 'no' see action 9.			
10. Will parking areas be required? If 'yes' see action 10.			

12.4 Actions to be taken – Vehicle Routes

Recommended Action	Action Taken
1. Ensure routes are clearly designated and pedestrians protected.	
2. Ensure plan assumes peak number. Utilize one-way system if necessary.	
3. Plan routes to allow safe access	
4. Ensure plan includes need to keep access routes clear	
5. Ensure sufficient signage	
6. Ensure sufficient crossing points are planned for. Ensure that motorists are told of crossing points e.g. via signage	
7. Ensure that blind spots are eradicated during planning process	
8. Ensure adequate sight lines and mirrors to assist drivers.	
9. Ensure scaffolds, trench shoring, falseworks and other structures are protected from impact	
10. Ensure sufficient parking is available. If necessary, designate a person to ensure that vehicles are parked safely. Ensure that adequate lighting exists	

12.5 Vehicle Movements Checklist

	Yes	No	NA
1. Are routes planned to reduce the need for excessive vehicle movements? If 'no' see action 1.			
2. Are vehicles fitted with reversing aids? If 'no' see action 2.			
3. Will vehicles reverse without reversing aids? If 'yes' see action 3.			
4. Are routes kept free of obstructions? If 'no' see action 4.			
5. Are routes clearly and suitably signed? If 'no' see action 5.			
6. Can pedestrians safely cross the main vehicle routes? If 'no' see action 6.			
7. Do pedestrians have a clear view of traffic movements at crossings and at gates that lead onto traffic routes? If 'no' see action 7.			
8. Do drivers have a clear view? If 'no' see action 8.			
9. Will vehicles run the risk of depositing mud, aggregates or other construction material on the roads? If 'yes' see action 9.			
10. Will vehicles need to be sheeted? If 'yes' see action 10.			

12.6 Actions to be Taken – Vehicle Movements

Recommended Action	Action Taken
1. Ensure routes provide sufficient space to turn. Keep routes to a minimum.	
2. Request that vehicles are fitted with reversing aids, warning sensors etc.	
3. Vehicles not fitted with reversing aids must be banked when reversing.	
4. Ensure plan includes need to keep access routes clear. Include in induction training.	
5. Ensure sufficient signage	
6. Ensure sufficient crossing points are planned for. Ensure that drivers are made aware of all crossing points.	
7. Ensure that blind spots are eradicated during the planning process	
8. Plan routes to eliminate reversing and blind spots.	
9. Consider wheel washing facilities or other suitable alternatives.	
10. Ensure provision of sheeting gantry as required	

12.7 Drivers Safe Work Practices Checklist

	Comment
1. Only operate vehicles/equipment if you are competent and authorized to drive them.	
2. Do not drive when your abilities are impaired ill-health, poor vision, prescribed or illegal drugs or alcohol.	
3. Make sure you fully understand the operating procedures of the vehicles you control.	
4. Know the site routes and follow them. Take care at pedestrian crossings.	
5. Understand the system of signals used on-site.	
6. Visiting drivers: seek appropriate authority to enter the site and operate vehicles	
7. Know the safe operating limits of the vehicle under your control especially as it relates to maximum loads and gradients.	
8. Carry out daily checks on vehicles and report all defect immediately to the supervisor.	
9. Follow site procedures and comply with all site rules.	
10. Do not drive at excessive speeds.	
11. Wear appropriate PPE when out of the cab.	
12. Ensure that windows and mirrors are kept clean and clear.	
13. Keep the vehicle tidy and free from items that may hinder the operation of vehicle controls.	
14. Do not allow passengers to ride along on vehicles unless safe seating is available.	
15. Park vehicles/equipment on flat ground wherever possible, with the engine switched off, the handbrake and trailer brake applied and where necessary, use wheel chocks.	
16. Do not reverse without reversing aid or banksman's assistance.	
17. Where visibility from the driving position is restricted, use visibility aids or a signaler. Stop if you lose sight of the signaler or the visibility aid becomes ineffective/defective.	
18. Do not remain on vehicles during loading operations unless driver's position is adequately protected.	
19. Ensure that loads are safe to transport.	
20. Do not attempt to get on to or off of moving vehicles.	
21. Do not make adjustments with the engine running and safeguards removed.	

	Comment
22. Do not smoke while operating the vehicle or during fuelling activities. Smoking is prohibited on-site except in areas designated for such.	
23. Do not use a mobile phone while driving or operating equipment.	
24. Sign below to acknowledge receipt of the above information: ---------- ---------- **Signature** **Date:**	

12.8 Signalers/Banksmen Checklist

	Comment
1. Use relevant safety procedures and correct signaling systems.	
2. Ensure drivers understand the correct signaling system.	
3. Signal instructions clearly	
4. Ensure that you are visible to the driver and the driver is visible to you; if not, stop the vehicle from moving.	
5. Stand in safe locations at all times.	
6. Warn pedestrians and make sure they are kept away from vehicle operations.	
7. Wear appropriate protective clothing including high-visibility clothing.	
8. Report work hazards to supervisors.	
9. Make sure you can get to and from your work location safely.	
10. Do not ride on the vehicle you are directing unless you are in a designated safe position.	
11. Do not direct vehicles if your ability is affected by drugs or alcohol.	
12. Do not use mobile phones while directing vehicles	
13. Sign below to acknowledge receipt of the above information: ---------- ---------- **Signature** **Date:**	

12.9 Safe Use of Site Dumpers/Dump Trucks Checklist

	Comment
1. Allow only competent people to operate site dumpers/dump trucks.	
2. Provide stop blocks at edges of excavations, trenches, pits, spoil heaps etc. to prevent dumpers falling when tipping.	
3. Do not operate site dumper's control unless seated on the driver's seat.	
4. Do not carry passengers unless purpose built seats are available/provided.	
5. Do not drive on gradients in excess of those safe for the dumper (see manufacturer's manual).	
6. Drive at appropriate speeds.	
7. Load on flat ground with brakes applied.	
8. Get off dumper when it is being loaded.	
9. Ensure that loads are distributed evenly and do not let them obscure your vision.	
10. Securely fix loads that may be of danger if they move.	
11. Stop the vehicle, take out of gear and apply parking brake before tipping.	
12. Do not drive around with skip in the vertical discharge position.	
13. Use appropriate towing pins.	
14. Do not leave engine running when you leave the vehicle unattended.	
15. Be aware of the differences in performance of the dumper when loaded and unloaded, particularly speed, braking and stability on slopes.	
16. Be aware of different handling and braking characteristics f the vehicle in wet and dry conditions.	
17. Do not use a mobile phone while operating a dumper/dump truck	
18. Sign below to acknowledge receipt of the above information: ---------- ---------- **Signature** **Date:**	

Annex D – Waste Management Plan

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Table of Contents

List of Acronyms

CCP	Contractor Control Plan
CIPP	Contractor Implementation Plan & Procedures
EMA	Environmental Management Authority
ESA	Environmental & Social Assessment
ESMP	Environmental & Social Management Plan
HSE	Health, Safety & Environment
MPU	Ministry of Public Utilities
MSDS	Material Safety Data Sheet
PPE	Personal Protective Equipment
SWMCOL	Solid Waste Management Company Limited
WMP	Waste Management Plan

1.0 Introduction

This Waste Management Plan (WMP) is intended to address the management of wastes that may be generated by/associated with the execution of the proposed Project in a manner which minimizes negative impacts on the environmental and socio-economic components of the Project. It is intended to serve as a guide document (Contractor Control Plan/CCP) which the Contractor will utilize to develop a site specific plan (Contractor Control Implementation Plan/CIPP)

1.1 Objectives

Specific objectives as it applies to the management of hazardous and non-hazardous wastes generated during the Construction Phase:

- Maintain control of chemicals and hazardous substances and to reduce excessive and/or wasteful ordering,
- Meet, at a minimum, requirements for the storage and use of all substances including hazardous and toxic substances in compliance with the Material Data Safety Sheet (MSDS),
- Aid in monitoring hazardous waste generation, and to eliminate excessive amounts of outdated chemicals kept on-site in storage
- Monitor all processes and activities that produce chemical or biological wastes to determine whether or not the wastes are hazardous wastes.
- Identify, collect, label, properly handle and store, and properly transport and dispose of through licensed transporters all hazardous wastes, universal wastes etc.
- Maintain documentation of the generation, accumulation, transportation, and disposal of all hazardous wastes, universal wastes, and hazardous biological wastes.
- Incorporate hazardous waste reduction techniques whenever possible.
- Provide at a minimum, a monthly review process for all elements of the Waste Management Plan with the specific purpose of incorporating changes designed to make the plan more effective and efficient.
- Protect the overall public health, natural resources and environmental quality;
- Promote the provision of waste collection and disposal services in an economical and efficient manner;
- Implement an active recycling program with emphasis on the diversion of materials from the waste stream providing that it is economically feasible;
- Comply with laws and regulations as it applies to waste
- Ensure that staff receive training on waste management.

2.0 Overall Management of Waste

2.1 Definitions

Waste	Waste may be defined as a material that has no intended use or reuse. Contaminated chemicals/materials, chemicals/materials in deteriorating containers, and any other chemical(s)/material(s) that are no longer used or useful should be considered as a waste.

Hazardous Waste	Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes. The Waste Management Rules, 2021 further defines hazardous wastes.
Non-hazardous Waste	Any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities which does not pose a significant threat to human health or the environment.
Universal Waste	Universal waste comes primarily from consumer products containing mercury, lead, cadmium and other substances that are hazardous to human health and the environment. These items cannot be discarded in household trash nor disposed of in landfills. Examples of universal waste are batteries, fluorescent tubes, and many electronic devices.
Unknown Wastes	Refers to wastes that cannot be identified typically as a result of improper labeling and/or labeling that is no longer legible. This waste must first be identified or its characteristics determined prior to its disposal so that it can be disposed of in an environmentally sound manner

2.2 Criteria for Classification of Waste

2.2.1 Hazardous Waste Determination

The identification or determination of a hazardous waste should be based on two important premises – listing and testing characteristics. Listing a substance, as a hazardous waste is an Environmental Management Authority (EMA) activity while the testing for a hazardous characteristic is a generator (MPU/Contractor) requirement.

Upon request, the Contractor will perform analytical testing, using standard or internationally accepted protocols, to determine if a substance exhibits a hazardous characteristic and thus requires classification as a hazardous waste.

2.2.1.1 Listed Hazardous Waste

National regulations (Waste Management Rules, 2021) list several categories of substances, which have toxic, carcinogenic, mutagenic, effects in humans, or have an adverse impact on the environment. These substances are listed by specific sources, non-specific sources, discarded commercial chemical products, container and spill residuals, or are considered acutely or extremely hazardous.

2.2.1.2 Characteristic Hazardous Waste

Certain substances, which are not specifically listed as a hazardous waste, are still regulated as a hazardous waste because they exhibit one or more of the following characteristics:

- ✓ Explosive
- ✓ Flammable Liquids

- ✓ Flammable Solids
- ✓ Substances or wastes liable to spontaneous combustion
- ✓ Substances or wastes which, in contact with water emit flammable gases
- ✓ Oxidizing
- ✓ Organic Peroxides
- ✓ Poisonous (acute)
- ✓ Infectious Substances
- ✓ Corrosives
- ✓ Liberation of toxic gases in contact with air or water
- ✓ Toxic (delayed or chronic)
- ✓ Ecotoxic

The Waste Management Rules, 2021 provides brief descriptions of the above mentioned.

2.2.1.3 Unknown Hazardous Chemicals or Waste

All hazardous waste generated, stored and sent for disposal must be completely labeled and identified. Contractor personnel, and any other person or entity that produces hazardous waste is responsible for accurately labeling and identifying all wastes under their control. When an unknown waste is discovered, an attempt must be made by the group to identify its contents immediately. In the event that someone cannot identify the waste, then the Contractor is responsible for performing an analysis to identify the unknown waste.

Any analysis performed by the Contractor must be conducted in the laboratories or location in which it was discovered. The cost of the analysis will be billed back to the appropriate party.

2.2.2 Non-hazardous Waste Determination

A waste is determined to be non-hazardous if it is not listed in Schedule 1 of the Waste Management Rules, 2021 and does not possess one or more of the hazardous characteristics listed Schedule 2 of the Waste Management Rules, 2021.

2.3 Waste Management Facilities

Three general categories of waste management facilities are available for the handling of wastes as briefly described below:

- ✓ **Treatment facilities:** use various processes (such as incineration or oxidation) to alter the character or composition of wastes (including hazardous wastes). Some treatment processes enable waste to be recovered and reused in manufacturing settings, while other treatment processes dramatically reduce the amount of waste.
- ✓ **Storage facilities** temporarily hold wastes until they are treated or disposed of.
- ✓ **Disposal facilities** permanently contain wastes. The most common type of disposal facility is a landfill, where wastes, inclusive of hazardous wastes are disposed of in carefully constructed units designed to protect groundwater and surface-water resources.

It is the responsibility of the Contractor to detail what types of waste will be sent to the various categories of waste management facilities. Options include:

- ✓ WASA Storage sites: these have limited capacity and are typically used for excess/left over construction materials such as pipes, valves and flanges, chemicals. These sites do not typically store demolition wastes, excess spoil/excavated materials
- ✓ Government entities: e.g. SWMCOL manages the three of the largest landfills – Forres Park, Guanapo and Beetham Landfill. This option can be considered a disposal option as wastes will be permanently contained. Various government Ministries e.g. Local Government may also designate appropriate storage, treatment and disposal sites
- ✓ Third Party Firms: there are a number of private firms which offer treatment facility services, disposal services as well as waste management equipment. Recycling firms are also available for use.

The Contractor will be required to make the necessary arrangements with the Ministries, government agencies and third party firms with regards to waste management.

2.3.1 Process for using third-party waste management facilities

An assessment of third-party, off-site recycling and waste treatment and disposal facilities helps to gain assurance that effective controls are in place to comply with appropriate regulations and to reduce any potential need for future human health and environmental activities associated with waste management activities. Third party waste management facilities should be evaluated with input from a waste management professional.

An assessment and inspection programme would typically include collection of data about the history and operation of the facility, a site visit to see the facility in person, a risk ranking, or evaluation of the information and periodic re-audits and site visits to confirm the facility stays in an acceptable condition. **Table 1** outlines some key elements for consideration and review during a facility assessment.

Table 1: Checklist for evaluation of Third Party Waste Management Facilities

Points to consider	Supporting Evidence
What types of waste are accepted at the site for treatment and disposal, and what methods are used?	▪ Applicable site license in place. ▪ Site procedures.
Are the treatment and disposal methods appropriate for the types of wastes accepted?	▪ Local legislation. ▪ Company policy. ▪ Good practice.
Are all required regulatory permits in place?	▪ Copies of relevant permits/licences for site and equipment (if required).
Is the facility in compliance with regulations and permits?	▪ Reports submitted to regulator. ▪ Regulator site inspection reports. ▪ Records of breaches/fines.
Are the facilities located, designed and constructed to provide environmental protection?	▪ Was an Environmental Impact Assessment performed? ▪ Appropriateness of design in relation to e.g. local geology, land use, topography,

Points to consider	Supporting Evidence
	presence of usable groundwater, soil permeability. ▪ Evidence of e.g. landfill lining, emission controls (for incinerators etc.), integrity testing for disposal wells.
Does the site have effective management and monitoring controls?	▪ Site procedures. ▪ Environmental monitoring programme. ▪ Evidence of monitoring and tracking emissions against maximum permissible limits. ▪ Organised and effective waste manifest system. ▪ Use of competent, accredited laboratories for analysis. ▪ Vehicle maintenance and service records.
Have steps been taken to mitigate the risk of HSE incidents?* HSE management plan.	▪ Condition of containers holding waste materials. ▪ Provision of secondary containment and/ or impervious barriers to prevent migration of materials and spills. ▪ Level of housekeeping. ▪ Any apparent spills and stains. ▪ Training and awareness of staff.
Does the facility respond quickly and effectively to any incidents?	▪ Spill response plan. ▪ Spill observation and reporting system. ▪ Spill response training records. ▪ Provision of spill kits on-site.
Does the facility have a good safety culture with adequately trained and resourced employees (including appropriate protective equipment)?	▪ Appropriate risk assessments. ▪ Training plan and training records. ▪ PPE availability on site. ▪ Appropriate PPE, MSDS etc signs. ▪ Performance track record.
Does the site have soil or groundwater impacts from previous or current operations?	▪ Site EIA/licence. ▪ Records of previous use.
Are impacts from nearby sources potentially affecting the site, for instance from groundwater migration?	▪ Groundwater monitoring programme results.
How close is the facility to nearby residents, cultural properties, or sensitive environmental areas?	▪ ESA. ▪ Site location plan.
Is security at the site adequate to prevent unauthorized access?	▪ Adequate fencing/patrolling. ▪ History of security breaches.

Points to consider	Supporting Evidence
	▪ Sightings of unauthorised personnel on site.
Are any sub-contracted services selected and managed responsibly?	▪ Evidence of effective sub-contractor audits.
What is the financial security of the facility, in terms of its longevity of operation and its ability to pay for potential incidents?	▪ Company funding/share owners, date of company founding, market share.
What are the relations with the surrounding community and regulators; is the facility a 'good neighbour'?	▪ Records of complaints, fines, local perceptions.
Does the facility have an end-of-life reinstatement plan and provision for its implementation, e.g. financial assurance?	▪ Decommissioning plan.

2.4 Wastes Generated

The Contractor will be required to list the wastes that will be generated on-site during the Construction Phase. This list should include hazardous wastes, construction wastes and typical solid waste.

The Contractor is also required to detail the sources of these wastes, the expected volumes and plans for management (treatment, disposal or storage). Waste storage, treatment and disposal sites must be identified and approved by the relevant authority for waste management purposes.

For wastes that are intended to be recycled, the Contractor must identify which wastes will be sent for recycling, how much waste, to what recycling firm as well as provide evidence that the recycling firm can adequately and appropriately treat with the waste in an environmentally sound manner.

2.4.1 Waste Management Options

The following table presents waste management options for the wastes generated during the Construction Phase. This table summarises some of the possible reduction/recycling, treatment and disposal methods that may be applicable to a variety of wastes typically found on-site.

This list is not exhaustive. The preferred reduction/recycling, treatment and disposal methods may vary according to available facilities, local conditions and regulatory requirements. Indications in the table that reduction options may exist do not necessarily mean that a significant reduction in waste volume can be reasonably achieved. Similarly, indication that a treatment or disposal option may be applicable does not necessarily mean that it will be appropriate or effective for specific waste streams or all environments. Combinations of treatment and disposal methods may be required to meet management objectives.

When using the following guidance, the Contractor must recognize and acknowledge that it is important to understand the chemical, physical and biological characteristics of the waste as well as the scale and frequency of generation. Note, not all the wastes listed in table 2 below will be generated by the Project.

Table 2: Waste Management Options Summary Table

	Recycle				Treatment						Disposal		
	Reclaim/Reuse	Use as fuel	Composting	Return	Incinerate	Neutralization	Evaporation	Wastewater systems	Land treatment	Solidification/Stabilization	Burial/inject to subsurface	Discharge to surface [f]	Landfill[¶]
Acids/Alkalis	x			x	x	x	x	x			x	x	
Activated carbon	x	x		x	x				x				x
Asbestos													x
Batteries & Battery Electrolyte	x			x		x				x			x
Chemicals – unused or spent chemicals and residues	x	x		x	x	x	x	x		x			x
Construction and demolition materials	x	x	x	x									x
Containers (empty) – drums/barrels	x			x	x	x							x
Domestic wastes/trash/food wastes	x	x	x		x				x				x
Drum rinse	x	x			x	x	x	x			x		x
Electronic wastes	x			x									x
Excavated materials & drill cuttings	X												X
Filters (air, water, other)	x	x		x	x					x			x
Gas cylinders	x			x									x
Glass	x			x	x								x
Glycols and antifreeze	x			x	x			x		x	x		x
Hydrotest fluids	x			x	x		x	x			x	x	
Insulating materials					x								x
Lubricants and Hydraulic fluids	x	x		x	x					x			x
Medical waste					x					x	x		x
Mercury containing wastes[f] (fluorescent tubes)	x			x						x			X
Paper & packaging wastes	x	x	x	x	x				x				x
Paint & other coating wastes	x	x		x	x		x			x			x
Plastic and rubber wastes	x		x	x									x
Refrigerants	x			x									
Scrap metal	x												x
Sludge from domestic sewage treatment			x				x	x	x	x		x	x
Stranded chemicals/solvents	x	x		x	x		x			x	x		x
Tyres	x	x		x	x								x *

ϕ After appropriate treatment as necessary

∂ Liquid waste should not be placed into landfills prior to solidification

ϕ After appropriate treatment as necessary

* Shredded

	Recycle				Treatment						Disposal		
	Reclaim/Reuse	Use as fuel	Composting	Return	Incinerate	Neutralization	Evaporation	Wastewater systems	Land treatment	Solidification/Stabilization	Burial/inject to subsurface	Discharge to surface [f]	Landfill[¶]
Wastewater							x	x	x			x	

Waste definitions for the wastes listed in Table 2 above are provided in **Appendix 5.**

2.5 Waste Tracking and Transfer

Once the treatment and disposal solution has been selected from available options, transfer and conveyance of wastes from the storage site to the site of treatment/disposal should be organized in accordance with applicable legal requirements.

Modes of transport and routes from the site of waste generation to the treatment/disposal site should be selected to reduce risks of release. Containers should be chosen to conform to legal requirements and method of transport.

Documentation on material properties and precautions to be taken in case of spillage (for example, the information on a Material Safety Data Sheet – (MSDS)) should be provided and should accompany the waste.

Tracking of waste types, quantities and methods and location of final disposal of those wastes should be considered as part of an overall waste management system to document the intended disposal of the waste.

Information to consider in tracking includes:

- ✓ Type of waste.
- ✓ Quantity or volume of waste.
- ✓ Final disposal location.
- ✓ Date of waste dispatch, transfer or disposal.
- ✓ Waste contractor details.
- ✓ Archiving and retention of waste tracking records as required.

For off-site waste shipments, more detailed tracking forms and signatures may often be used to document the chain of custody each time the waste changes possession from the site generating the waste, to the entity responsible for its transport to the disposal facility. A waste receipt from the receiving waste facility documents that the waste arrived at the appropriate waste facility. An example of a waste tracking sheet is given in **Appendix 1.**

2.6 Waste Tracking System

Procedures will be implemented by the Contractor to track the types of wastes generated and the disposal and recycle/reclaim options used to manage the wastes. Accurate waste inventories and waste tracking systems can be a useful resource for several reasons including:

- ✓ Records of how much of each waste stream is produced at individual sites can help identify waste minimization opportunities.
- ✓ Records of where wastes are disposed may be useful if there is a future need to conduct a site investigation or remediation effort due to a concern or impact.

The goal of the Waste Tracking System is to record, for each waste generated and managed, the:

- ✓ Type of waste,
- ✓ Volume (quantity) of waste,
- ✓ Handling or disposition method used, and the
- ✓ Ultimate disposal location (e.g., specific landfill and cell location).

Personnel handling wastes will be instructed to complete a Waste Manifest Form for each shipment of waste. The manifest will record the above types of information about each waste stream and the data recorded on the manifest will be entered into a central computer database that will allow the data to be sorted to produce various types of reports. Examples of the types of summaries that may be able to be generated include:

- ✓ Volume of each waste type generated by source and/or over time
- ✓ Volume of each waste type generated by location
- ✓ Volume and disposal methods used for each waste stream over time

As appropriate, the data in the database can be evaluated periodically to identify potential trends that could lead to potential opportunities to improve waste management practices or waste minimization. The information can also be used to shape future waste management decisions such as assessing the needs for additional landfill or incinerator capacity.

2.7 Offsite Waste Management/Disposal Facilities

The Contractor will be required to detail the offsite waste management arrangements. Details should include:

- ✓ A list of wastes that will be managed off-site
- ✓ Volume of waste that will be managed offsite
- ✓ How they will be managed at the offsite location
- ✓ Information with regards to the facility managing the wastes
- ✓ Justification for the selection of the particular facility

At this stage in the project, the Executing Agency cannot accurately predict what type and volumes of the different types of wastes that will be generated at the various stages during the Construction Phase and as such, prescriptive recommendations as it applies to offsite waste management cannot be provided within this document.

2.8 Waste Reduction Strategies

The principles of waste management include the incorporation of a hierarchy of management practices that is integral to the development of the strategy for dealing with wastes. This hierarchy is frequently expressed in terms of reduction, reuse, recycling and finally residue treatment and disposal.

Waste management, however, begins with prevention. Prevention refers to the avoidance or removal of waste by modification of design and operating practices. This principle can be incorporated, to the extent practical, into all stages of the project life cycle.

The Contractor will be responsible for detailing how the volume of waste generated will be reduced inclusive of the different methods that will be utilized to treat with the different types of wastes.

2.8.1 Remove and Reduce

Collectively this is known as 'reduction at source'. Source reduction occurs prior to reuse, recycling, treatment, or disposal. Source reduction may be achieved through equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training or inventory control. Source reduction is often the most cost effective way to manage waste.

Volume reduction

- Scheduling sequential hydro-testing to reduce the demand for test water and the volume of water for subsequent management and disposal
- Inventory control and management to avoid surplus e.g. use of 'just in time' delivery of short shelf life consumables.
- Optimize purchasing supply contracts to favour bulk purchases therefore reducing the volume of packaging.
- Bulk supply of products in reusable containers e.g. chemicals supplied in reusable steel tanks rather than 25 litre plastic drums.
- Supply reductions: allow for return of unused products and recycled containers to vendors in contracts.
- Supplier take-back schemes e.g. computer equipment, empty containers etc.
- Improved housekeeping and spill prevention.

Toxicity Reduction

Examples of reducing toxicity include:

- Use of non-chlorinated degreasing agents
- Water-based paints in preference to solvent-based paints
- Biodegradable 'plastics'
- Asbestos-free gaskets and insulation
- Mercury-free components (this includes lighting)
- Hydro-testing using low toxicity (or no) additives

2.8.2 Reuse

The re-use of materials in their original form such as:

- Chemical containers - Some containers can be reused only once to provide container integrity while others can be reused multiple times using an approved chemical vendor to refill chemical 'x' into the same used chemical 'x' container with the correct choice of container material and

stock return procedures. Quality control checks should avoid cross contamination and integrity issues.

- Reuse of oily rags/pads that can be cleaned between uses. Need to consider the additional impact of solvents, detergents and oily residues related to cleaning – have the potential to create another waste stream.
- Refurbishment of equipment e.g. valves, meters.
- Supply of equipment in reusable containers e.g. the use of plastic boxes rather than cardboard can be considered. It is essential to identify a re-use option and to implement it; otherwise it may be better to use recyclable materials.

2.8.3 Recycling/recovery

This is the conversion of wastes into usable materials and/or extraction of energy or materials from waste. Examples include:

- Recycling scrap metal
- Re-conditioning solvents
- Using oily wastes for road construction and stabilisation (though consideration of chemical components and potential leaching to soil and groundwater should be undertaken before such use, for example, asphaltics may be appropriate for road use, but used oil may not)
- Using crushed clean concrete for road construction material and hard standing
- Discarding shredded tyres for landfill liner protective layers or as an alternate daily cover for landfills. For example, tyres and high grip rubber mats/flooring might be suitable for use. The area of operation and availability of recycling facilities will dictate what can be done.
- Injecting used oil into the oil production plant.
- Use of (clean/decontaminated) split drums for reinforcing retaining walls.
- Recovering oil from tank bottoms
- Using hydrocarbon and other calorific wastes (solvents, oils, wood) for energy recovery (consideration of chemical constituents should be given for air emissions).

2.8.4 Residue Treatment

The destruction, detoxification and/or neutralization of residues through processes such as:

- Biological methods – composting (if appropriate, materials can be recycled), land farming
- Thermal methods – incineration, thermal desorption
- Chemical methods – neutralization, stabilization
- Physical methods – filtration, centrifugation, compaction or shredding

2.8.5 Disposal

Possible disposal methods for consideration includes:

- Injection
- Discharge to water or land
- Landfill to appropriate facility

2.9 Identifying "Unknown" Wastes

The Contractor will be required to detail how unknown wastes will be treated. The following provides a general guideline with regards to the process for identifying "unknown" wastes discovered on-site.

Screening and Identifying Waste

1. Unknown waste containers shall be immediately examined at the time of discovery. Container markings may provide additional information about contents. Staff shall attempt to learn as much as possible about unidentified wastes from the personnel bringing in the waste. Questions should be asked such as:
    - ✓ Was the material found?
    - ✓ Was the material stored in the restricted access area or in a laydown yard/general storage area?
    - ✓ How long ago was it discovered, i.e. was container present during the last inventory check?
2. If contents are still unknown at this point, segregate the container from other stored wastes, place into secondary containment, and contact the contracted hazardous waste disposal company for further direction.
3. If the label on a container indicates the unknown contents may be an imminent danger or indicates the highest level of warning (e.g., caution, warning, danger), ask the personnel bringing in the waste to gently remove the item and place in an area away from sensitive receptors and on-site personnel.
4. Every effort shall be made to properly identify the unknown waste. A recommended method may be to take a digital picture of the unknown waste container and e-mail to contracted hazardous wastes disposal company for identification assistance and further direction.
5. If necessary, perform preliminary testing (e.g., pH, flammability, water reactive) of the unknown waste to determine its hazard class (individual conducting this testing must be trained to do so). Additional waste identification questions or further processing instructions shall be addressed to contracted hazardous wastes disposal company. See **Appendix 2** for further information and sample forms
6. After proper identification of unknown material is determined, the waste may be commingled and lab packed with other hazardous wastes. Process wastes according to the contracted hazardous wastes disposal company requirements.

3.0 Waste Storage

Storage is the holding of waste for a temporary period of time prior to the waste being treated, disposed, or stored elsewhere. Hazardous waste is commonly stored prior to treatment or disposal, and must be stored in containers, tanks, containment buildings, drip pads, waste piles, or surface impoundments that comply with the regulations (Waste Management Rules, 2021).

3.1 Hazardous Waste

3.1.1 Containers

Condition of Containers

Containers that are deteriorating (e.g., cracked, rusted) or leaking must not be used. Waste stored in defective containers must be transferred to containers in good condition or handled in industry acceptable manner.

Compatibility with Waste Stored

The term incompatible waste refers to a hazardous waste which is unsuitable for (1) placement in a container because it may cause corrosion or decay of the container or inner liner; or (2) commingling with another waste or material under uncontrolled conditions because it might produce heat or pressure, fire or explosion, violent reaction, toxic dusts, mists, fumes or gases, or flammable fumes or gases.

Containers used to store hazardous waste must be made of or lined with materials that will not react with and are otherwise compatible with the waste in the container. Incompatible wastes and materials must not be placed in the same container. This requirement includes unwashed containers that previously held an incompatible waste or material. Incompatible wastes or materials can only be mixed in a manner that will not cause an adverse reaction, such as an explosion or uncontrolled flammable fumes.

Adequate analysis should be performed to avoid creating uncontrolled hazards such as heat generation, violent reaction, fire, explosion, and generation of flammable or toxic gases.

Containment

Designated container storage areas must have a secondary containment system. Secondary containment provides a backup system to prevent a release into the environment should primary containment (i.e., the container) fail. This usually consists of a poured concrete pad or other impervious base with curbing to prevent releases of hazardous waste into the environment and to allow drainage of any accumulated liquid to a sump, tank, or other container.

Storage areas holding containers with no free liquids are not required to have secondary containment systems provided that (1) the storage area is sloped or otherwise designed and operated to remove precipitation; or (2) the containers are elevated or otherwise protected from contact with accumulated liquid.

Ignitable and Reactive Wastes

Ideally, ignitable and/or reactive wastes should be stored at least 50 feet from the property line of the work site. Many work sites may stack drums along fence lines for storage space -- this may be a convenient storage area that maximizes use of space, however, ignitable and/or reactive wastes CANNOT be stored this way.

Locating these wastes well within the property boundaries provides two safeguards:

a. reduces the risk of the general public reaching/contacting the waste or being harmed in an explosion; and
b. If a release of hazardous waste does occur, this will help prevent the waste from migrating offsite.

Manage ignitable and/or reactive wastes to prevent fire and/or explosions. At minimum ignitable and/or reactive wastes must be kept away from:

a. fire;
b. hot surfaces like operating machinery, engines;
c. radiant heat or sunlight;
d. cutting and welding operations;
e. frictional heat -- keep drums stationary, don't pull drums along on the ground;
f. sparks from static electricity, electrical
g. operations, or friction; and
h. some reactive wastes must be kept away from water.

Finally, smoking must be banned in all areas that manage ignitable or reactive wastes, especially when wastes are being transferred/placed into containers**.**

3.1.2 Labeling of Containers

Clearly mark on the container the date hazardous waste completely filled the container. In addition, clearly mark all containers holding hazardous waste with the words "HAZARDOUS WASTE". Additionally, label should identify the waste, including the name of the substance, characteristics and handling requirements as well as comply with any other required labeling and markings as stated in the Motor Vehicles & Road Traffic Act.

General Guidelines for Labeling include:

- Have all personnel use the same method (e.g., handwritten, prepared labels) to label containers. Make sure all handlers know what the markings mean.
- Besides the start date and the words "Hazardous Waste," include information about contents (e.g., toxic, reactive, incompatible).
- Apply labels to the container when waste is first placed in the container. The label will be in place for shipment and provides information about the waste to drum handlers.
- Before reusing containers, make sure all old markings/labels are washed off or blacked out.

3.1.3 Inspection and Inventory

Container storage areas must be inspected weekly. Inspections protect the Contractor, Executing Agency, and the public -- through inspections, spills can be prevented before they happen.

The Contractor should develop and maintain a standard inspection checklist to be used during every weekly inspection. The checklist should be detailed and address the labeling and management procedures followed on-site. An example of a checklist that can be modified can be found in **Appendix 3.**

At a minimum, the inspection checklist should cover:

- ✓ leaks or staining from containers;
- ✓ container condition, including dents, bulging, and/or corrosion;
- ✓ labeling -- start date, the words "Hazardous Waste" and other information; and
- ✓ management practices -- such as aisle space, drum stacking.

Inspections should be detailed and methodical. Anyone doing inspections should be trained to properly conduct these inspections.

General guidelines to follow when inspecting containers are as follows:

- ✓ Follow the inspection checklist – make detailed notes if something abnormal is detected.
- ✓ Be thorough. Check the tops of drums to look for waste residue or corrosion.

- ✓ Walk all the way around containers – check entire storage area.
- ✓ Check containment area for stains.
- ✓ Note anything unusual in containment area -- even if it might not be a problem.
- ✓ If problems are found, get the problem taken care of immediately.
- ✓ Keep a logbook of the facility's inspection checklist.

3.1.4 Location of Storage Areas

Hazardous waste collection areas are designated areas that can safely accommodate hazardous waste containers and their contents for a specified waste accumulation period. Waste collection areas must be planned, prepared or constructed, tracked, inspected, and maintained in accordance with local regulations and/or industry best practices.

Waste collection areas may be indoors or outdoors and they must, at a minimum:

- ✓ Be formally designated
- ✓ Be sited away from vehicular traffic, sewer drains, storm drains, and property boundaries
- ✓ Provide adequate space for aisles around each container
- ✓ Be readily accessible for fire fighting and other emergency procedures
- ✓ Not be subject to flooding caused by 24 hour storm
- ✓ be chosen to minimize the potential for environmental damage, including any threats to the quality of surface water and groundwater; and to the health of humans, animals and plants from the normal on-site activities and from any other causes
- ✓ Bear signs indicating that hazardous wastes are stored therein. The signs shall be of such design as to be legible from a reasonable distance.
- ✓ Incompatible wastes must be stored in such a manner that contact in the event of an accidental release is not possible.

These additional planning criteria are recommended, but not required; the waste accumulation area should be:

- ✓ Sited on a non-porous surface, such as specially coated concrete
- ✓ Secured from unauthorized entry. Consider a room or fenced-in area that can be locked.
- ✓ Protected from exposure to sun and rain. This can be accomplished by choosing an indoor area, or covering the area with a canopy, or covering the containers with a tarp.

Notwithstanding the requirements identified above, hazardous waste must be stored in such a manner that it does not:

- ✓ generate extreme heat or pressure, fire or explosion or violent reaction;
- ✓ produce uncontrolled toxic mists, fumes, dusts or gases in sufficient quantities to threaten human health;
- ✓ produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion;
- ✓ damage the structural integrity of the storage area infrastructure;
- ✓ threaten human health or impact the environment through other likely means

Storage using Containers

A storage facility where containers containing liquid hazardous waste are stored shall consist of a structure with:

- ✓ a floor constructed of material which will not react with or absorb any waste or waste constituent, and which has no drains that provide a direct connection to sewers;
- ✓ a continuous impervious curb (minimum height of '15 centimeters) placed on the perimeter of the floor in such a manner that waste will not escape between the floor and curb;
- ✓ appropriate side walls and roof to prevent the containers from the weather; and
- ✓ a place to load and unload the containers designed so that:
    a) any spill will be contained and
    b) clean up of spilled materials will not produce a significant increase in the amount of waste to be managed as might result from the spill onto land.
- ✓ A storage facility where containers containing solid hazardous waste are stored shall consist of a structure with appropriate sidewalks and roof to protect the containers from the weather. If a proper covered area is not provided, only those containers provided with secondary containment such as a plastic inner liner or some form of over pack container may be stored in this type of storage facility
- ✓ Alternative designs will be considered provided they meet the intent for containment provided by the features outlined above.

Storage using Tanks

- ✓ All tanks in which liquid hazardous waste i.e. stored shall be surrounded by dike/bund or other equivalent structure configured in contain the waste under tank failure conditions with the following capacity:
    a) Bund to contain, 110 percent of the capacity of the tank or
    b) When the bund contains more than one tank, 110 percent of the volume of the largest tank plus 10 percent of the aggregate capacity of all the other tanks stored therein
- ✓ The bund shall be constructed to withstand the hydrostatic head associated with it being full of liquid resulting from other than catastrophic events.
- ✓ The bunded area shall be graded to a sump with necessary piping to pass over the bund for rain water removal. There shall be no openings in the bund that provides a direct connection to any place beyond the bund area.
- ✓ A storage tank shall be provided with some means of controlling vapour release (e.g. activated carbon bed, scrubber or an inert gas blanket) if the vapour pressure of the stored hazardous waste is high enough to be of concern.
- ✓ Any leakage from the tank shall be contained and prevented from entering into the remainder of the storage site and places beyond, including sewers and the ground underneath the site.

3.2 Non-hazardous Waste

3.2.1 Containers

Containers that are deteriorating (e.g., cracked, rusted) or leaking must not be used. Waste stored in defective containers must be transferred to containers in good condition or handled in industry acceptable manner.

Containers must be properly covered so as to prevent windblown dust generation. They must be adequately sized and made of materials that are compatible with the intended waste to be stored.

3.2.2 Labeling of Containers

General Guidelines for Labeling include:

- Have all personnel use the same method (e.g., handwritten, prepared labels) to label containers. Make sure all handlers know what the markings mean.
- Besides the start date label should clearly indicate the type of waste to be stored; this will minimize cross contamination of the materials. This is particularly important for wastes intended for recycling and salvage.
- Apply labels to the container when waste is first placed in the container. The label will be in place for shipment and provides information about the waste to handlers/waste disposers.
- Before reusing containers, make sure all old markings/labels are washed off or blacked out.

3.2.3 Inventory and Inspections

Container storage areas must be inspected weekly. Inspections protect the Contractor, Executing Agency, and the public -- through inspections, spills can be prevented before they happen.

The Contractor should develop and maintain a standard inspection checklist to be used during every weekly inspection. The checklist should be detailed and address the labeling and management procedures followed on-site.

3.2.4 Location of Storage Areas

Waste collection areas must be planned, prepared or constructed, tracked, inspected, and maintained in accordance with local regulations and/or industry best practices.

Waste collection areas may be indoors or outdoors and they must, at a minimum:

- ✓ Be formally designated
- ✓ Be sited away from vehicular traffic, sewer drains, storm drains, and property boundaries
- ✓ Provide adequate space for aisles around each container
- ✓ Be readily accessible for fire fighting and other emergency procedures
- ✓ Not be subject to flooding caused by 24 hour storm
- ✓ be chosen to minimize the potential for environmental damage, including any threats to the quality of surface water and groundwater; and to the health of humans, animals and plants from the normal on-site activities and from any other causes

4.0 Waste Transportation

4.1 Vehicle Requirements

All vehicles intended to be used to transport waste, either hazardous or non-hazardous, must be in compliance with all applicable rules and regulations as it applies to the requirements for vehicles involved in the transportation of waste materials such as the Motor Vehicles and Road Traffic Act.

It is the responsibility of the Contractor to ensure that all Contractor owned vehicles have the appropriate permits, licenses, certificates and or insurance required for the transportation of wastes. The Contractor must also ensure that all sub-contractors hired to transport waste materials also possess the relevant aforementioned documentation prior to transportation of wastes. This documentation must be supplied to the Executing Agency.

Vehicles not authorized for the transportation of wastes and lacking the proper documentation as it applies to waste transportation must not be utilized for this purpose.

At a minimum, vehicles transporting hazardous wastes should:

- ✓ Have the name or trademark of the firm with lettering in a color contrasting with the background legible from a distance of 50 feet during daylight, on each side of the vehicle or container;
- ✓ Vehicles, containers, and any attached equipment used for transporting hazardous waste must be in sound condition and containers must be designed or maintained to contain hazardous waste;
- ✓ Hazardous wastes that are subject to volatilization or wind dispersal shall be transported in covered containers.

4.1.1 Vehicle Placarding

Placards/ warning signs/ internationally accepted signage, should measure at least 273mm (10.8 inches) on both sides and have a 12.7mm (0.5 inches) solid line inner border and be conspicuously sited. The text indicating the hazard and the hazard class should be at least 41mm (1.6 inches) in height for both.

4.1.2 Communication Capability

Vehicles should be equipped with dispatch radios and drivers may also be provided with mobile/cellular phone to allow for communication with the Contractor, facility receiving wastes as well as to contact emergency services in the event of an accidental spill or other emergency incident requiring external assistance.

4.2 Driver Requirements

Personnel selected as drivers for transport of hazardous and flammable material should possess a valid driving license in a relevant classification from the local license authority.

It is recommended that prospective drivers also possess the following:

- ✓ Certificate of health from a recognized physician or general hospital. (This should include a drug test.)
- ✓ Experience in driving the relevant class of vehicle.
- ✓ Defensive Driving Certification

Recommended components of a training program are as follows:

a) Theoretical and practical training relevant to:
   - ➢ the type of vehicle, and
   - ➢ class of hazardous material to be assigned to the driver concerned.

b) Detailed theoretical and practical training on emergency response action to be taken in the event of an incident.
c) Procedure to be followed by the driver on reaching his/her destination.
d) Drivers/operators should be trained n the proper method of operating waste handling vehicles and in the procedures for loading and unloading waste handling vehicles

The driver must also be in possession of the waste manifest required for the transportation of the waste so as to be able to produce said manifest if so required by an officer of the law.

4.2.1 Waste Manifests

- ✓ A person transporting hazardous waste that requires a manifest shall comply with all manifest procedures;
- ✓ Hazardous wastes must be delivered to authorized facilities only. In the event that the waste cannot be delivered to the facility designated on the manifest, the transporter shall contact the generator for instructions and revise the manifest according to the generator's instructions;
- ✓ A transporter of hazardous waste shall sign and keep a copy of the manifest signed by the generator and the next designated transporter or facility for a period of at least three years from the date the waste was accepted by the initial transporter.

4.3 Route

The most direct route utilizing national highways should be utilized in the transportation of hazardous wastes so as to minimize the public exposure to the waste materials. Peak traffic hours should be avoided unless transport is absolutely necessary. To minimize distances to be travelled, appropriate treatment and disposal facilities within close proximity to the work areas should be considered/selected.

5.0 Health & Safety Issues

The Contractor should state the health and safety issues that will be encountered during the Construction Phase although it is expected that these concerns will be dealt with in greater detail in the Contractor Health and Safety Plan.

6.0 Waste Education & Training Program

The Contractor will be required to ensure that all personnel involved in the management of on-site wastes have received the appropriate training to do so. Additionally, all sub-contractors hired to remove wastes or otherwise manage waste on-site must provide proof that staff is certified. At a minimum, on-site personnel should receive:

- ✓ **Hazmat training**
- ✓ **Emergency & Spill Response Training** – Personnel must be familiar with the site's Oil and Hazardous Material Spill Contingency and Emergency Response Plan
- ✓ **Occupational diseases associated with Construction Wastes**
- ✓ **Fundamentals of Waste Management**

- ✓ **Inventory Control**
- ✓ **Conducting Inspections**

The Contractor will detail how frequently on-site personnel will receive training, the content of the training and the methods used to train the on-site personnel.

Appendix 1- Example of a Waste Tracking Sheet

Waste Manifest Form

Part A – To be completed by GENERATOR

Source Site Location GPS coordinates and/or kilometer post mark or other location descriptor (use attachment(s) as necessary):	

Origin of waste:								Receiver use only (Part C)				
Waste description (use attachment(s) as necessary)	Waste type	Hazard	Container		Quantity shipped	Units, e.g. tonnes	Handling/disposition	No. of containers received	Container type	Quantity received	Units	Handling/disposition
			No.	Type								

Generator additional information: e.g. condition of container, requirement to return empty container	

Intended receiver: Company Waste Management Facility Third Party Facility
Include facility (company) name, full address, telephone number and name of contact individual

Certification	I declare that the information I have provided in Part A is correct and complete	
Name (print):	Signature:	Date (DD/MM/YY):
Telephone:	Fax:	24-hr Emergency

Generator's address: (this is the address to which the Receiver is to send the Waste Manifest Forms to)

Part B – To be completed by TRANSPORTER

Name of Transporter: (Include company name, full address, telephone number and name of contact individual)

Certification	I declare that I have received the waste as described in Part A for delivery to the Intended Receiver and that the information in Part B is correct and complete	
Name (print):	Signature:	Date (DD/MM/YY):
Telephone:	Fax:	24-hr Emergency

Part C – To be completed by RECEIVER

Date Received (DD/MM/YY):	Intended receiver? (see Part A)	Yes	No

Receiving location: Company waste Management Facility Third Party Facility
Include facility (company) name, full address, telephone number and name of contact individual

Receiver additional information: e.g. condition of container, requirement to return empty containers

Certification	Except for the irregularities/discrepancies noted above, I declare that I have received the wastes as described in Part A and that the information in Part C is correct and complete.

Name (print):	Signature:	Date (DD/MM/YY):
Telephone:	Fax:	24-hr Emergency

Part D – To be completed by GENERATOR

Name of Authorized Person (print):	Signature:	Date (DD/MM/YY):

Appendix 2- Sample Procedure for Identification of Unknown Wastes

Step 1: Determine physical description. Note the following:

- Color
- State (solid, liquid)
- Particle size
- Liquids
- Layering
- Incidental odor (DO NOT SMELL)

Step 2: Determine flammability.

a. Place a small amount, approximately, 5 grams, of the unknown material into a cup or weight dish.
b. Apply an ignition source (a lit match or butane lighter flame) to the unknown material.
c. If the sample ignites immediately, or in a somewhat delayed fashion, consider the material to be flammable.

Observation	Result
Sample immediately combusts	Waste is hazardous for explosive (H1, H3)
Delayed combustion or to a lesser degree	Waste is combustable but not necessarily hazardous
Sample melts	Non-combustable

Step 3: Determine water reactivity.

a. Place a pea-sized amount of the unknown material, using a disposable spatula or pipette into cup or weight dish.
b. Add a few drops of water on the sample.

Observation	Results
Smokes, emits fumes, sizzles, fizzes, or jumps in water	Sample is water reactive, potentially an inorganic metal if solid, organic if liquid and may be considered as having hazardous characteristics (hazardous material)(H10)

Step 4: Determine if sample is an oxidizer.

a. For liquids, place a few drops of the sample onto a strip of potassium-iodide starch paper.
b. For solids or semi-solids, slurry sample with some distilled water in a 1:1 mixture or ratio.
c. Place the potassium-iodide starch paper onto the sample.
d. Observe for any color changes.

Observation	Results
Potassium-iodide starch paper turns purple	Substance is an oxidizer and considered as having hazardous characteristics (hazardous material)(H5.1)
No color change	Substance is not an oxidizer

Step 5: Determine corrosivity.

a. For solids, add a pea-sized portion of the material to a few drops of distilled water.
b. Dip pH paper into the sample.
c. For liquids, dip pH paper into sample.

Observation	Results
pH = 0	Acidic – the lesser the number, the stronger the acid. A result of less than or equal to 2.0 is considered corrosive (hazardous)
pH = 5 – 9	Neutral
pH =10 – 14	Alkaline – the higher the number, the stronger the alkalinity. A result of greater than 12.5 is considered corrosive (hazardous)

Step 6: Cyanide test.

a. Place 5 grams, nickel-size, of the sample into a test tube.
b. If material is solid or semi-solid, slurry it with distilled water.
c. Wet a strip of the testing paper with some distilled water and place it well above the sample.
d. Add 5 ml of concentrated sulfuric acid to sample and gently stir. Immediately cover the test tube.
e. Observe for any test paper color changes.

Observation	Results
Pale green test paper turns blue	Cyanide is present. Chemical is hazardous for cyanides (A4050).

Step 7: Sulfide test.

a. Place 5 grams, of the sample into a test tube.
b. If material is solid or semi-solid, slurry it with some distilled water.
c. Wet a strip of lead-acetate paper with some distilled water and place the paper well above sample.
d. Add 5 ml of hydrochloric acid to the sample and gently stir and immediately cover the test tube.
e. Observe for any color changes to the test paper.

Observation	Results
Lead-acetate strip turns brown	Possible reactive sulphides.

Step 8: Determine if the material is hazardous.

If an unknown material is negative to all tests, or if you are still unsure about what to classify the material as, you may place the material to the side. A contracted disposal company employee can do additional

testing upon arrival for a waste pickup. In most cases, those materials will not be shipped on that date. Fill out the Unknown Material Screening Report Form and send it along with the inventories for shipment, see below.

Unknown Materials Report Form

Generator:
Date/Time sampled:
Address:
Contact Person/Phone number:

Test Performed	**Yes**	**No**	**Result**
pH (exact result)	☐	☐	
Flash point (does material flash)	☐	☐	
Water reactive	☐	☐	
Water soluble/based	☐	☐	
Air reactive	☐	☐	
Oxidizer	☐	☐	
Sulphides	☐	☐	
Cyanides	☐	☐	
Peroxides	☐	☐	

Comments: (Include color, size, and kind of container—glass, plastic, metal—color of the material, physical state of the material, any label information, etc.)
Staff completing sampling:

If item is still unknown at this point, call the contracted hazardous waste disposal company.

Appendix 3 – Sample Inspection Checklist

Month: _____

Year: _____

Instructions: Weekly, place a "Yes" next to all inspection items that meet facility rules. Place a "No" next to all inspection items that do not meet the rules. Please provide specific comments on all "No-marked" items. When weekly inspection is completed, inspector must initial at the bottom of the table. Report all No-marked items to appropriate supervisor.

Inspection Item	**Four Week Inspection Period**				**Comments on Inspection Item**
	Date:	**Date:**	**Date:**	**Date:**	
No. of containers stored in unit					
Containers marked/labeled properly					
Containers dated properly					
Containers observed to be free of staining/leaks					
Containers observed with closed tops of bungs					
Containers observed without dents or corrosion					
Appropriate aisle space maintained					
Containment area free of water or other liquids					
Inspector's Initials					

Overall Comments:

-

_____

_____

_____

_____

_____

_____

_____

Reviewed by: _____

Date: _____

Appendix 4 – Sample Waste Management Data Sheet

Project Name:

Project Address/Location:

Primary Contractor:

Person responsible for waste management on site (name and job title):

Person and company completing this form, if different:

Types of waste arising (add more rows if needed)

Material	**Quantity (in m^3)**					
	Re-used on-site	Re-used off-site	Recycled for use on-site	Recycled for use off-site	Sent to Recycling Facility	Disposal to Landfill
Inert						
Active						
Hazardous						
Totals (in m^3)						

Appendix 5 – Waste Definitions

Waste	Definition
Acid/Alkalis including wet cell battery electrolyte	Waste acids/alkalis should be managed as corrosive wastes if their pH is less than 2.0 or greater than 12.5.
Activated Carbon	Discarded charcoal and activated carbon, including filters, used and unused.
Asbestos	Both friable and non-friable asbestos waste containing more than 1% asbestos by weight.
Battery Electrolyte	Spent nickel-cadmium, lithium, mercury-cell, and lead-acid batteries. May be corrosive or water reactive.
Chemicals – Unused or Spent, Chemicals and Residues	Chemicals and additives or their residues that may no longer be used for their intended purpose because of being spent or degraded, expired or obsolete (change in methodology).
Construction & Demolition Material	By-products of construction, maintenance, demolition activities. Most of these wastes tend to be inert.
Containers – (empty) drums, barrels	A container is empty if all material has been removed that can be removed using practices commonly employed to remove the material from that type of container e.g., pouring, pumping, aspirating. Containers that are not empty should be managed based on the characteristics of the contained material.
Domestic Waste/Trash/Food	Discarded items from the kitchen, bathroom, laundry, warehouse, offices, etc. Many of these items may be biodegradable; others will be inert.
Drum Rinse	Aqueous rinsate from steam cleaning, or rinsing containers.
Electronic and Computer Wastes	Toner cartridges, mobile phones, computers and other accessories.
Filters – (gas/air, water, other)	These filters may be sock, cartridge, or canister-type filters used to remove solids and impurities.
Gas Cylinders (empty)	A cylinder is empty if all material has been removed that can be removed using practices commonly employed.
Hydrotest Fluids	Fluids used to test pipeline integrity.
Lubricants and Hydraulic Fluids	Petroleum-based lubricating greases, motor oils and transmission oil, hydraulic fluids as well as synthetic oils used for these same purposes. These oils may contain impurities, e.g. metals, as a result of their use.
Medical Waste	Wastes generated by general clinical procedures including sharps. Many of these may contain pathogens and be potentially biohazardous materials.
Mercury-Containing Wastes	Surplus mercury and devices containing mercury including fluorescent tubes.
Paper and Packaging	Paper, cardboard and wood.
Plastic and Rubber	Materials comprised of plastics (PET, HDPE, PVC, LDPE, PS, etc) and rubber.
Refrigerants	Cooling substances; any of the various halocarbon compounds consisting of carbon, hydrogen, chlorine and fluorine e.g. chlorofluorocarbons (CFCs).
Scrap Metal	Excess used and unused metal materials and equipment.
Sludge from Domestic Sewage treatment	Sludge consisting of the bio mass removed to remain equilibrium in a sewage treatment unit.
Wastewater	Spent or used water with mixture of water and dissolved or suspended solids.

Annex E – Emergency Response Plan

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Table of Contents

List of Figures

List of Tables

List of Acronyms

BMP	**Best Management Practices**
CCP	**Contractor Control Plan**
CIPP	**Contractor Implementation Plan & Procedures**
EC	**Emergency Coordinator**
ECC	**Emergency Coordinating Committee**
ECO	**Emergency Communications Officer**
EEO	**Emergency Engineering Officer**
EHSO	**Emergency Health & Safety Officer**
EM	**Emergency Manager**
ESM	**Emergency Site Manager**
HSE	**Health, Safety & Environment**
EA	**Executing Agency**
ESA	**Environmental & Social Assessment**
ERT	**Emergency Response Team**
ESMP	**Environmental & Social Management Plan**
IDB	**Inter-American Development Bank**
MPU	**Ministry of Public Utilities**
PIE	**Post Incident Evaluation**
RIA	**Risk Identification & Assessment Procedure**
SCERP	**Spill Contingency and Emergency Response Plan**
SPC	**Special Purpose Company**
WASA	**Water & Sewerage Authority**
WTP	**Water Treatment Plant**

1.0 INTRODUCTION

This Contractor Control Plan (CCP) is designed to provide a high-level overview of the procedures to mitigate and control the impacts on community and occupational health and safety, the environment and the Project in the event of emergency situations during the execution of the Project.

Whereas this document provides the overall approach and commitment to emergency response and preparedness, the Contractor Implementation Plan & Procedures ("CIPP") must provide detailed command and control and response actions, and it is these plans that must be used in conjunction with this overarching plan in the event of an emergency situation inclusive of spills of oils and hazardous materials, spills of other non-hazardous materials as well as disasters (natural and man-made).

It forms part of the Environmental and Social Management Plan ("ESMP") for the project. The site-specific CIPP will need to be approved by the Executing Agency (EA) (Project Owner) prior to implementation. Additionally, it is expected that the CIPP will be reviewed and revised (if required) at least every six months and re-submitted for approval prior to implementation.

1.1 Purpose

The CCP is a management control document that fulfills the following purposes:

- Serves as an important part of the environmental management process to translate commitments made in the Project Source Documents (Certificate of Environmental Clearance (CEC) and Inter-American Development Bank (IDB) Loan documents with respect to emergency and spill response into contractor actions.
- Serves as a key tool by which the Executing Agency can check the CIPPs and specifically the procedures and method statements that specify how the activities described in their contracts will be carried out in compliance with project commitments.
- Provides transparency to the IDB that commitments are being met and are being translated through to the Contractor who is responsible for implementation.

It presents:

- Responsibilities for the implementation of the plan;
- Best Management Practices to be implemented by the Contractor during construction and/or installation works to meet the project commitments and eliminate or reduce potential impacts;
- Verification and monitoring requirements; and
- Reporting requirements.

1.2 Objectives

The broad objective of this CCP is to describe the approach and procedures to be followed by the contractor for responding to emergencies during the execution of the Project. The CCP also assists the Executing Agency in ensuring that the intended outcomes of the proposed emergency response measures are achieved and assures compliance with legal and policy obligations and lender requirements.

The objectives of this Management Plan are to:

- ✓ Outline the applicable standards with regards to emergency preparedness and response;
- ✓ Define the emergency preparedness and response procedures utilised during the execution of the Project;
- ✓ Define roles and responsibilities of key personnel in the event of an emergency;
- ✓ Identify emergency communication protocols;
- ✓ Define training requirements and evacuation response exercises; and
- ✓ Identify the types of emergencies that may require assistance.

1.3 Scope

The CCP specifically covers the activities associated with the proposed Project. These include:

- ✓ The new facility and designated access to the facility areas including, but not limited to, the construction sites, drainage channels, access roads, storage areas and office facilities;
- ✓ The construction assembly/laydown yards and associated facilities and infrastructure;
- ✓ The associated pipeline network, any lift station sites and associated appurtenances;
- ✓ Transport of materials to and from the sites;

1.4 Implementation of the Plan/Management Structure

The act of managing spills and natural or man-made disasters will require a team effort approach. With this, the management of the proposed contractor will formulate an Emergency Response Team (ERT) to address any of the aforementioned disasters in a quick, responsible and safe manner. The Contractor shall detail the responsibilities, reporting hierarchy and contact information for the individuals identified within the CIPP. Proof of training in specific areas listed previously (first aid, hazardous material spill response, disaster relief etc) must also be supplied to WASA for the persons identified as members of the ERT.

This Team will be led by an Emergency Coordinator/Team Leader (with an alternate), who shall direct and execute all the activities outlined by the response plans. The ERT must conduct periodic meetings to address important issues concerning the emergency response plans. Such important issues should be the objective of the Team, their roles and responsibilities, updates, training, drills as well as table top exercises.

The Emergency Response Team (ERT) will report through the normal, internal management chain-of-command. Due to the possibility of various construction locations and variety of field activities involved during this project, establishment of more than one ERT may be necessary. Under all circumstances, prompt and proper treatment of the injured or ill employee is of utmost importance.

1.5 Potential Emergency Events

Potential events that could impact Project-related activities, personnel or assets range from major physical incidents such as fire, to failure of significant computer or communications systems. These potential events could include (but not limited):

- Fire (contained and conflagration);
- Explosion (accident or terrorist);
- Slope / trench failure;
- Natural Disaster – earthquake, hurricane, storm, flood;
- Road incident or road obstruction (accident, chemical spill, impassable river crossings, bridge/culvert collapse etc.);
- Spillage of hazardous or potentially-hazardous materials (on or off-site);
- Industrial action;
- Criminal, sabotage or arson attack;
- Security emergency;
- Damage to above ground or underground utility;
- Interruption to utilities supplies;
- Accidental Fatality or major injury;

The contractor CIPP should contain detailed procedures for responding to these potential emergency events as well as any others that the Contractor may additionally identify. The Contractor will be required to develop his ERP and emergency procedures in accordance with responder agencies (Fire, Police, ODPM, Relevant Regional or Borough Corporation) and consider nearby activities, events, projects that can affect the efficacy of the ERP.

1.6 Emergency Response Plan Distribution

At a minimum, the CIPP (developed from the CCP) will be made available to the following:

- Contractor Staff inclusive of but not limited to:
  - All employees involved (whether directly or indirectly) with oil handling, transfer, storage, spill response and maintenance of oil equipment;
  - All employees involved (whether directly or indirectly) with hazardous materials handling, transfer, storage, spill response;
  - All HSE personnel;

- All Security personnel;

- Fuel, oil or hazardous material delivery company employees;
- Project Supervisors or Managers who have direct reports involved in the aforementioned activities;
- WASA Health, Safety & Environment Division personnel;
- WASA Community Relations Officer designated specifically for the Project – this individual will be able to relay the relevant information to communities/residents that may be adversely affected by spills etc.[1]
- National Emergency Response Agencies – ODPM, Trinidad & Tobago Fire Services, Trinidad & Tobago Police Services etc;
- Relevant Regional/Borough/City Corporations
- Environmental Management Authority (EMA) – In compliance with the CEC issued, the Project Specific Spill Contingency and Emergency Response Plan must be made available to the EMA upon request.
- Occupational Health & Safety Agency (OSH Agency) – In compliance with the CEC issued the Project Specific Spill Contingency and Emergency Response Plan must be reviewed by the OSH Agency
- Inter-American Development Bank
- Companies sub-contracted by the Contractor to provide works and services, including any specialist environmental remediation activities.

2.0 POLICY AND CONTROL STANDARDS

2.1 Policy Statement

All aspects of the Project will be managed in accordance with WASA's HSE policies, best management practices and international and local standards as well as the specific HSE Design Standards for the project. In addition, WASA is committed to conducting its business in a manner which:

- Ensures that all facilities are designed, constructed, commissioned, maintained and operated to high and consistent standards;
- Complies with the requirements of the EMA and IDB;
- Meets the Environmental & Social policy requirements of the IDB; and

[1] Community Relations Officer will relay information via the Construction Supervisor. The Construction Supervisor in turn will ensure that suggested recommendations/actions to be taken are implemented and provide status updates/reports to the Community Relations Officer

- Is compatible with the balanced economical and environmental needs of the community.

2.2 Control Standards

2.2.1 National Laws

- ✓ Disaster Measures Act (1978)
- ✓ Environmental Management Act
  - ➢ Certificate of Environmental Clearance Rules
  - ➢ Water Pollution Rules
  - ➢ Waste Management Rules (Draft)
    - ✓ Water & Sewerage Act
    - ✓ OSH Act

2.2.2 National Plans and Policies

- ✓ National Oil Spill Contingency Plan
- ✓ Integrated Solid Waste Management Policy
- ✓ ODPM National Response Framework 2010
- ✓ WASA's Emergency Response Plan and Procedures

2.2.3 International Treaties

- ✓ Cartegena Protocol
- ✓ LBS Protocol (Protocol Concerning Pollution from Land-Based Sources & Activities)

2.2.4 Inter-American Development Bank Policies & World Bank Group Guidelines

- ✓ OP-703: Environmental and Safeguards Compliance Policy
- ✓ OP-704: Disaster Risk Management Policy
- ✓ OP-102: Access to Information
- ✓ International Financial Corporation Environmental, Health and Safety Guidelines

3.0 EMERGENCY RESPONSE ROLES & RESPONSIBILITIES

3.1 Emergency Response Team

The Contractor is required to establish an Emergency Response Team (ERT). By definition, an ERT is a group of people who prepare for and respond to any emergency incident, such as a natural disaster or an interruption of business operations. ERT members ideally are trained and prepared to fulfill the roles required by the specific situation. As the size of an emergency grows, and as more resources are drawn into the event, the command of the situation may shift through several phases, as such, the Contractor should take this into account when developing the CIPP. Individual team members can be trained in various aspects of the response, be it Medical Assistance/First Aid, hazardous materials spills, hostage situations, information systems attacks or disaster relief. Ideally the ERT should have defined a protocol or set of actions to perform to mitigate the negative effects of the emergency incident.

In the event of an emergency, the roles of the specific project personnel will expand to include new tasks and responsibilities. **Error! Reference source not found.** below lists the recommended designees and an overview of their duties.

Table 1: Positions, Requirements & Duties

Emergency Coordinator	This is usually Construction Site Manager or equivalent: • Proficient in English (spoken and written) and suitably trained in ERP; • Available on a 24-hour basis; • Able to arrive at the facility or site in a reasonable time frame[2] (within 1 hour following notification); • Responsible for overseeing the implementation and response to emergencies or other threats to life and property on the Project; • Providing sufficient resources, trained personnel and facilities to prepare for and address emergency requirements; • Reviewing the Project's ERP for adequacy and functionality; • Directing and coordinating personnel/operations from the Emergency Operating Centre as required; • Providing permission for use of project equipment and resources; • Able to engage specialist services as required;

[2] It is anticipated that the EC will be located at the main jobsite

	• Providing permission for offsite responses; • Communicating with external National Responders such as fire services, police and ambulance services; • Reporting to and liaising with Client and his representative on status of emergency and related information.
Emergency Operations Officer	This is usually the Environment, Health and Safety Officer or equivalent: • Proficient in English (spoken and written) and suitably trained in ERP; • Available on a 24-hour basis; • Able to arrive at the facility or site in a reasonable time frame[3] (within 1 hour following notification); • Implementing emergency procedures and response to threats; • Provide coordination of the project in the event of an emergency; • Implementing appropriate training and drills; • Reviewing and updating emergency procedures; • Ensuring personnel, visitors, subcontractors are aware of procedures; • Training of personnel and wardens; • Maintaining current lists of personnel (i.e. wardens, ERT, etc.) and visitors in their areas for assembly and evacuation purposes; • Directing and coordinating personnel/operations from the Emergency Operations Centre as required; • Ensuring emergency equipment inspections are undertaken as scheduled; • Audit emergency response process; • Arrange briefing at the completion of each emergency and emergency exercise.
On-Scene Commander	Site Supervisor or senior personnel on site of incident:

[3] It is anticipated that the EC will be located at the main jobsite

	• Take initial control and coordinate first response; • Managing Emergency Response Team and scene safety as a priority; • Directing first aid to injured personnel; • Securing the emergency scene to enable health and safety of all persons; • Initiating evacuation if required; • Securing as far as practicable, incident location from disturbance or interference until cleared by Emergency Operations Officer; • Providing, direction, assistance and support to persons at the scene; • Conduct damage assessment; • Maintaining (internal) communication with EC, EOO and ERT; • Seconding labour, equipment and machinery from immediate resources to assist to control the emergency, effect remedy or save life.
Emergency Response Team	These are usually designated site personnel: • Attend Emergency Response Training; • Reports to area of concern or Emergency Operating Centre depending in type of emergency; • Assists to stabilize and make area safe around the incident and support response according to area of expertise e.g. fire, spills, etc.;
Safety Wardens	Nominated and trained site employees: • Coordinating the accounting of personnel and visitors within their control and reporting on their presence or absence; • Coordinating and managing directions of Onsite Commander; • Advising personnel of an emergency in their area and directing them to muster point;

	• Restricting area into affected areas to emergency personnel only; • Providing first aid and CPR as required and trained.
Supervisors	Support emergency response team members in their crew by releasing them for training, drills, debriefing as required.
Site Personnel (including subcontractors, visitors, etc.)	• Participate in emergency exercises where required. In the event of an emergency, make work area safe, report to muster point and await further instructions; • Obeying all instructions provided by wardens and emergency response measures; • Shutting down all necessary equipment and work so that areas are left in safe condition.

3.2 Executing Agency's Role in Emergency Response

The Executing Agency's (EA) role in the Emergency Response is to (i) ensure that the response is in compliance with emergency action plans, (ii) ensure that response is conducted in a manner which ensures the health and safety of employees, emergency responders, the public and the environment, (iii) lend technical assistance as required. This oversight will be executed by the EA Contracted Special Purpose Company (SPC) Supervisor (a representative hired to oversee the Project) who will act as a liaison between the Contractor and the EA (via the Project Manager & Project Executing Unit).

Additionally, the WASA will be responsible for informing the necessary regulatory agencies as required. In compliance with the issued CEC, the WASA Environment & Regulatory Compliance Department must inform the EMA of all accidents, emergencies and [4]spills within 24 hours of the discovery of the incident. **The Contractor is not to contact the EMA, OSH Agency or any other regulatory agency directly.**

Additionally, an Incident Report detailing the following must also be submitted to the EMA within 10 calendar days of discovery of an emergency:

- ✓ Cause of the emergency
- ✓ Effects of the emergency, including casualties, description and cost of damage
- ✓ Corrective measures taken to alleviate the situation
- ✓ An estimate as to when the situation shall be (or statement of when it was) resolved
- ✓ Steps to be taken to reduce the probability or prevent a recurrence.

[4] 10 litres or more of fuel and lubricants

- ✓ Insurance certificates, chain of custody documentation and disposal records provided by firms hired to conduct remedial and disposal actions.

This Incident Report will be generated based on the information supplied to WASA by the ERT via the Construction Supervisor.

The MPU and WASA will also be responsible for communicating with the media with regards to the provision information on the incident such as possible causes and mitigation measures implemented as well as status updates with regards to clean-up and restoration works. The Contractor and/or members of the ERT such as the ECO will not be permitted to disclose any information to the media unless it has been previously revealed in an official WASA Media Release or permission has been explicitly granted by the Head, Corporate Communications (WASA employee) to issue a statement that has been approved by same. **All media requests for information must be directed to the MPU and/or WASA, Corporate Communications; all information disseminated to the media must be issued from MPU and/or WASA or have been reviewed and approved by MPU/WASA, Corporate Communications before release to the media.**

3.3 Training

The Contractor CIPP must detail training that employees as well as suppliers/vendors will be required to complete. It must also identify and detail training that will be administered to other visitors to the job-site. The CIPP must: identify institutions/persons that will be conducting the training – these must be certified/registered institutions that will be able to issue either locally, regionally or internationally recognized certificates; courses selected and course content; as well as cost associated with proposed training activities.

3.3.1 Members of Emergency Response Team

Members of the ERT should receive training (from a certified institution) inclusive of but not limited to the following:

- ✓ **Hazardous Material Spill Response** (at least 2.5 hours) – this training should be in compliance with standard guides for development of hazardous training curriculum such as the ASTM F 1011 or equivalent standard. It should create awareness of regulations that affect spills and spill clean-up and disposal, explain responsibilities, provide strategies to: prevent spills; assess hazards presented by spills; how and when to report spills as required; clean-up of spills when appropriate. Hands-on activities include response to spills of different hazardous materials, table top exercises.
- ✓ **Fire Safety** (at least 2.5 hours) – individuals should be trained in fire chemistry, mitigation practices, hazardous materials identification, suppression options, and are introduced to the concept of size-up. Hands-on skills include using a fire extinguisher to suppress a live flame, and wearing basic protective gear.
- ✓ **First Aid and Cardio Pulmonary Resuscitation (CPR)** (at least 2.5 hours) **–** basic first aid and CPR certification to deal with minor injuries on the job-site.
- ✓ **Disaster Preparedness** (at least 2.5 hours) **-** Topics should include (in part) identifying local disaster threats, disaster impact, mitigation and preparedness concepts, and an overview of Citizen Corps and CERT. Hands on skills include team-building exercises, and shutting off utilities.

- ✓ **Disaster Medical Operations (1)** (at least 2.5 hours) **–** individuals should be trained to identify and treat certain life-threatening conditions in a disaster setting, as well as START triage. Hands-on skills include performing head-tilt/chin-lift, practicing bleeding control techniques, and performing triage as an exercise. **Simple triage and rapid treatment** (**START**) is a method used by first responders to effectively and efficiently evaluate all of the victims during a mass casualty incident (MCI). The first-arriving medical personnel will use a triage tool called a triage tag to categorize the victims by the severity of their injury. Once they have a better handle of the MCI, the on-scene personnel will call in to request for the additional appropriate resources and assign the incoming emergency service personnel their tasks. The victims will be easily identifiable in terms of what the appropriate care is needed by the triage tags they were administered.
- ✓ **Disaster Medical Operations (2)** (at least 2.5 hours) - Topics should cover mass casualty operations, public health, assessing patients, and treating injuries. Individuals practice patient assessment, and various treatment techniques.
- ✓ **Light Search and Rescue Operations** (at least 2.5 hours) – individuals should learn about assessing structural damage, marking structures that have been searched, search techniques, as well as rescue techniques and cribbing. Hands-on activities include lifting and cribbing an object and practicing rescue carries.
- ✓ **ERT Organization** (at least 1.5 hours) – individuals are introduced to several concepts from the Incident Command System, and job-site team organization and communication should be explained. Hands-on skills include a table-top exercise focusing on incident command and control.
- ✓ **Disaster Psychology** (at least 1 hour) - Responder well-being and dealing with victim trauma are the topics of this unit

Members of the ERT will be required to undergo re-certification as required by the individual training courses (where applicable such as first-aid certification performed every 3 years). Refresher courses (not quite as detailed as first training/certification) that cover the aforementioned areas should be conducted at least every 6 months by a qualified trainer/institution. Records of training must be kept on file by the Contractor for a minimum of 5 years after training. Completed Training Session Documentation Forms must also be provided to the EA.

3.3.2 Other Employees

All other employees, particularly those directly involved in the handling of oils, lubricants, fuels and other hazardous materials must also receive training on the ERP. The goals of the ERP training should include:

- ✓ To provide an overview of the ERP Requirements
- ✓ To provide a summary of the ERP Plan
- ✓ To identify Spill Prevention & Response Procedures
- ✓ To inform on Roles and Responsibilities
- ✓ To identify where additional Information Resources can be found/accessed

Training can take the format of HSE Bulletin, Daily Information Sheet, Tool Box Talk, lecture sessions (with power point presentations and handout/take home materials) coupled with practical exercises and simulated emergency scenarios and should be conducted by trained/qualified/certified persons.

Topics to be covered under this training should include:

- ✓ **ERP Requirements –** inclusive of governing agencies and applicable laws
- ✓ **Summary of ERP –** identification of fuels, lubricants, chemicals regulated under the ERP, containers regulated under the ERP, location of the ERP on-site, contents of the ERP plan
- ✓ **Identification of Roles and Responsibilities –** identifies persons of the ERT responsible for different aspects of the ERP such as person responsible for training, person responsible for maintaining spill response kits etc.
- ✓ **Spill Prevention –** such as routine inspections, personnel training, location, purpose and use of alarms and shut off valves, secondary containment, who to call in case of spill
- ✓ **Device inventory**
- ✓ **Spill Scenarios –** identification of potential spill sources, appropriate response etc.
- ✓ **Incidental Spills –** how to treat with incidental spills (spills of known materials that do not pose potential health, safety or environmental hazards)
- ✓ **Non-Incidental spills** – how to treat with non-incidental spills (spills of potential contaminants in excess of 10 litres)
- ✓ **Response Procedures** – isolation of area to protect people, identification of source of spill, note the type and volume of the spill, identification of potential hazards, clean up of incidental spills, persons to contact if spill cannot be contained
- ✓ **Spill Response Supplies and Uses** – sorbent booms and socks, oil absorption pads, spill mats for covering floors and drains, personnel protective equipment (PPE), collection drums etc.
- ✓ **Inspections** – what requires monthly documented inspections, best management practices inspections and record keeping
- ✓ **Tank Testing** – frequency of formal and informal inspections and leak testing and record keeping
- ✓ **Site Security** – identification of security requirements for storage of oils, fuels and other hazardous materials
- ✓ **Common violations of ERP** – identification of common violations such as untrained personnel, failure to report a spill, inadequate secondary containment
- ✓ **Communications** – Internal and external notifications
- ✓ **Information Resources** – links to websites that provide additional information, identification of where Material Safety Data Sheets are stored and how they can be accessed

Participants will be assessed using a written exam/quiz as well as through a simulated emergency scenario. Successful participants will receive a certificate of participation, while unsuccessful participants will be required to redo the training until successful completion (maximum of three repeats allowed). Following certification, participants will be required to attend a re-fresher course at least every six months. Records of training must be kept on file by the Contractor for a minimum of 5 years after training. Completed Training Session Documentation Forms must also be provided to the EA.

3.3.3 Visitor ERP Orientation Training

Visitors (particularly those that may be frequently visiting the site – delivery personnel, equipment maintenance personnel, persons from regulatory agencies/organizations) to the site will be required to complete a 20 minute ERP Orientation training, at the end of which they should receive an Orientation Card certifying that they have completed the training. This Orientation Card should be valid for at least a 30 day time period (the duration of the validity can be at the discretion of the Site Supervisor).

The Visitor ERP Orientation Training should be conducted by the EC of the ERT and/or the Environmental Health and Safety Officer. This training can take the form of a power point presentation identifying (at a minimum):

- ✓ Muster points
- ✓ On-site Hazards
- ✓ Areas of restricted access
- ✓ PPE that must be worn and why
- ✓ How to recognize members of the ERT
- ✓ How to report a spill or emergency should you discover one
- ✓ How to identify safety alarms and other warning systems
- ✓ How to safely exit the job-site

Visitors must also sign as: having completed the Orientation Training, received the Orientation Card and agreed to follow the site rules as it applies to SCERP.

Persons completing the Orientation Training can also be assessed using a multiple choice quiz, checklist or other appropriate assessment method which should be developed by the Contractor and approved by the EA/WASA. Once the Orientation Card has expired, the visitor will be required to repeat the Visitor SCERP Orientation Training.

Records of Visitor SCERP Orientation Training must be maintained by the Contractor throughout the duration of the Construction Phase.

3.4 Emergency Response Exercises/Drills

Drills enable response personnel to become knowledgeable and proficient in the strengths and weaknesses of plans, equipment and procedures. The general goals of drills should be to:

- ✓ Increase readiness in the event of an actual emergency

- ✓ Provide a means to assess the effectiveness of response plans and response capabilities
- ✓ Demonstrate the knowledge and skill of the plan holders
- ✓ Serve as a training tool for response personnel
- ✓ Provide an opportunity to practice skills and improve individual performance in a non-threatening environment
- ✓ Requires participants to network with each other and pre-plan decisions on resources
- ✓ Validate existing policies and procedures
- ✓ Identify planning conflicts
- ✓ Identify resource needs
- ✓ Clarifies roles and responsibilities of everyone involved

The Contractor will be required to conduct drills on a regular basis depending on construction status and identified risks. However, given the expected lifespan of the project it is recommended that disaster drills be conducted on at least an annual basis. Drills should include, but limited to:

- ✓ Medical Emergencies;
- ✓ Fire Emergencies;
- ✓ Hazardous spills/leaks;
- ✓ Natural Disasters;
- ✓ Rescue from height, confined space, collapsed trench, etc.

The Emergency Operations Officer should prepare a written overview of the planned exercise and facilitate the drill. Both the Construction Supervisor and Client should be invited to either participate or observe the exercise.

Where practicable, external; emergency groups may be requested to participate to ensure communications and joint actions are addressed where lacking.

A timeline of the exercise will be maintained and used in debriefing and training along with any photos or videos of the event.

A debrief will occur at the completion of each exercise with all participating personnel. A report should be prepared following each event, with recommendations for improvement and provided to the Construction Supervisor and Client by the Emergency Operations Officer.

3.5 Emergency Operation Centre (EOC)

The Contractor shall establish a location for an Emergency Operation Centre (EOC). The EOC will act as a central point of contact during an emergency situation. The EC and EOO along with members of the ERT will be responsible for notifying the various emergency services and Construction Supervisor and Client (Environment, Health and Safety Specialist) as necessary while maintaining communication with personnel at the site of the emergency.

In the event that EOC is compromised (fire, bomb threat, etc.), an alternative location shall be provide and communicated to subcontractor managers and other ERT members. A contact list of ERT members, responding agencies, Contractor Supervisor, Client Personnel, subcontractor companies and other external support organizations shall be made available and kept relevant.

3.6 Emergency Evacuation Muster Areas

The locations of muster areas are to be defined by the Contractor prior to the start of works. Muster areas on site will normally be located outside of construction and office areas unless the EC or EOO nominate other areas at the time of the incident. Such changes may be based on prevailing conditions or other mitigating factors.

Further, as construction sites are developed, signage shall be provided to direct personnel to Muster Areas. Should any Muster Area be rendered inappropriate or unsafe, due to incidents occurring, wind direction or construction activities, then alternative location(s) shall be designated.

The EOO shall be responsible for updating muster areas as well as signage as required especially with respect to moving work fronts. Similarly, evacuation routes are to be updated as required with respect to construction activity throughout the site and in the field.

Muster Areas shall be regularly communicated via notices, tool box talks, maps, safety meetings, etc. to project personnel.

3.7 Emergency Response Categories

Incidents vary by their nature and the level of response required. To determine the appropriate response an incident must be classified according to its characteristics, as being a Tier 1, 2, or 3 Event. Each tier has its own response activities, which build upon resources activated at lower tiers. This allows for the escalation of an event to be quickly adjusted for.

Emergencies can be classified into three (3) Tiers depending upon their severity/impact.

Tier 1 Emergency

Is an emergency, managed locally using in-house resources and does not involve the activation of the Emergency Response Plan. It does not attract media attention or does not involve any public. However, the Emergency Team Leader should be informed of the situation. Notification to the Supervisors and other authorities should be timely.

Examples of Tier 1 emergencies include:

- an oil, fluid, or fuel spill of any magnitude that is confined to the site and does not flow onto private, public property, or enter a stream, river, pond, dry drainage;
- an employee or contractor injury accident (either industrial or vehicular) resulting in minor injury that may require medical attention, but does not require hospitalization;
- minor property damage that does not compromise the safe operation of vehicles or equipment;

- a small gas release which can be contained by manual valve closure or flaring;
- a small brush or structure fire that has been contained on site.

Tier 2 Emergency

Is an emergency which escalates beyond the control of local/site resources and requires external assistance from the Authority or external agencies. It may disrupt sizable portions of the work and could attract (or has a reasonable probability of attracting) media attention. These events may escalate quickly and have serious consequences on the initial functions of WASA. The Emergency Team Leader upon receiving information and advice will determine whether appropriate resources are available to manage the event.

Examples of Tier 2 emergencies include:

- an oil, fluid, or fuel spill of any magnitude that leaves the site and flows onto private, state property, or that may enter a stream, river, pond, or dry drainage;
- an employee or contractor injury accident (either industrial or vehicular) resulting in hospitalization;
- property damage resulting from fires, explosions, impact, or contacts that exceeds the safety threshold of the equipment or the structure;
- leak in a high-pressure natural gas liquids pipeline that cannot be controlled by a manual valve closure, but that does not represent an immediate danger to persons in the area;
- Damage to WASA infrastructure (plant, equipment, pipeline)
- flooding of an area where personnel are present

Tier 3 Emergency

A major incident that adversely affects the entire operations and also the surrounding community. During a Tier 3 emergency, normal operations could be suspended. External Assistance is definitely required for this event as a fatality has occurred, the public safety is jeopardized, or there is a significant and ongoing environmental impact.

Examples of Tier 3 emergencies include:

- an oil, fluid, or fuel spill of any magnitude that enters a watercourse and threatens the intake of a municipal or private water supply;
- any leak or spill (controlled or uncontrolled) that causes the evacuation of nearby residences, buildings or facilities, or causes significant environment damage;
- a fire, explosion, impact, or contact resulting in the destruction of Contractor, WASA property, injury to the general public and/or damage to private or public structures;

- an employee or contractor injury accident (either industrial or vehicular) resulting in a human fatality;
- uncontrolled flow of flammable gas mixtures;
- rupture of a pipeline;
- report of a bomb threat; and
- hurricane or tropical storm warning issued by the MET Office.

Tier 3 require notification of the Contractor Management, SPC and WASA, who will then notify outside municipal services and the state regulatory agencies so that they may be kept informed of the situation.

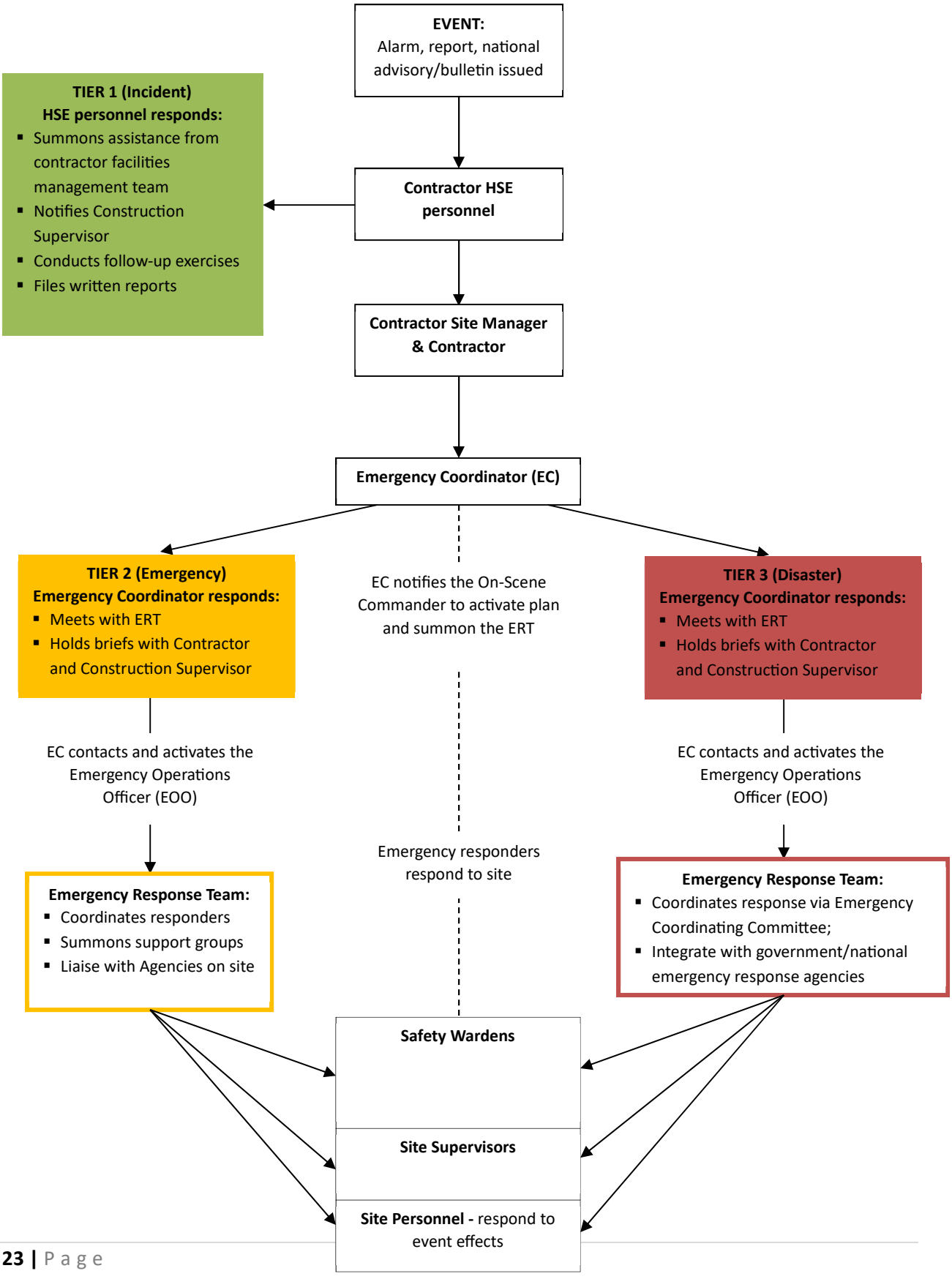
3.7.1 Emergency Response Plans Activation

Tier 1 (Incidents) do not require the activation of the ERT and associated ERPs. A Tier 2 (Emergency) or a Tier 3 (Disaster) Event will invoke the ERT and ERP, which can be activated by the Emergency Coordinator, who may designate someone to activate the plan in his/her absence, such as an alternate.

The disruptive event would be assessed by the Emergency Coordinator with the advice of members of the ERT and/or others as necessary. On the basis of event characteristics, a determination would be made as to the Tier Response required.

Tiers 2 and 3 follow the same procedures for assessment and notification. The only difference being that Tier 3 would involve a larger number of assessments, contacts and briefings because of the scale of the event. Response mobilization also differs in Tier 3 by the number of parties involved, as does the level of coordination required.

Figure 1: Emergency Response Flowchart.



3.7.2 Tier 1 (Incident) Response

In the event of a Tier 1 Incident the Emergency Response Plan would not be activated. The Contractor HSE personnel (most likely a Senior HSE Officer) would undertake control of the situation by assuming the role of Emergency Operations Officer. Coordination would be conducted through Contractor HSE, who would summon and advise any necessary Emergency Responders[5] if necessary (in Tier 1 Incidents, a member of the Contractor's HSE staff who has been trained in Communications should be responsible for contacting external assistance). The roles of Emergency Operations would entail the situation driven responsibilities set out in the standard operating procedures of the HSE response plans.

Emergency contact procedures should be followed for Tier 1 (Incident) Events to ensure all necessary parties are informed of an incident. Discretion does exist in the timing and nature of notifications made but each Tier 1 Contact should be considered on a need to know basis. Tier 1 (Incident) with significant potential to escalate would invoke call out procedures to alert relevant Tier 2 Contacts.

At any time a disruptive event occurs, which requires the assistance of another Response Group or External Emergency Response Agency, the EC should be contacted. It is their role to ensure that the necessary notices are given to the appropriate personnel and to oversee initial response coordination. The following contact list exists for information purposes only. Any request for emergency assistance is to be made through the On-Scene Commander under the direction of the Emergency Coordinator.

TIER 1 INCIDENT CONTACTS	
PRIMARY	ALTERNATE
Name:	Name:
Title:	Title:
Address:	Address:
Business Phone:	Business Phone:
Residential/Home:	Residential/Home:
Cellular/mobile:	Cellular/mobile:
Pager:	Pager:

3.7.2.1 Tier 1 Incident & Report

Entails an originating call or alarm, which Site HSE personnel (who may also be accompanied by site security personnel) responds to by summoning any necessary external assistance/emergency responders (see footnote 5) and by deploying their personnel as required.

Tier 1 Assessment & Notification

[5] In this case emergency responders may be service providers to aid in site clean-up such as oil disposal companies

This entails an initial assessment of the situation by the Contractor's HSE personnel and if required, site security personnel at the scene. A senior member of the Contractor's HSE personnel would be advised of the situation if managerial decisions or notices must be made. The senior member of the Contractor's HSE personnel or their alternate would advise the Contractor (who in turn will notify the Project Manager/SPC) if necessary and would ensure that the appropriate Response Groups have been briefed for assistance.

Tier 1 Response & Recovery

This may be coordinated by a senior member of the Contractor's HSE personnel. The responders involved may also coordinate amongst themselves. In either instance, the senior member of the Contractor's HSE personnel should be able to follow up the incident report with a record of the actions taken and progress involved.

3.8 Spill & Emergency Response Implementation

3.8.1 Pre-Incident Contingency Planning

3.8.1.1 Response Equipment

Following the completion of the site-specific RIA and development of appropriate Mitigation Measures, it is the responsibility of the Contractor to ensure that the necessary response equipment is available either on-site or readily available from external service providers.

Based on the types of oils/fuels and hazardous materials to be stored, the volume of these materials and the site conditions, the Contractor will be required to keep the appropriate Spill Kits on site. An inventory of the Spill Kits must also be maintained at all times.

Where additional response equipment will be required from external suppliers, it is recommended that the Contractor develop an easy to use matrix detailing the type of equipment required, the supplier, contact information for the supplier specific to the type of incident/emergency that can be easily accessed and used during an emergency.

3.8.2 Response Actions Based on Severity of Emergency or Spill Event

3.8.2.1 Tier 1 Spill Events

Tier 1 Spill Events include splashes and drips resulting from broken oil lines or hoses, leaking plant, vehicles and equipment, hydraulic fluid or coolant hoses leaks and/or inadequate storage. For the purpose of this Plan, tier 1 spills will be set at less than 10 litres (for fuels or lubricants).

3.8.2.1.1 Specific Response to Spills into Water Bodies

Because the goal of oil and hazardous material spill response is to minimize the overall impacts on natural and economic resources, some resources will be of greater concern than others; and response options offering different degrees of resource protection will be selected accordingly. Decisions regarding cleanup method(s) must balance two factors:

a) The potential environmental impacts with the no action alternative, and

b) The potential environmental impacts associated with a response method or group of methods.

The decisions to select response methods should consider the potential of each possible method for reducing the environmental consequences of the spill and the response (including a natural recovery

alternative). The method, or combination of methods, that most reduces consequences effectively, should be the preferred response strategy.

The environmental consequences of a spill and the response will depend on the specific spill conditions, such as the type and amount of oil/hazardous material, weather conditions, habitat where the spill occurred, and effectiveness of the response methods.

Options include:

- ✓ Natural Recovery
- ✓ Booms
- ✓ Barriers and Spill Berms
- ✓ Skimming
- ✓ Dispersants
- ✓ Solidifiers
- ✓ Vacuum

3.8.2.1.2 Specific Response to Spills on Land

he consequences of a spill and the response will depend on the specific spill conditions, such as the type and amount of oil, weather conditions, habitat where the spill occurred, and effectiveness of the response methods.

Options for spill response on land include:

- ✓ Natural Recovery
- ✓ Barriers/Spill Berms
- ✓ Solidifiers
- ✓ Sediment Re-working/Tilling
- ✓ Vacuum
- ✓ Surface Washing Agents
- ✓ Trenching

3.8.2.2 Tier 2 Events

3.8.2.2.1 Tier 2 Spill Event

Tier 2 spill events are not anticipated during construction and are spills that would result from events such as the loss of containment of large bulk fuel or fluid chemical storage tanks, accidents involving fuel and/or liquid chemical transport vehicles and rupture of major oil, fuel, or liquid chemical transfer pipes. For the purpose of this plan tier 2 spills should be set at ≥ 10 litres in volume.

3.8.2.2.2 Tier 2 Non-Spill Events

Tier 2 events are generally considered intermediate emergencies that potentially disrupt construction activities or capacity. Examples include multiple minor injuries, any major injury, intermediate fires, widespread power outage, civil/employee disturbance/hysteria and similar scale emergency events with extensive impact.

As Tier 2 events are generally not anticipated at construction sites, the Plan should present an overview of response strategies which are inclusive of but not limited to the following:

- ✓ Deployment of absorbents and/or inflatable booms to contain fuel if possible
- ✓ Trenches or dams can be dug across the path of the spill to intercept and contain fuel
- ✓ Fuel can be moved by hand squeeges along the ground and into the trenches, fuel can then be pumped out of the trench or mopped up using absorbents
- ✓ Procedures for handling injuries – assessment, response/casualty handling etc.
- ✓ Fire response

3.8.2.3 Tier 3 Spill Events

Tier 3 spills are not expected during the Project construction activities. Tier 3 events (other than spills) are generally regarded as major emergencies that seriously disrupt construction activities or capacity. Examples include mass casualties, employee death, major damage, major fires, natural disasters, major disease outbreak, major weather emergencies and similar scale emergency events with extensive and debilitating impact. This would then trigger disaster management actions (See Section 5)

Responses to Tier 3 spill events will utilize all of the Tier 2 spill response resources augmented by additional assets sourced from external agencies and service providers.

Annex 5 addresses oil and hazardous waste spill prevention measures and best practices.

3.8.3 Evacuation Plan

The Contractor will be required to develop site-specific evacuation plans. These plans should at a minimum provide the following:

- ✓ Instructions for employees on what to do when asked to evacuate
- ✓ When to evacuate
- ✓ Recommended evacuation script
- ✓ How to assist injured persons during an evacuation

4.0 DISASTER MANAGEMENT – TIER 3

4.1 Definition of Disaster

'Disaster' is defined as a crisis situation causing wide spread damage which can far exceed our ability to recover. Thus, by definition, there cannot be a perfect ideal system that prevents damage, because then it would not be a disaster. It has to significantly affect our ability to recover. Only then it can be called as 'disaster'.

Disasters are not totally discrete events. Their possibility of occurrence, time, place and severity of the strike can be reasonably and in some cases accurately predicted by technological and scientific advances (e.g. hurricane/tropical storms). It has been established there is a definite pattern in their occurrences and hence we can to some extent reduce the impact of damage though we cannot reduce the extent of damage itself.

4.1.1 Types of Disasters

Disasters are mainly of 2 types,

- ✓ Natural disasters. Example – earthquakes, floods, landslides, etc.
- ✓ Man-made disasters. Example – war, bomb blasts, chemical leaks, etc.

The phases of all disasters, either natural or man-made, are the same. The disasters often differ in quantity of damage caused or in quality of the type of medical consequences. For example floods can cause drowning deaths and infections, fuel and hazardous material leaks cause toxic manifestations, etc.

4.1.2 Disaster Management Cycle

Disaster management cycle includes the following stages/ phases:

- ✓ ***Disaster phase*** - The phase during which the event of the disaster takes place.
- ✓ ***Response phase*** - This is the period that immediately follows the occurrence of the disaster.
- ✓ ***Recovery/ Rehabilitation phase*** - During this time that the actual impact of disaster is realized.
- ✓ ***Risk Reduction/ Mitigation phase*** – Return to pre-disaster conditions.
- ✓ ***Preparedness phase*** - This phase involves the development of awareness among the population on the general aspects of disaster and on how to behave in the face of a future disaster.

4.2 Disaster Classification

Disaster Management can be viewed as the discipline of dealing with and avoiding risks. It is a discipline that involves preparing, supporting and rebuilding when natural or human made disasters occur. The actions (efforts to avoid or ameliorate the impact) taken depends in part on the perceptions of the risk. In any event, an effective disaster management system will rely on the emergency/disaster plans available.

Considering the possibilities of such an occurrence, the Contractor should plan to develop and implement a Disaster Management Plan aimed at identifying the different potential disasters that could impact the development. This plan should focus on four potential types of disasters that can arise from various sources and affect the operation and livelihood of the project in some form or fashion. Table 2 outlines some of the more likely disasters that could occur on site.

Table 2: Summary of Disaster Management Plans

Disaster	Description	Response Plans	Stages
Hurricane & Tropical Storms	Hurricanes and storms can vary in strength damaging equipment and delaying project works	Hurricane Preparedness Plan	Alert, Response, Recovery
Fire	Fire outbreaks can vary in size and location and can cause irreparable damage to the project's equipment.	Fire Prevention and Response Plan	Response
Fuel/Oils spills and leaks	This incident could pose a serious impact to the receiving environment in which the project site is located.	Spill Contingency & Emergency Response Plan	Response, Recovery
Medical	Medical emergencies can occur at any moment without giving notice and therefore requires a quick and coordinated effort to respond to this need.	Medical Emergency Plan (Transportation and Evacuation)	Response, Recovery

The Contractor CIPP should take into consideration the four aforementioned potential disasters, among others and plan accordingly in order to mitigate and ameliorate any negative effects these types of disasters could have on the infrastructure, operation and management of the project.

4.3 Risk Analysis

The Contractor will be required to conduct a Risk Analysis specific to the worksite. This Risk Analysis should be done using a suitable General Risk Assessment Procedure Guideline (**See Appendix 4 – sample)** in an

effort to identify potential hazards, risks and areas of vulnerability with a view to develop the appropriate plans listed in **Table 2**: Summary of Disaster Management Plans

. All mitigation/prevention, response and recovery measures suggested by the Contractor must be able to adequately address risk to comply with local standards, or where these are not available, international standards or industry best practices which have demonstrated and/or documented proof of effectiveness.

4.4 Disaster Plans

The Contractor is required to develop detailed Implementation Plans for the following Disaster plans which must be approved by the Executing Agency prior to their implementation based on the information provided below. This is intended to be a guide document rather than prescriptive; it will be the responsibility of the Contractor to generate prescriptive measures and plans. The four basic plans presented are:

- ✓ Hurricane Preparedness Plan (Evacuation Plan)
- ✓ Fire Response Plan
- ✓ Spill Contingency Plan
- ✓ Medical Emergency Plan

4.4.1 Hurricane/Tropical Storm Preparedness Plan (Evacuation Plan)

The hurricane preparedness plan will involve an alert, response, and recovery stage to deal with any natural disaster involving hurricanes, storms, or tropical depressions. This is the most common natural phenomenon occurring in Trinidad & Tobago and may be the only one that would require a full-scale evacuation. Trinidad & Tobago lies within the hurricane belt and is vulnerable to high wind and storm surge.

The hurricane season in Trinidad & Tobago commences officially on June 1st and ends on November 30th. The Hurricane Preparedness Plan (HPP) is aimed at making reasonable preparations should the project be threatened by an imminent Tropical Depression or Hurricane strike. This is to enable the Contractor to protect their equipment, employees and assets, and also to ensure that the project is able to continue after the hurricane has passed.

4.4.1.1 Purpose of the Hurricane Preparedness Plan

The purpose of the hurricane preparedness plan should be to:

a) Establish the coordinating mechanisms necessary to prepare and implement measures to safeguard property and lives of all concerned during the threat of a storm or hurricane.

b) Increase awareness to management and others (contractor, employees, observers etc.) of the need for hurricane preparedness.

The basic overall responsibilities of the Contractor is to ensure that the coordinating mechanism that will ensure maximum safety of property or lives during an incoming storm, is put in place, and to make sure

the staff, vendors, service providers and the Executing Agency, SPC and WASA are familiar with the mechanism.

4.4.1.2 Information Systems

The official alert system for a storm or hurricane entails the coordination between the Office of Disaster Preparedness and Management (ODPM) and the Trinidad & Tobago Metrological Office. Upon receipt of the official notice, the Team Leader/Emergency Coordinator will activate the required hurricane plan.

The proposed project will follow the official alert and hurricane categories profile put in place. The categories and associated wind speeds are stated in **Error! Reference source not found.** below:

Table 3: Hurricane categories and associated Wind Speeds

Category	Sustained Winds	Typical Type of Damage due to Hurricane Winds
1	74-95 mph or 119-153 km/h	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph or 154-177 km/h	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph or 178-208 km/h	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph or 209-251 km/h	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher or 252 km/h or higher	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

4.4.1.2.1 Definitions

Tropical Storm Watch	A tropical storm watch (TRA) is issued when tropical storm conditions, including winds from 39 to 73 mph (35 to 64 knots, 63 to 117 km/h) pose a possible threat to a specified coastal area within 48 hours.
Tropical Storm Warning	A tropical storm watch (TRA) is issued when tropical storm conditions, including winds from 39 to 73 mph (35 to 64 knots, 63 to 117 km/h) pose a possible threat to a specified coastal area within 48 hours.
Hurricane Watch	A hurricane watch (HUA) is issued when the onset of tropical storm conditions appear possible in the warning area within the next 48 hours.
Hurricane Warning	A hurricane warning (HUW) is issued when a hurricane with sustained winds of 74 mph (65 knots, 118 km/h) or higher is expected. The National Hurricane Center will issue the HUW when tropical storm conditions are likely in the warned area within the next 36 hours.

4.4.1.3 Pre-season Preparation

The Emergency Coordinator should ensure that all equipments are always checked and available during the project installation process. The Emergency Coordinator will also ensure that all assets such as equipment etc. and vehicles are photographed (digital with date) at the beginning of the project, for possible insurance claims.

4.4.1.4 Implementation Plan during Threats

Preliminary Alert – Hurricane Alert (Phase A)

This is the First Phase and means that a storm or hurricane may threaten within 72 hours/hurricane has entered the region. The Contractor CIPP should detail (at a minimum):

- ✓ Actions to be taken if the Trinidad & Tobago Meteorological Office and/or ODPM issues a warning;
- ✓ Arrangements to be made to ensure that ERT stay informed of the storm progress;
- ✓ Checklists to be prepared in the event of a strike;
- ✓ Itemized list/inventory of equipment to stay and those to be removed to a designated site
- ✓ Employees on-site and their contact information.

Documentation of checks performed, equipment itemized etc. should be maintained in a safe and secure location and made available upon request.

Hurricane Warning (Phase B)

During this phase, a hurricane may threaten within (36) thirty-six hours. The Contractor CIPP should detail:

- ✓ Official shelters designated for the on-site staff and any other employee in need of such shelters;
- ✓ Identify employees to report to the job-site after the hurricane has passed and the all clear issued by the Trinidad & Tobago Meteorological Office/ODPM;
- ✓ Inspect the site to ensure that all listed equipment to be removed has been so done, the infrastructure on-site has been secured, materials stored on-site has either been removed to a safe designated area or properly secured in-situ;
- ✓ Update Executing Agency on all actions taken.

Hurricane Warning (Phase C)

During this phase, a hurricane is likely to strike project area within (24) twenty-four hours. The Contractor CIPP should detail:

- ✓ The checklist of items that will be required and who the list will be distributed;
- ✓ The precautionary list;
- ✓ What final preparations will be concluded;
- ✓ How evacuation of the site will be conducted

All Clear (Phase D)

This is the ALL CLEAR, which will be declared by ODPM after the hurricane has passed and it is safe to return to review the effects of the hurricane. The Contractor CIPP should detail:

- ✓ Procedures to be followed for return to the jobsite and how surveys of the jobsite will be conducted to assess any damage
- ✓ The contents of the brief report to be generated – at a minimum, this report should include a description of all damage sustained, supported by photographs and an estimate of the costs associated with the damages;
- ✓ How the clean-up phase will be initiated inclusive of what are the planned clean up, disposal, remedial works to be executed.

4.4.1.5 Reports

Initial Report of damages, cost estimates, estimated time for recovery must be prepared by the Contractor, reviewed by the Construction Supervisor and submitted to the Executing Agency (via the SPC) one week

after returning to the work-site. This report must also present recovery works already done as well as the additional plans to return to normal business operations.

Recovery Progress Reports must be prepared by the Contractor, then reviewed by the SPC and then submitted to the Executing Agency on a weekly basis until the completion of the Recovery Works and re-start of Project Construction.

4.4.2 Fire Prevention and Response Plan

The fire prevention and response plan should focus on the possibility of a fire and any fire outbreak, whether large or small, that might occur. It is therefore important to consider its likelihood and with this in mind, the development will develop a response plan aimed at addressing the awareness and the mechanism necessary for its response.

The Contractor will have the site equipped with its own fire-fighting equipment, in order to provide quick response and service as well as a comprehensive fire prevention plan.

4.4.2.1 Purpose of the Plan

The purpose of the plan is to ensure that the coordinating mechanism will ensure maximum safety of property or lives during a blaze, and to ensure the Contractor, Contractor staff and other personnel on-site (service providers) are familiar with the mechanism. The purpose of the Fire Prevention and Response plan for the proposed project is to:

- ✓ Increase awareness to all concerned of the need for a fire prevention and response plan,
- ✓ To establish the coordinating mechanisms necessary for site management to prepare and implement measures to safeguard property and lives of all concerned should a fire occur in on site,
- ✓ Indicate all possible evacuation routes for all persons on-site.

4.4.2.2 Fire Protection Equipment/System

Equipment and personnel on-site should be protected from fire in one form or another. Good housekeeping practices should be maintained at all times to keep the worksite clean, additionally surrounding brush area (no more than absolutely necessary) should be removed or kept low as to minimize risk of bush fires in close proximity to the worksite particularly during the Dry season.

The Contractor CIPP should detail the type of fire suppression systems that will be available on site; this includes but is not limited to:

- ✓ ***Water for fire-fighting purposes*** – the number and volume of the tanks should be detailed; the placement (and reasoning for site selected) of the tanks, water pump systems and hoses that will be used inclusive of number and type (these must be appropriate for use in firefighting)

- ✓ ***Fire extinguishers*** – number and placement of fire extinguishers, different types e.g. multipurpose dry chemical (Class ABC) that will be available as well as the size of the extinguishers (5lbs, 10lbs etc)

4.4.2.3 Fire Prevention

Fire prevention is an important aspect in precluding its occurrence. While water is plentiful at certain sites in the project area and its immediate availability is possible, there are some measures designed to prevent fires. The Contractor CIPP will need to detail site-specific measures designed to prevent fires such as:

- ✓ ***Use of fire retardant material (where appropriate)*** - The use of nonflammable material will be encouraged within the project such as in hazardous material storage areas, areas where hot works are being carried out, personnel involved in hot works should also be outfitted in flame retardant PPE.
- ✓ ***Qualified personnel to operate equipment and electrical systems*** - Only certified technicians will be allowed to carry out any work on the work site as required. Certification records for these persons must be retained and provided to the Executing Agency.

4.4.2.4 Fire Response

As mentioned previously, fire outbreaks are unpredictable but can be prevented. It is difficult to portray a response plan for the project site considering the different scenarios that might arise from a fire. It is important though, to have in mind certain tips and guidelines relating to the event of a fire. These guidelines may come in the form of a fire combating plan whereby trained staff may utilize the different fire controls to extinguish the fire.

Fire outbreaks sometimes require an evacuation plan and for this reason, a comprehensive evacuation plan is required to be developed. This plan is important and must address congested areas such as a pipeline trench.

General guidelines for actions to be taken during small and large fires are stated below, the Contractor is expected to provide further details on the execution of these actions e.g. “sound the alarm” – Contractor CIPP must detail the type of alarm that will be used, different warning sirens that may be used, how long the alarm will ring etc.

In the advent of a fire (small fires)

Fires first start small and then grow large as time progresses and if there is enough fuel, oxygen and heat for the fire.

Actions to be taken:

- ✓ Sound the alarm
- ✓ Use an extinguishing media preferably a fire extinguisher to fight the fire.
- ✓ Do not fight a large fire with a fire extinguisher.
- ✓ Check to see that the fire is completely extinguished.
- ✓ Inspect the fire area and assess for damages.

- ✓ Close off the area for safety purposes.

At some point, the Emergency Coordinator needs to be notified of the situation. A report of the incident should be submitted to the Executing Agency.

In the advent of a large fire

Utilize these procedures if a large fire occurs or otherwise:

Actions to be taken:

- ✓ Sound the Alarm
- ✓ Use an extinguishing media such as a fire extinguisher and the pumps and hoses to fight the fire.
- ✓ If possible, remove any fuel (combustible material) that could be engulfed by the fire
- ✓ Use fire hoses at full pressure aiming at the base of the fire
- ✓ Evacuate any persons within the area or found in the area at the time of the incident
- ✓ Once contained, check if the fire has been completely extinguished
- ✓ Inspect the fire area and assess for damages

At some point, the Emergency Coordinator along with the project's fire station needs to be notified of the situation. A report of the incident should be submitted to the Executing Agency (via the SPC) for assessment. The Contractor will notify any member of the National Fire Service by telephone or email for further investigation and recommendation.

4.4.3 Medical Emergency Plan

A medical emergency is an injury or illness that poses an immediate threat to a person's life or long term health. These emergencies may require assistance from another person, who should ideally be suitably qualified to do so, although some of these emergencies can be dealt with by the victim themselves. Dependent on the severity of the emergency, and the quality of any treatment given, it may require the involvement of multiple levels of care, from a first-aider to an emergency physician through to specialist surgeons.

Any response to an emergency medical situation will depend strongly on the situation, the patient involved and availability of resources to help them. It will also vary depending on the location of the emergency.

This response plan will cater to basic first aid health care only and any emergency transportation to a recognized health institution such as a hospital or health center.

4.4.3.1 Purpose of the Plan

The primary objective of the medical response plan should be to:

- ✓ Establish the coordinating mechanism necessary to respond to a health situation and to implement basic first aid treatment where applicable.
- ✓ Develop and implement a coordinating mechanism necessary to secure appropriate emergency transportation to a recognized health institution.
- ✓ Increase awareness to employees of the availability of such primary health care.

4.4.3.2 Basic First Aid

As mentioned previously, the proposed development plans to offer basic first aid treatment in the event of a medical emergency. First Aid is the provision of limited care for an illness or injury, which is provided, usually by a certified person, to a sick or injured patient until definitive medical treatment can be accessed, or until the illness or injury is dealt with (as not all illnesses or injuries will require a higher level of treatment). It generally consists of series of simple, sometimes life saving, medical techniques, that an individual, either with or without formal medical training, can be trained to perform with minimal equipment.

This equipment usually involves the medical supplies commonly found in a First Aid Kit. A First Aid Kit is a collection of supplies and equipment for use in giving first aid, particularly in a medical emergency. Most First Aid Kits contain bandages for controlling bleeding, personal protective equipment such as gloves and a breathing barrier for performing rescue breathing and CPR (cardiopulmonary resuscitation), and sometimes instructions on how to perform first aid.

Aims:

The 3 main aims of first aid, commonly referred to as the "3 Ps" are:

- ✓ Preserve life
- ✓ Prevent further injury
- ✓ Promote recovery

4.4.3.3 Transportation (Evacuation) of the patient

When conventional first aid requires additional medical attention, the patient must be transported to a recognized health institution for further treatment as quickly as possible. The act of preparing the patient and notifying the institution is a very complicated and critical issue.

Time is of the essence and therefore important in a life or death situation. For this reason it is important to establish relations with the health institution within the project area and notify them on the project's plan and whether the institution is able to assist in emergency cases. In any event, the Emergency Coordinator will be required to make transportation arrangements to the health institution in the event of a medical emergency.

The closest health institution, where professionals are available to provide health care to the staff/on-site personnel will need to be advised of the project and project injuries. Similarly, the island has several other health institutions that are also available. In the same token critical patients will be required to be transported to the Hospital or any private tertiary care facility for immediate emergency treatment.

Transportation or evacuation of the patient will first involve transportation to the project's health institution with referrals to the nearest health clinic. If further and immediate treatment is required then patients will be transported utilizing the best means available.

4.4.3.4 Medical Evacuation Plan

Medical Evacuation encompasses:

a) Collecting the injured

b) Triage (Sorting)

c) Providing an evacuation mode (transport)

d) Providing medical care en route

e) Anticipating complications and being ready to perform emergency medical intervention

4.4.3.4.1 Evacuation Precedence

The injured must be evacuated by the most expeditious means of evacuation dependent on their medical condition and assigned evacuation precedence:

- ✓ **PRIORITY 1: URGENT**

Assigned to emergency cases that should be evacuated as soon as possible and within a maximum of 2 hours in order to save life, limb, or eyesight, to prevent complications of serious illness, or to avoid permanent disability.

- ✓ **PRIORITY 2: PRIORITY**

Assigned to sick and injured personnel requiring prompt medical care. This precedence is used when the individual should be evacuated within 4 hours or his medical condition could deteriorate to such a degree that he will become an URGENT precedence, or whose requirements for special treatment are not available on-site, or who will suffer unnecessary pain or disability.

- ✓ **PRIORITY 3: ROUTINE**

Assigned to sick and injured personnel requiring evacuation but whose condition is not expected to deteriorate significantly. The sick and injured in this category should be evacuated within 24 hours.

- ✓ **PRIORITY 4: CONVENIENCE**

Assigned to patients for whom evacuation by medical vehicle is a matter of medical convenience rather than necessity.

4.4.3.4.2 Medical Evacuation System

An efficient medical evacuation system:

- ✓ Minimizes mortality by rapidly and efficiently moving the sick and injured to a medical treatment facility;
- ✓ Clears the jobsite thus enabling work to continue onsite;
- ✓ Builds morale of the on-site personnel/workers by demonstrating that care is quickly available if they are injured;
- ✓ Provides en-route medical care which is essential for optimum success

The EHSO ensures that the optimum evacuation mode is used based upon:

- ✓ Patient's medical condition
- ✓ Availability of resources
- ✓ Destination medical treatment facility

The evacuation of personnel in non-medical assets must be considered in mass casualty situations. Non medical assets would be augmented, whenever possible, with personnel who have received at least basic medical training to provide en-route medical care. When augmentation of medical personnel is not possible, the transportation of casualties can still be accomplished using nonmedical vehicles; this however must be carefully planned in advance prior to implementation.

Routinely bypassing levels of care is detrimental to the injured person and the system. By passing levels of care –

- ✓ Negates the effectiveness of medical resources
- ✓ Risks further injury to the patient
- ✓ Causes over-evacuation of less critically injured personnel thereby resulting in a delay of removal of more seriously injured personnel
- ✓ Removes evacuation assets from its supporting position for longer periods of time

4.4.3.4.3 Basic Considerations for Medical Evacuations Operations

a) General

The basic tenets which influence the employment of medical evacuation assets must be considered. These factors include:

- ✓ Anticipated patient load
- ✓ Patient conditions

- ✓ Availability of medical evacuation resources
- ✓ Availability and location of medical treatment facilities
- ✓ Road network
- ✓ Weather conditions

b) Ambulance Route Selection

The following factors should be considered when selecting ambulance routes:

- ✓ Availability of routes
- ✓ Physical characteristics of roads and off-road routes
- ✓ Traffic density
- ✓ Time and distance factors

5.0 NOTIFICATION PROCEDURES

5.1 Internal Notification

The Contractor is expected to determine the details of the internal notification procedures, however it is generally accepted that upon discovery of a spill or occurrence of an incident, the HSE personnel will be informed of the incident. The HSE personnel is responsible for informing the Contractor of the situation and advising on whether the EC needs to be contacted and the ERP activated. Until the activation of the ERP, the HSE personnel will be responsible for the spill response which should be based on safety first and containment of the spill.

The EC will initiate the internal notification process by activating the ERT and inform them of the nature of the emergency and the first steps to be taken. Members of the ERT will initiate their fan-out procedure to alert on-site staff and to direct them where and when to report as identified in the ERP if necessary.

If deemed necessary, the external notification procedure will be followed to contact external agencies/service providers for assistance.

5.2 External Notification

External notification is Regulatory Agencies will be conducted by Executing Agency officials. Once the ERT has determined that there is a need to contact the Regulatory Agencies, the EC will inform the Contractor who in turn will contact the Construction Supervisor. The Project Manager (under advisement of the SPC) is responsible for informing the Executing Agency of the status of the emergency.

Based on the agency that needs to be notified, the relevant department representative of the PWG will communicate with the external agency e.g. for a spill in excess of 10 litres of diesel fuel, the member of

the WASA Environment & Regulatory Compliance Department will proceed to report the incident to the EMA and continue to liaise with them until the completion of the clean-up/remedial works.

All notification of external regulatory agencies will be conducted by the Executing Agency and/or WASA (where permits/licences have been specifically issued in WASA name). The Contractor can however directly contact both service providers to access external resources and contact emergency services (Fire Services, Police, and Ambulance etc). This is the responsibility of the member of the ERT designated for Communications (ECO). The Communications designee is also responsible for contacting external service providers.

In instances where Contractor employees have been injured on-site, it is the responsibility of the Contractor Company Human Resources to contact the next of kin.

5.3 Communication with the Public

In accordance with the CEC issued for the project, a Community Relations Officer will be designated to communicate with the community/public directly impacted by the project. This individual will be assigned specifically to the project and will be able to access support from the WASA Corporate Communications Department (when necessary); approval must be sought from and granted by WASA and the MPU before any information is disseminated to the public.

The Community Relations Officer will be responsible for informing the community of proposed activities and changes to the project. Official statements to the public at large will be co-ordinated and released only following MPU and/or WASA approval and these statements will be made by MPU and/or WASA only. Aggrieved persons may also seek further redress through the Grievance Settlement Procedure.

6.0 POST INCIDENT EVALUATION

Post-incident[6] evaluation (PIE) is a review of incident response used to identify and correct weaknesses, as well as determine strengths and promulgate them. PIEs are normally used to support program revision.

The post-incident review process begins with determining who will conduct the PIE. An effective evaluation depends heavily on the objectivity of the review team. For that reason, a team of individuals that were not involved with the response to or management of the incident should be selected.

The team should provide expertise in management, human factors, communications, planning and training. The team should include specialists that are technical experts in particular areas of concern for the specific incident. Specialty areas may include disaster response and management, fire, hazardous materials, environmental impacts and regulations or hostage situations.

Key areas of consideration in the evaluation should include:

- ✓ Mobilization procedures for personnel and equipment;

[6] Incident in this instance refers to Tiers 1, 2 & 3 events

- ✓ Implementation plans and procedures;
- ✓ Management and coordination of emergency response;
- ✓ Stakeholder reaction;
- ✓ Internal and external communications;
- ✓ Post-incident perception; and
- ✓ The short and long term consequences of the incident.

A PIE report does not have to follow any special format and should only be as detailed as necessary to be a useful tool for crisis, disaster, and emergency planners and managers. The report should include recommendations for program enhancement or other modifications. It should address the following items:

- ✓ A consolidated event time line;
- ✓ Incident cause and recommendations for future correction or prevention;
- ✓ Mobilization process, including notification of personnel and activation of facilities (this is particularly important in reviewing the time required to respond to an incident involving hazardous materials that could pose a threat to the surrounding community);
- ✓ Prevention, mitigation and response equipment performance and procedures; Implementation and performance of disaster response and crisis management plans and procedures including strengths, weaknesses, and concerns;
- ✓ Management and coordination of disaster response and crisis management actions of those involved in responding to the incident;
- ✓ Community and other stockholder reactions, especially any actions initiated by community emergency managers to protect its citizens;
- ✓ Post-incident perception of organization performance, as revealed during interviews, in press reports, by changes in stock price, by investor reactions, etc.;
- ✓ Company, corporation, or industry consequences, especially if alternative technologies are available;
- ✓ Key “lessons learned” listed separately, to facilitate the implementation of enhancements that may be required.
- ✓ Based on the PIE, the disaster recovery and crisis management programs should be revised to improve future performance. This could lead to revisions in several areas:
- ➢ If the incident had not been previously identified as a potential hazard or vulnerability in the disaster and crisis plans then it should be added, and the hazard and vulnerability analysis should be reviewed;
- ➢ If the report revealed weaknesses or gaps in the organization, the disaster response and/or crisis management structure should be modified;

- If the policies and procedures did not address issues that became important during the incident, policies and procedures would need to be developed for those areas;
- If response went poorly due to a lack of training, exercising or planning, these areas should be enhanced or modified and personnel should be familiarized with the changes; and
- In areas where participants diverged from their existing plans and response or management operations went especially well, the disaster response and/or crisis management plans should be modified to reflect the reality of success.

7.0 DOCUMENTATION & REPORTING

7.1 Reporting of Incident-Related Data

All incidents must be reported to on-site HSE Staff. The Contractor is required to develop incident reporting forms that will be utilized for Tier 1, 2 & 3 events. **Appendix 3** provides a sample Incident Report Form.

These forms should be included in the written Incident Reports which must be submitted to the Executing Agency, five (5) calendar days following the discovery/occurrence of an incident. These Incident Reports are required under the CEC issued for the project.

These Reports should include:

- ✓ Cause of the emergency
- ✓ Effects of the emergency, including casualties, description and cost of damage
- ✓ Corrective measures taken to alleviate the situation
- ✓ An estimate as to when the situation shall be (or statement of when it was) resolved
- ✓ Steps to be taken to reduce the probability or prevent a recurrence.
- ✓ Insurance certificates, chain of custody documentation and disposal records provided by firms hired to conduct remedial and disposal actions.

In addition to the Incident Reports required for regulatory purposes, the Contractor must also complete a Post-Incident Evaluation Report to be submitted to the Executing Agency (following the occurrence of an incident) upon request.

7.2 Retention of Data/Reports/Files

The Contractor should retain data/reports/files for the duration of the Construction Phase and for at least five years after the completion of the Construction works. All documents associated with the ERP must be retained on-site while incident reports can be stored both on-site and at the Contractor's off-site office. It is preferred that documents are kept in both electronic and printed formats.

8.0 WASTE MANAGEMENT

Contaminated waste materials generated as a result of a spill of oil or other hazardous material will be handled as hazardous and oily waste. The management and disposal of such wastes is discussed in the Waste Management Plan.

Appendix 1 – Drill Matrix

Drill Requirements

Drill Type	***Frequency***	***Participation***	***Comment***	***Reference in SCERP***
State type of drill here *e.g. Desktop exercises*	***List frequency here*** *(recommended quarterly)*	***List persons required to participate here*** *e.g. ERT*	**List objective and/or purpose of exercise here** e.g. *Review and discuss all emergency procedures and flow charts in sequence, confirm that all emergency contacts are current. Objective; to ensure that team leaders all understand the procedures and how they interact.*	***Reference Section in site specific SCERP here***
Fire Fighting				
Casualty Handling				
First Aid				
Confined Space Rescue				
Disaster Drill				
Oil Spill Clean-up				

Drill Matrix

Week:	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
Drill Type																				
State type of drill here *e.g. Fire Fighting*																				
e.g. Casualty Handling																				
e.g. Confined Space Rescue																				
e.g. Disaster drill																				

Every 4 weeks =	*Every 8 weeks =*	*Every 8 weeks =*	*Annual =*

Appendix 2 – Sample Container Storage Area Inspection Checklist

Month: _____

Year: _____

Instructions: Weekly, place a "Yes" next to all inspection items that meet facility rules. Place a "No" next to all inspection items that do not meet the rules. Please provide specific comments on all "No-marked" items. When weekly inspection is completed, inspector must initial at the bottom of the table. Report all No-marked items to appropriate supervisor.

Inspection Item	**Four Week Inspection Period**				**Comments on Inspection Item**
	Date:	**Date:**	**Date:**	**Date:**	
No. of containers stored in unit					
Containers marked/labeled properly					
Containers dated properly					
Containers observed to be free of staining/leaks					
Containers observed with closed tops of bungs					
Containers observed without dents or corrosion					
Appropriate aisle space maintained					
Containment area free of water or other liquids					
Inspector's Initials					

Overall Comments:

-

_____

_____

_____

_____

_____

_____

_____

Reviewed by: _____

Date: _____

Annex 3 – Sample Incident Report Form

Spill or Incident Report Form

Site:	Primary Contractor:
Date:	Incident Date:

Complete for any type of petroleum product or hazardous materials/waste spill or incident

Person Reporting Spill or Incident:	
Name:	Address:
Organization:	
Title:	
Telephone:	
Fax:	Signature:

Type of Spill:	
Common Name of Spilled Substance:	
Estimated Quantity Spilled:	
Estimated Concentration:	
Date of Spill:	
Time Spill Started:_____AM/PM	Time Spill Ended:_____AM/PM

SPILL TO LAND	SPILL TO WATER BODY
Name of site:	Name of water body:
Street Address:	Location of discharge:
Town/City:	Description of area from which spilled material may reach:
Region/Parish:	

Spill or Incident Report Form

If no Spill, describe Incident:

Actions Taken:

To contain Spill or Impact of Incident:

To clean up Spill or Recover from Incident:

To remove clean up material/contaminated items:

To prevent reoccurrence:

Person responsible for managing spill response:	
Name:	Signature:
Phone:	Fax:

Spill Notification List

Agency	**Phone**
Local Emergency Contacts:	
➢ Fire Services	990
➢ Ambulance Service	990
➢ Police Services	999
➢ Regional Corporation	
➢ Hospital Services	
Spills to water	
➢	
➢	
Spills to land	
➢	
➢	
Emergency Spill Response Contractor(s)	

➢	
➢	
➢	

Spill Reporting Information

Where is the spill?	
What spilled?	
How much spilled?	
How concentrated is the spilled material?	
Who spilled the material?	
Is anyone cleaning up the spill?	
Are there resource damages (e.g. dead fish)	
Who is reporting the spills?	
Your contact information	

Appendix 4 – General Hazard Assessment for Emergencies

Assessments would be done by a competent qualified team of personnel (preferably trained in conducting risk assessments) who have a good working knowledge of the construction sites and planning for emergencies. Staff should always be involved and include supervisors and workers who work with the process under review as they are the most familiar with the activities.

The following five (5) basic steps would be followed:

Step 1: Identify the hazards

Step 2: Decide who/what might be harmed and how

Step 3: Evaluate the risks

Step 4: Decide on control measures and put control measures in place

Step 5: Record the findings and review the assessment

Step 1: Identify the Hazards

An emergency is an event, actual or imminent that endangers or threatens to endanger life, property, or the environment. Due to the nature of emergencies, they have the potential to result in death or serious injury. The following should be considered in Hazard Identification:

- ✓ Location and Layout of the sites – type of buildings, neighboring operations, access and egress, natural hazards such as rivers, major utility and infrastructure e.g. power, gas etc.
- ✓ Climate and Natural Disasters - Trinidad is within the hurricane belt as well as in a seismic active zone
- ✓ Security Threats – consider the potential for security threats, bomb threats, intruders, criminal activity
- ✓ Biological / Chemical Spills – consider the release of substances/wastes into the surrounding environment, community, waterways, etc.
- ✓ Offsite Emergencies – this includes transportation of workers from home to workplace or events where provided
- ✓ Communicable Disease – this includes communicable diseases that require a coordinate response from the workplace or community
- ✓ Other – consider other emergencies that impact the workplace/site(s) based on previous events or other information

Step 2: Decide who/what might be harmed

For each hazard it must be determined who/what might be harmed and how; this will help in identifying the best way of managing the risk later on. This does not mean listing everyone, every species etc by name, but rather refers to identifying groups of people, habitats, ecosystems (e.g. 'people working in the storeroom' or 'passers-by' or aquatic environments, mangroves, residents of 'X' Street etc).

The personnel conducting the risk assessments will determine those who might be exposed to the hazards identified in Step 1, paying particular attention to new, untrained, casual or part-time staff, sensitive species and their associated environments, sensitive social receptors such as nearby kindergartens, schools, hospitals, commercial centres.

The following will be considered:

- All members of staff
- Visitors to the premises
- Maintenance staff
- Clients
- Service Providers
- Equipment Suppliers
- Trainees
- Young workers

In addition, there may be persons who might not be directly involved with the activity but who might still be affected by a process, such as:

- ✓ Security staff
- ✓ Domestic staff
- ✓ Contractors
- ✓ Members of the public
- ✓ Neighboring communities/residents

The personnel conducting the risk assessment should include in their assessment:

- Any workers who have particular requirements, e.g. new and young workers, may be at particular risk. Extra thought will be needed for some hazards;
- cleaners, visitors, contractors, maintenance workers etc, who may not be in the workplace all the time;
- members of the public, if they could be hurt by the activities;

- particular habitats that may be affected by the activities e.g. aquatic habitats, mangrove systems etc.;

In each case, it will be identified how each worker/ group of workers/environment might be harmed, i.e. what type of injury/ill health/contamination/pollution/loss of habitat might occur.

Step 3: Evaluate the Risks

There are two parts to evaluating the risk, they include; assessing existing controls, and giving a risk rating. After risks are prioritized, the next stage in Step3 of the Risk Assessment Method will be to define a management action plan which outlines control measures (Risk Control Recommendation Worksheet).

Assess the Existing Controls

The personnel conducting the risk assessment should identify all existing controls. Consideration would be given to how effective the existing controls are, they will be examined to determine if they are actually being used, or if they are being overridden and ignored. The opinions of all those who use the current control measures, such as employees or contractors will be considered.

Giving a 'risk rating' to each risk

The personnel conducting the risk assessment should evaluate the relative importance of risks, by considering the severity of any loss, the likelihood of occurrence, the number of persons who might be exposed, extent to which the environment is impacted i.e. duration, reversibility.

The desired outcome of this step is a prioritized list of risks for further action.

The following Risk Assessment Method would be applied:

For each of the risks the following would be determined:

- An estimate of the likelihood of an incident occurring, bearing in mind existing control measures;
- An estimate of the consequences of an incident occurring, bearing in mind existing control measures;
- The likelihood and consequence estimates would then be combined to rate the risk.

This method provides a rough means of ranking the risks. The risk scores derived would be interpreted with caution as the process by which they are obtained is subjective and judgmental.

Determining Likelihood

The following descriptive scale would be used to nominate the likelihood of an incident occurring at the workplace.

Likelihood

Very likely	Could happen frequently (Typically experienced at least once every six months).
Likely	Could happen occasionally (Typically experienced once every five years).

Unlikely	Could happen, but rarely (Typically experienced once during the working lifetime of the project).

The following factors would be considered in determining the likelihood of an incident occurring:

- How often the situation occurs; generally, the greater the frequency of exposure, the more likely an incident will occur.
- How many receptors are exposed; generally, the greater the number of receptors exposed, the more likely an incident will occur.
- The duration of exposure. Generally, the longer the exposure, the more likely an incident will occur.
- The position of the hazard relative to receptors and to other hazards. For example, workers working close to a noisy machine are more likely to suffer hearing loss than those working further away; trees located nearer to stockpiles are more likely to show signs of dust deposition on their leaves;
- Distractions, such as time pressures or workplace conditions which may influence careful undertaking of a task.
- Quantities of materials or multiple exposure points involved. For example, an incident (such as an explosion) is more likely to occur as a result of a small amount of flammable liquid, such as petrol, in a container which allows room for expanding gases than from a full container of the liquid with no room for expanding gases; an item of plant may have a number of places with exposed moving parts that could injure a worker;
- Environmental conditions. Are there conditions which can increase the likelihood of an incident occurring; for example, water in the vicinity of an electrical hazard.
- Condition of equipment. The use of defective equipment is more likely to cause an incident.
- The effectiveness of existing control measures. The following questions must be addressed:
  - Do the existing control measures represent good practice?
  - Are the existing control measures minimizing exposure to the risk?
  - Do workers know about the existing control measures?
  - Are the existing control measures being used/followed?
  - Are there adequate systems or procedures in place in relation to the existing control measures?
  - Is there adequate training and supervision in relation to the existing control measures?
  - Is there adequate maintenance in relation to the existing control measures?
  - How easy is it to use, or work with, the existing control measures?

Determining Consequences

The following descriptive scale will be used to nominate the consequences of an incident occurring:

Consequences

High	Death or permanent disablement (e.g., amputations; fatal injuries; occupational cancer; other severely life shortening diseases; acute fatal diseases) Serious bodily injury or serious work caused illness (e.g. major fractures; poisonings; multiple injuries; Permanent change to the environment e.g. establishment of a road through a vegetated area, habitat loss
Moderate	Moderate injury or illness requiring casualty treatment with no foreseeable long-term effects. Medium term environmental impacts e.g. temporary reduction of air quality resulting exhaust fumes from the use of heavy vehicles
Low	Minor injury or illness requiring first aid only, no lost work time (e.g., superficial injuries; minor cuts and bruises; eye irritation from dust; nuisance and irritation; ill-health leading to temporary discomfort). Short term environmental impact with easily reversible impacts

To determine the consequences, a judgment must be made on the severity of the potential outcome. All information gathered during the identification stage will be reviewed, including incident statistics and manufacturer's data. The following factors which can affect the consequences will also be considered:

- Potential for "chain reaction" - where a hazard, if not eliminated, evolves and compounds into an even more dangerous situation;
- Concentrations of substances. For example, a minor injury/contamination might result because of a dilute chemical, while a fatality/fish kill might result from a concentrated form of the same chemical;
- Volumes of materials. For example, the potential consequences of a leak of a small amount of a particular chemical, such as ammonia, into the workplace may be relatively minor, compared with the potential consequences of the release of a large amount of the same chemical;
- Speeds of projectiles and moving parts;
- Heights. The force with which a falling object hits a person (and hence the potential injury), will generally increase the greater the distance it falls. Similarly, a person will, in general, sustain greater injuries if falling from a greater height;
- Position of the receptor relative to the hazard. For example, workers working close to a noisy machine are likely to incur greater hearing damage than those working further away or trees closer to stockpiles are likely to incur greater dust deposition on leaves than those further away;

- Weights. For example, a worker will generally sustain a more severe injury from lifting material in 60kg packages than from lifting the same material packaged in 30 kg lots;
- Forces and energy levels. For example, the higher the voltage of electricity and the possibility of a high current flowing through a person, the more severe the consequences are likely to be.

Risk Assessment Tool – Risk Priority Chart (Rate Each Risk)

The level of risk, or 'risk score', is determined by the relationship between likelihood and consequence. This relationship can be represented using a matrix, as follows. The personnel conducting the risk assessment would determine the risk score for each risk by plotting consequence and likelihood estimates on the table below.

Risk Priority Chart

		CONSEQUENCES: How severely could it affect health and safety?		
LIKELIHOOD How likely could it happen?		**HIGH** - death or permanent disablement. Serious bodily injury or serious work caused illness Irreversible damage to the environment	**MODERATE** - injury or illness requiring casualty treatment. Reversible damage that requires moderate resources	**LOW** - injury or illness requiring first aid only, no lost time. Easily reversible impacts that are short term in duration
		3	2	1
VERY LIKELY - could happen frequently	3	Intolerable Risk 9	Substantial Risk 6	Moderate Risk 3
LIKELY - could happen occasionally	2	Substantial Risk 6	Moderate Risk 4	Tolerable Risk 2
UNLIKELY - could happen, but rare	1	Moderate Risk 3	Tolerable Risk 2	Trivial Risk 1

This stage of the risk assessment gives a basis for ranking risks in terms of their priorities. It is important to note that the risk scores obtained have no absolute value. This chart provides a means of ranking the risks ONLY.

The scores (1-9) in the risk priority chart indicate how important it is to do something about each risk, as follows:

Score	**Actions**
1 - Trivial	No action necessary.
2 - Tolerable	No further action necessary; monitor to ensure that controls are maintained and still effective.
3 &4 - Moderate	Implement measures to reduce or eliminate risk, but costs of prevention and/or control can be a consideration.
6 - Substantial	Urgent efforts needed to reduce risk; although reduction costs may be high, prevention and/or control measures should still be implemented.
9 - Intolerable	Work activity should not be started or continued until the risk has been reduced; prevention and/or control measures are to be implemented regardless of cost constraints if the activity is to be carried out.

Prioritize Risks

Risk will be prioritized based on their risk score. The risk scores will be used for comparison purposes ONLY. When risk scores for all risks in the workplace are compared, the resulting ranking will be a guide to the order in which the risks should be addressed.

Step 4: Decide on Control Measures and Put Control Measures in Place

Decide Appropriate Control Measures

Based on the outcome of the Risk Rating exercise, personnel conducting the risk assessment would then have to indicate whether the existing precautions are adequate, and, if they are not, define a management action plan to indicate what more must be done to reduce the risk to an acceptable level.

The following questions need to be answered:

- ✓ Are there legislated things that I must do in relation to the specific hazard?
- ✓ Are there guidelines in the WASA Safety and Health Policy, EMA guide documents, IDB and IFC guidelines relating to the specific hazard?
- ✓ What are existing controls?
- ✓ Are controls as high as possible in list of control priorities?
- ✓ Do controls protect everyone exposed to harm?

- ✓ What additional controls are required?

If there are specifications in the OSH Act or EM Act about any of the hazards identified then it must be followed to control the risks associated with those hazards in the way specified in the legislation.

If there are guidelines in the IDB and IFC Policies about any of the hazards identified then it must be followed or adopt and follow another way that gives the same level of protection against the risks.

The Contractor would assess whether a risk is still unacceptable, despite any current controls, then indicate what further mitigation measures and workplace precautions are needed to control the risk to the lowest level that is reasonably practicable, if it cannot be eliminated altogether.

Step 5: Record the Findings and Review the Assessment

Record the findings; a written record of significant finding of a risk assessment should be maintained on file. The records must show that:

- ✓ A proper check was made (conducted a good hazard review);
- ✓ You asked who might be affected (determined the risks of those hazards identified);
- ✓ You dealt with all the obvious significant hazards, taking into account all of the receptors who could be involved (implemented control measures suitable for the risk);
- ✓ The precautions are reasonable, and the remaining risk is low (reviewed and monitored all hazards in the workplace).

The personnel conducting the risk assessment should record the findings using a risk assessment form to record the significant hazards identified for the specific work areas and rank the hazards according to the risk matrix. The calculation of risk is based on the likelihood or probability of the harm being realized and the severity of the consequences.

The assessment would include practical recommendations to control the risk, and also indicate what the re-calculated risk should be if recommended controls are implemented to determine if it could be lowered to an acceptable level. Newly introduced controls should lower risk by one level, i.e., from high to medium or from medium to low.

***The following must be recorded*:**

In addition to any site or activity specific details, the following will be noted:

- Name of the person/s doing the assessment
- Date
- Work location being assessed
- Known or expected hazards associated with the activities
- The risk of injury/damage and its severity likely to arise from these hazards

- Who/what is at risk?
- Measures to be taken to reduce the level of risk
- Training pre-requisites
- Level of risk remaining
- Action to be taken in an emergency
- References, if any
- Signature of Assessor

Appendix 5 – Oil & Hazardous Material Spills – Prevention Measures and Best Practices

OIL & HAZARDOUS MATERIAL SPILLS

Spill Prevention Measures

A key component of an integrated approach to pollution prevention is to minimize accidental and incidental releases of toxic and hazardous materials to the environment. These releases usually result in not only a waste of material, but also in the generation of contaminated soil, absorbent material, and contaminated product that has to be treated and disposed. A structured plan is absolutely necessary to ensure control of systems and verify that the goal of zero spills can be achieved.

Spills are caused by a number of common factors, but the most likely causes are:

- ✓ Mechanical failure
- ✓ Personnel error
- ✓ Fires and explosions
- ✓ Power failures
- ✓ Natural disasters such as floods, earthquakes, and hurricanes.

The following suggested measures go a long way toward laying the foundation for a system that will minimize occurrence of accidental spills:

- ✓ Good design
- ✓ Explicit and detailed operating and maintenance procedures
- ✓ Thorough training of all personnel
- ✓ Conscientious and timely maintenance of equipment and facilities
- ✓ Strict job responsibility and accountability
- ✓ Redundant process control and alarm monitoring systems

Since the great majority of spills result from poor design and improper maintenance procedures, proper design, maintenance procedures, training, and prevention measures can greatly reduce the incidence of spills. Other proactive and reactive processes should be implemented to minimize the occurrence, reoccurrence, and severity of spills that occur. These actions include investigating all spills to determine root cause; performing process hazard analyses to look at factors such as chemical interactions, maximum material inventories, materials compatibility, and failure scenarios; and developing spill action plans to be followed in the event of a spill.

In addition, physical barriers should be used to contain spills and minimize environmental damage (contamination of soil, groundwater, or leakage into sewers or surface waters) in the event of a release.

Physical barriers include neutralizing agents and containment devices (booms) should be strategically located so that they can be quickly deployed in the event of a spill.

The Contractor site specific CIPP will detail how spills will be contained and treated with - the equipment that will be used, physical barriers and neutralizing agents and where they will be located on-site.

Monitoring Systems

Knowledge and decision making are critical factors in taking appropriate action when an unusual circumstance presents itself. Instrumentation is the key to obtaining fast and accurate knowledge of the status of the process. Furthermore, redundancy of instrumentation is a vital component of any good spill prevention system. All critical instruments, such as drum or tank level sensors, should be duplicated, preferably with an instrument using a different means of sensing to avoid a double failure.

Control and accuracy of inventory by material balance may also indicate a spill is occurring. Alarm set points should be chosen to minimize false alarms while maintaining adequate response for true failures.

Piping Systems

Pipelines are often the site of major spills, typically because of equipment failure. Guidelines for designing, maintaining, and operating pipelines are as follows:

- ✓ A standard identification system should be developed for all pipelines to assure proper and accurate indication of the product flowing within each and every line. All lines should be marked and their markings maintained.
- ✓ Any product fill line entering a tank below the liquid level should have a check valve and isolation valve combination located close to the receiving tank in order to prevent massive backflow or siphoning of the material out of the tank. The isolation valve permits easy maintenance of the check valve as well as tight shutoff in the event of a transfer shutoff.
- ✓ Underground pipelines should be avoided. If lines must be underground, they should have protective coatings and wrappings, as well as cathodic protection to minimize corrosion. In addition, a section of the underground line should be exposed and inspected annually until the entire length of the line has been inspected over a period of years. Then the process should be continued from the original starting point.
- ✓ If a pipeline is taken out of service for an extended period of time, it should be marked, blind flanged, and isolated at both ends.
- ✓ Pipelines supported just off the ground, especially those using wood or makeshift shoes, should be avoided. Pipelines should be routed in designated pipe racks with standard pipe shoes at each support point.
- ✓ All connections should undergo at least a regular quarterly visual inspection, at which time an assessment can be made of the general condition of the line, its support structure, and other components.
- ✓ Pumping systems should be located in close proximity to storage tanks.

- ✓ Baffles, hard coatings, high alloys, long bends, or other means of abrasion resistant designs should be used for abrasive or erosive liquids.

Bulk Storage

- ✓ Underground tank use should be avoided unless adequate measures have been taken to assure integrity of the vessel by a combination of careful design, quality construction, conscientious maintenance, continuous monitoring, and periodic inspection.
- ✓ Material storage should only be done in vessels designed and constructed to meet the requirements of the stored material. Additionally, all vessels should be subjected to integrity testing by the most appropriate non-destructive means, e.g., x-ray, dye penetrant, etc. All tanks should also undergo hydrostatic testing as a new tank and following maintenance work.
- ✓ Thickness testing should be done periodically and compared to the vessel's original thickness to track reduction due to corrosion.
- ✓ Large volume storage should have a spill containment volume (e.g., pits, dikes, or curbs) equal to 110% of the volume of the largest tank.
- ✓ Drainage of rainwater from containment areas should be restricted to in-plant treatment, unless assurances such as locked valves, careful analysis of water, and monitoring of pumpouts are carried out.
- ✓ Fail-safe engineering designs should be used on all tanks: high and low audible alarms with redundancy directed to a constantly manned control station and high level pump cut-offs or valve shutoffs to stop flow at a predetermined liquid level to prevent overfilling of tanks.
- ✓ Visible product seeps or leaks from seams, cracks, or gaskets should be followed by immediate corrective action.
- ✓ Analytic devices (e.g., pH sensors) should be installed in wastewater sumps or other collection point for early warning of spilled material.

Materials Compatibility

Compatibility of materials should always be checked before putting a pipeline, vessel, or piece of mechanical equipment into service. Materials include the bulk materials of each item as well as the gaskets, o-rings, coatings, liners, and seals. Consider cleanout conditions, especially high temperature conditions that may be incompatible at an elevated temperature.

Best Management Practices for Spill Prevention

Container Storage

a) Install a paved floor with curbing to contain spills of materials and contaminated storm water. The curb should be high enough to contain the volume of the largest tank plus additional volume for

rainfall accumulation. A reasonable approximation is 110% or more of the largest storage tank, depending on the amount of rainfall reaching the site.

b) Cover the storage area or bring the containers indoors. The containers should have covers to prevent rainfall from percolating through the stored materials. Waste liquids should be covered with tarpaulins or roofed structures that are large enough to keep rainfall out of the perimeter.

c) Prevent mixing of chemicals in case of a spill by segregating incompatible or reactive materials in separate containment areas.

d) For containers which are accessed for removal of a liquid chemical by employees, install the paved, curbed and covered area described in a) and b) above. Place a drip pan under the container spout.

e) Install overfill protection on storage tanks and drums, and install guard rails around tanks and pipes to prevent damage from vehicles.

f) Prevent unauthorized persons from accessing storage containers and causing spills. For example, lock storage buildings and use lockable drum lids. Also, provide warning signs, such as:

    i. DANGER – HAZARDOUS MATERIALS and AUTHORIZED PERSONNEL ONLY, etc.

g) Inspect containers each month for deterioration and leaks. Check the covers and lids of containers to make sure they are securely fastened.

h) If the material stored is a “hazardous waste,” you must comply with any and all state and federal regulations and requirements not mentioned in this BMP.

i) Maintain an Emergency Spill Response and Cleanup Plan.

j) Maintain properly stocked spill control kits throughout the facility at locations where accidental discharges have a potential to occur.

Secondary Containment

General

a) Bund/sump capacity should contain 10% volume of the total containers or the total volume of the largest container, whichever is greater, for containers stored indoors

b) For containers stored outdoors, bund/sump capacity should be 110% volume of the largest container to compensate for precipitation

Mobile Fuelling

This involves fueling earthmoving or excavation equipment from a tank truck or some other container that is moved around the site. Secondary containment equipment used during mobile fueling should be:

a) Sized to contain the most likely volume of fuel to be spilled during a fuel transfer.

b) Portable containment equipment should be positioned to catch any fuel spills due to overfilling the equipment and any other spills that may occur at or near the fuel filler port to that equipment.

c) The selection of containment equipment and its positioning and use should take into account all of the drip points associated with the fuel filling port and the hose from the fuel delivery truck.

d) Personnel must attend to the fueling process to ensure that any spills will be of limited volume.

Fuel Storage & Transfer Areas

This involves fueling equipment in a fixed location on the site. Refueling containers (skid-mounted tanks, drums, five-gallon cans) must have secondary containment.

a) Secondary containment areas for fuel storage tanks must be able to contain 110 percent of the volume of the largest fuel storage container and have an impervious floor.

b) Tanks may be placed within a metal, plastic, polymer or pre-cast concrete vault providing 110 percent of the volume of the largest fuel storage container.

c) For smaller volumes stored in fuel drums, containment pallets provide suitable secondary containment

d) Fuel transfer should be done over a flat, impervious fuel transfer area adjacent to the fuel storage tank(s). The impervious fuel transfer area should extend beyond the full reach (length) of the fuel hose to avoid spills directly onto a pervious surface.

e) Portable containment equipment may provide both secondary containment for the fuel storage tank (110 percent of the volume) and the required impervious area (typically raised at the perimeter) necessary for conducting fuel transfers.

f) Tank storage and fuel transfers may also be within secondary containment areas constructed by forming a basin sloped down to a central low point or bermed along the perimeter, lined with a continuous sheet of 20 mil (or greater) polymer material or appropriate geo membrane liner , and backfilled with at least six inches of sand.

Leak & Integrity Inspections

Inspection of Containers for Leaks

a) Container storage areas must be inspected weekly. Inspections protect the Contractor, the Executing Agency, and the public -- through inspections, spills can be stopped before they happen.

b) Develop and maintain a standard inspection checklist to be used during every weekly inspection. The checklist should be detailed and also address the labeling and management procedures followed at the work-site. **See Annex 2** for an example of a checklist that can be modified as necessary

c) At a minimum, the checklist should cover the following:

- ✓ leaks or staining from containers;

- ✓ container condition, including dents, bulging, and/or corrosion;
- ✓ labeling -- start date, the words "Hazardous Waste" and other information; and
- ✓ management practices -- such as aisle space, drum stacking.

d) Inspections should be detailed and methodological and conducted by trained persons.

e) Tips for conducting inspections include:

- ✓ Follow the inspection checklist – make detailed notes if you find something wrong.
- ✓ Be thorough. Check the tops of drums to look for waste residue or corrosion.
- ✓ Walk all the way around containers – check entire storage area.
- ✓ Check containment area for stains.
- ✓ Note anything unusual in containment area -- even if it might not be a problem.
- ✓ If problems are found, get the problem taken care of immediately.
- ✓ Keep a logbook of the facility's inspection checklist.

Inspection of transfer pipelines and hoses for Leaks

a) Inspect starter controls for pumps within secondary containment to ensure that they will remain locked in "off" position when not operating;

b) Inspect loading/unloading connections of pipelines to ensure that they are securely capped or blank flanged when not in service;

c) Inspect valves and valve operation, piping, flange joints, expansion joints, valve glands, catch pans, pipeline supports and metal surfaces;

d) Ensure that the loading/unloading area drains to a catchment basin or other similar containment structure; the capacity of the containment structure must be equivalent to the largest compartment of a tank car or truck loaded/unloaded;

Integrity Inspections

Depending on the type of container, integrity testing may be as simple as an external visual inspection or may involve more complicated methods of non-destructive testing such as Magnetic Flux Leakage (MFL) or ultrasonic thickness (UT) measurements, vacuum box testing, and weld inspection in order to adequately assess the container condition.

While frequent external visual inspections can often be completed by trained facility personnel, the requirement to conduct regular integrity tests or inspections may involve hiring specialized personnel (as specified by the applicable industry standard). For example, integrity testing of field-erected aboveground storage tanks in accordance with American Petroleum Institute (API) API 653 involves formal in-service external inspections and formal out-of-service internal inspections to be conducted by an API 653 certified inspector.

A formal in-service external inspection involves visual inspection and UT measurements of the shell. A formal out-of-service internal inspection determines the condition of the tank's floor, walls and structure, but should also include the shell, roof, nozzles, and tank appurtenances. The out-of-service inspection typically includes non-destructive testing such as MFL scanning of the floor, vacuum box testing floor welds, helium leak testing, UT measurements, and tank bottom settlement measurements.

Records and reports of integrity inspections must be maintained by the Contractor and submitted to the PMO on a regular basis (frequency to be determined by the Project Manager)

Pints, Quarts, Gallon, Pails and Kegs

It is generally accepted that all items less than 55 gallons do not require integrity testing, regardless of the number of containers, however regular visual inspections for integrity should be included in the leak inspection conducted.

55-Gallon Drums

a) Storage and use areas for these containers will be included in a visual inspection plan.

b) Depending upon the number of drums and their area density, they will be included in the monthly-recorded inspections required under STI or API inspection requirements.

c) If there is a main storage location for drums, a daily or weekly sign-in sheet that someone checked the location to be sure that there are no leaking drums can be utilized. The design of the plan should also take into account items such as containment capabilities. Better containment may mean less frequent recorded inspections.

d) Single drums being used in a given location on a containment skid will be inspected daily. A single drum rupture operating with properly sized containment and in the absence of floor drains cannot reach any location to do environmental damage. (This however does require adequate, readily available spill clean-up capabilities.)

Above Ground Storage Tanks, Totes etc.

a) Integrity inspections of above ground storage tanks and totes (>80 gallons) should be conducted on at least a monthly basis

b) Integrity inspections should be conducted by certified individuals such as American Petroleum Institute (API) authorized inspectors, Steel Tank Institute (STI) certified persons or equivalent qualified/certified individuals/inspectors

c) Inspections should be conducted in accordance with the appropriate API of STI standard e.g. API 653 or SP 001 (Steel Tank Institute Standard for the Inspection of above Ground Storage Tanks) or equivalent.

d) Tips for inspection include:

- ✓ Inspect each container individually
- ✓ Inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas.

- ✓ Include the container's supports and foundations.

Fuels & Hazardous Material Handling

a) Fuels and hazardous materials will be handled in accordance with the Material Safety Data Sheet (MSDS) specific to the item being handled

b) Appropriate PPE recommended by the MSDS will be worn at all times by persons involved in the handling of fuels and hazardous materials

c) Restrict use of materials to only when and where necessary to complete the construction activity.

d) Reduce or eliminate on-site use of hazardous materials.

e) Carefully select appropriate material needed for the task.

f) Do not remove the original label. Comply with manufacturer's labels, which include product information regarding uses, protective equipment, flammability, ventilation, and mixing of chemicals

g) Dispose container only after all of the product has been used.

h) Restrict amount of chemical solutions etc prepared to quantity necessary for the current application.

i) Comply with the recommended usage instructions

j) An ample supply of cleanup materials for spills shall be readily accessible.

k) Provide employee training on proper material use.

Restricted Areas

a) Restricted areas must be clearly and predominantly identified using the proper signage and warning colours

b) Signage used must be appropriately sized in compliance with any industry accepted standard as it applies to dimensions, placement etc of signage.

c) Depending on items stored in or activities conducted within the restricted area, security may be posted at the access and/or egress points of the restricted area

d) Restricted areas can only be entered only if the individual has been granted authorization by the person in charge of the area

e) Persons entering restricted areas must adhere to all posted entry requirements

f) Boundaries of restricted areas must be clearly demarcated – small restricted areas may be taped off with warning/barricade/construction tape; while larger areas may be fenced with chain link wire or other appropriate fencing material.

g) A log of all materials stored in the restricted area as well as persons accessing the restricted area must be maintained for as long as the restricted area exists.

h) An inventory of all materials stored, removed, used and replenished etc must also be maintained.

Restricted Refueling Areas

a) Only designated persons will be allowed to conduct fueling operations in the restricted refueling area

b) In case of spillage, filler caps shall be replaced and spillage disposed of before engines are started

c) Engines shall be stopped and operators shall not be on the equipment during refueling operations

d) Smoking and open flames shall be prohibited in areas used for fueling, fuel storage or enclosed storage of equipment containing fuel

e) Fueling must be performed on level-grade areas and on impermeable surfaces.

f) Use nozzles equipped with automatic shut-off to control drips. Do not top off.

g) Protect the areas where equipment or vehicles are being repaired, maintained, fueled or parked from storm water run-on and runoff.

h) Use barriers such as berms, sand bags or dikes to prevent storm water run-on and runoff, and to contain spills.

Other Material Specific Measures

a) All other materials intended for use during Construction will be stored in accordance with the MSDS for the material/product

b) These materials will be subject to the BMPs identified herein as well as BMPs developed specifically for the material/product

c) As far as possible unused material, spent materials and containers will be either returned to the manufacturer/supplier for disposal or disposed of at an appropriate disposal facility; disposal records must be retained by the Contractor.

Spill Preparedness Practices

a) Contingency planning including general and detailed action and logistics plans.

b) Conduct site preparedness training and exercises for action management, personnel involved in spill containment and persons involved in site clean-up.

c) Develop a spill preparedness strategy.

d) Review and examination of spill response technology available and its applicability to the Construction Phase.

Annex F – Health and Safety Plan (HASP)

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Table of Contents

List of Acronyms

AHA	Activity Hazard Analysis
COVID	Corona Virus
EA	Executing Agency
EHS	Environmental Health & Safety
EHSO	Environmental Health & Safety Officer
ESMP	Environmental & Social Management Plan
HASP	Health & Safety Plan
HSM	Health & Safety Manager
JAS	Job Safety Analysis
JHA	Job Hazard Analysis
LOTO	Lock Out Tag Out
MSDS	Material Safety Data Sheet
PPE	Personal Protective Equipment
START	Supervisory Training in Accident Reduction Techniques
WASA	Water & Sewerage Authority

1.0 Introduction

This Health and Safety Plan (HASP) outlines construction health and safety requirements for the construction of the Project. This HASP is a planning document which identifies requirements based on legislative requirements, industry standard practices, the environmental social assessment undertaken for the Project, and subsequent evaluations and discussions. In accordance with the Project Construction Environmental and Social Management Plan (ESMP), to which this Plan is annexed, is the Contractor's responsibility to prepare a site specific Plan to be submitted and approved by the Executing Agency in accordance with the procedures and time frame outlined in the ESMP and contractual obligations.

The intent of this Plan is to identify baseline mitigation measures for management of health and safety issues. The Contractors can adopt these measures or, if any of the procedures identified herein are deemed (based on the project-specific risk assessment performed prior to construction and/or further evaluation), unnecessary, technically infeasible, or unsuitable due to local conditions, alternative measures would be identified and described (and an explanation of how the alternative measures achieve a comparable level of mitigation would be provided). Any such changes from the measures in this Plan will be approved by the Contractor and WASA upon written request, if the Contractor and WASA agree that an alternative measure:

- Provides equal or better environmental protection;
- Is necessary because a portion of this Plan is infeasible or unworkable based on project-specific conditions; or
- Is specifically required in writing by management government agency or other entity having jurisdiction.

If additional field activities are identified during the course of the construction activities that are not covered by this HASP, the addenda will be submitted to the Executing Agency for review. Upon review of such addenda, the addenda will be provided to Contractor companies and available for review at the same locations noted above, and the provisions of such addenda will be implemented.

1.1 Objectives

This HASP outlines safety and health requirements and guidelines developed for project work. When implemented, these requirements will help protect site personnel, visitors, the public, and the environment from exposure to potential safety and health hazards.

This HASP will be updated as conditions or situations change.

The objectives of this HASP are to:

- Identify the physical, chemical, and biological hazards potentially present associated with the Project Work Plan and associated activities;
- Prescribe the protective measures necessary to control those hazards;
- Define emergency procedures; and
- Prescribe training and medical qualification criteria for site personnel.

This HASP must be reviewed by all Contractor and subcontractors, supervisors, foremen, and safety personnel. All other project personnel performing field activities will receive a site-specific project safety orientation summarizing the content of the HASP. If requested, project personnel will be provided the

time necessary to review the entire HASP. All personnel will be required to sign the appropriate documentation acknowledging an understanding of the HASP. Visitors will also be required to receive an abbreviated project safety orientation, in addition to being escorted by an authorized project team member when going on the site.

The project goal is zero incidents and zero injuries with work tasks designed to minimize or eliminate hazards to personnel, equipment, the environment, and the general public. No individuals shall perform tasks that may endanger their own safety and health or that of others. In other words, all individuals are empowered to have "stop work authority"

1.2 Zero Incident Philosophy

This HASP uses the Zero Incident management approach. The safety goal for this project is zero incidents, zero injuries. The Zero Incident philosophy originated with a study by the Construction Industry Institute (CII), which identified specific control measures shown to dramatically reduce the probability of incidents.

These control measures, known as Zero Incident Techniques, provide the framework for this HASP, and the Project Team's proactive approach to manage the interrelated areas of safety, health, environment, and risk management. The definition of an incident is any unplanned or unexpected event that results in or has the potential to result in (i.e., near-miss incident) a personal injury, property damage or environmental release.

To ensure the success of the HASP, the project safety culture must be dynamic and evolving. This begins with training all management personnel in the foundations and philosophy of the Zero Incident Techniques and through Supervisory Training in Accident Reduction Techniques, known as the START program. This training lays the groundwork for a successful project by creating accountability and responsibility for the safety and risk process with all individuals.

2.0 Site Safety Personnel

Personnel	Role/Function
Environmental Health & Safety Officer	• Provide leadership by demonstrating a personal commitment to safety at all times; • Provide hands-on participation in the development and implementation of the HASP; • Develop incentive/rewards programs to recognize safety achievements; • Establish a disciplinary program for unsafe behaviour; and • Meet safety targets. • Ensure that there is regular Safety Committee meetings; • Implement safe systems of work for activities; • Approve any changes to the HASP due to modifications of procedures or newly proposed site activities; • Ensure that personnel assigned to the project have appropriate training certifications and medical clearance; • Ensure controlled substance and alcohol testing is completed for all workers prior to starting work;

Personnel	Role/Function
	• Assess site security and control procedures that address the health and safety of the public and non-authorized personnel who may visit the work sites ▪ Coordinate the HSMs on matters relating to work site activities, ongoing and/or planned, to verify that adequate consideration is given to maximum employee health and safety protection and compliance with applicable local, state, and federal regulations; ▪ Consult with project team members on matters relating to suspending site activities in the event of an emergency; and • Verify that corrective actions resulting from deficiencies identified by audit and observation are implemented and effective
Project Health & Safety Monitors	The Project HSMs will be responsible for managing on-site health and safety activities and will provide support to the EHSO on health and safety issues that relate to their tasks. Additional duties include but are not limited to: ▪ Suspend field work in an emergency or if unsafe work conditions exist; ▪ Review safety protocols and procedures (activity hazard analysis / job safety analysis [AHA/JSA]/ Permit to Work) as necessary for work; ▪ Observe workers for signs and symptoms of chemical exposure, heat/cold stress, fatigue, etc. ▪ Inspect the site work zones/areas (i.e., construction, processing/operations, dredging) to verify that adequate hazard communication measures are in place
Project Workers	• To commit to the project zero incident culture and to believe that all incidents are preventable and zero incidents are attainable; • To exercise your “Stop Work Authority” by intervening if you see co-workers about to commit an unsafe act and to call a halt to any unsafe activity you witness; • To participate in daily tool box meetings and to share opinions or ideas on better safe work practices; • To adhere to the buddy system at all times; • To follow all procedures identified in the HASP, Contractor HASP or may be communicated by supervisory staff; • To be receptive to training in safer work practices; and • To be tolerant towards co-workers and open to their views and suggestions pertaining to safer work practices even if they are different from what one is used to doing.

3.0 Potential Health & Safety Hazards and Controls

3.1 Field Hazards & Controls

The following sections discuss general safety and health hazards associated with the proposed scope of works for this phase. All work must be performed using the buddy system, a system of organizing employees into work groups so that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency. If an individual in a work group does not have a direct line of sight with another group member, then the individual must have a means of communicating with the group (i.e., two-way radio).

Hazards

The hazards associated with these activities can be physical, biological, and environmental. Physical hazards include but are not limited to:

- Being caught in/between/under equipment or materials;
- Being struck by tools/equipment/materials/Flying or moving objects;
- Coming in contact with electricity;
- Fall from elevation;
- Fatigue;
- Fires;
- Contact with chemicals;
- Confined Spaces
- Lifting or carrying heavy materials;
- Pulling or pushing objects and materials;
- Slips/trips/falls on same elevation surfaces;
- Vehicle incidents; and
- Working in trenches/excavations.

Biological hazards include exposure to dead animals, organic wastes, and water that can harbor parasites and pathogens. Environmental hazards include exposure to poisonous vegetation, insects, animals, rodents, heat, noise, and lightning.

Manual materials handling and manual project site preparation may cause blisters, sore muscles, and joint and skeletal injuries; these activities may also present eye, overhead, contusion, and laceration hazards. The work area may present slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil.

Control Measures

In the Contractor HASP, a Risk Assessment will be provided for each major activity that will take place. The Contractor HASP will also provide the Job Safety Assessment (JSA) for each major task, which identifies the steps, hazards and control measures for each task. Also included will be applicable procedures to mitigate known risks or hazards, such as emergency equipment or supplies required to be available on site based on the field activities taking place and potential releases to the environment.

Control measures are be highly dependent on the scope and sequencing of the work and the specific environment in the area of the Project. Therefore, only standard general construction industry controls are addressed in this HASP. Control measures specific to working in the Project areas will be developed upon final work plan details and provided in the final Contractor HASP to be approved by THE EXECUTING AGENCY in accordance with the ESMP and contractual obligations.

3.2 General Hazards & Controls

General safety and health hazards are associated with the field activities of the work plan and support activities. Contractors are required to conduct an Job Hazard Analysis (JHA) for all aspects of their work. The JHA consists of the following three steps:

- Identify the task and break it down into steps;
- Identify the hazards associated with each step; and,
- Identify the specific hazard control measure used for each step in accordance with the order-of-precedence method of control.

Below are some sample questions to aid the Contractor in completing JHAs. This list is not comprehensive because each portion of the project (i.e., construction, processing/operations, dredging) has its own requirements and environmental conditions. The person developing the JHA should also consider taking photographs of the work area for a more detailed analysis of the work environment.

In addition, the Contractor shall use the following list as a guide in determining the construction activity hazards analyses for various high-hazard operations and critical tasks.

- **Pre-mobilization inspection.** Conduct an initial site inspection for prejob planning. The inspection should cover potential exposures such as the location of electrical lines, underground utilities, nearby structures, traffic conditions, site security needs, public exposures general liability, and other potential exposures.
- **Water, wastewater**. Analyze work adjacent to, in, or over water (including lakes, canals, dams, treatment plants, water tanks, clarifiers, and reservoirs) for hazards.
- **Traffic controls**. Plan the traffic controls for delivery of equipment or materials as well as any equipment operations. Control measures include warning signs, flagmen, traffic stoppage and control, and unloading procedures.
- **Material storage**. Consider where materials and equipment will be stored on site.
    - Implement measures to protect against vandalism and theft of tools, equipment, or materials. Also consider the hazards that may exist for workers when they are storing or retrieving those materials.
- **Material handling**. Consider the size and weight of loads, the equipment to be used, how the equipment is set up and protected, and safety and maintenance inspections of material handling and rigging equipment. Also consider employee training in the use of the equipment or personal body mechanics when engaged in manual material handling activities.
- **Heavy equipment controls**. Evaluate the use of heavy equipment in operations such as site clearing, grading, and excavation or lifting. Controls should include equipment alarms, use of qualified operators, and pre-use inspections.
- **Personal protective equipment**. Consider operations where PPE is required and the type of PPE required, e.g., eye, head, foot, respiratory, hearing and hand protection, and types of special protective clothing.
- **Portable hand and power tools**. Evaluate the tools to be used and the ways that workers are protected from the hazards associated with the use of tools. Consider tool maintenance requirements; electrical requirements; the use of ground fault circuit interrupters, grounding, extension cords, and tool inspection procedures; and employee training and PPE requirements.
- **On-site traffic**. Internal traffic control plans should include ways to restrict the number of vehicles on site, the flow of vehicles through the site, haul roads, speed controls, subcontractor employee

parking areas, merging of site traffic with local vehicle traffic, pedestrian controls in traffic zones, access by emergency and rescue vehicles, and operator controls.

- **Employee training**. Always review the safety training needs of employees. Training should include initial site safety orientations and chemical hazard communication training. Some operations (e.g., excavation, blasting, scaffold erection, tunneling, confined space, operating heavy equipment, and working in highly hazardous plant process operations) may require special training that should be checked and evaluated.
- **Confined spaces**. Confined space work requires special consideration, evaluation, and controls. Each space should be reviewed for regulatory compliance.
- **Excavations and trenching**. These activities require complete analysis of existing underground exposures, soils, sloping and shoring methods, equipment, and engineering if depth of trench or excavations exceeds four feet. An AHA is recommended for all trenching operations.
- **Concrete formwork and placement**. Adequate access and egress to elevated concrete work is essential to the safe and quality placement of concrete work. Work involving concrete should consider protective measures such as staging, platforms, handrails, and other passive forms of employee protection.
- **Mechanical, electrical, and piping**. Evaluate all work associated with the installation, repair, and maintenance of mechanical, piping and electrical work for interferences, LOTO, line break procedures, and applicable customer requirements.
- **Hazard communication**. A site-specific hazard communication plan is required to be developed by the Contractor. A copy of a material safety data sheet (MSDS) for each chemical brought to the site will be maintained by the Contractor with a copy sent to the CM. Labels on containers will be visible and readable.

4.0 Worker Health & Safety

As stated in the ESMP with Framework approach, the Contractor will ensure that the following mitigation measures are followed during construction and operational activities:

The contractor must have a health and safety policy that is known and understood by all workers. It must be visible to the workers on site.

- All workers must observe the relevant COVID-19 protocols which include physical distancing, wearing of masks, washing and sanitizing of hands and work spaces.
- Provide fair compensation and treatment of workers for work done
- Provide equitable and ethical terms and conditions of employment for workers
- Provide safe and acceptable working conditions, including securing worker health and safety.
- Inform the employees of the occupational risks and preventative measures that must be taken
- to address these risks.
- Inform workers of their legal rights and obligations and provide them with the necessary training on Project occupational health and safety.
- Ensure all workers have the required personal protective equipment required of them to work on the Project and to regularly monitor to ensure compliance.
- Perform routine checks of health and safety equipment to ensure that they proper functioning.
- Assign an officer with responsibility for worker health and safety.

- Construction areas should be clearly demarcated with safety signs and barriers to prevent possible incidents.
- Workers should be properly trained in the proper use of construction equipment.
- All workers must be trained in the proper use of all health and safety equipment.
- All workers must be trained in the proper handling and management/ disposal of all types of waste.
- All workers are to be informed of hazards and provided with suitable and sufficient training and PPE for the safe handling of Chemicals.
- All workers are to be provided with suitable and sufficient hygiene and welfare facilities e.g. rest rooms, lunch spaces, lockers, toilets, first aid, clean drinking and washing water, etc.
- The contractor EHS Manager/ Officer shall maintain a register of all EHS related incidents that have occurred as a result of the activities associated with the contract. EHS incidents that should be recorded include fires, accidents, spills of hazardous materials that contaminate soil or water resources, stop-order notices issued by any Regional Corporation or any other relevant agency, non- compliance with this ESMP.
- Each EHS related incident will be investigated by the client's EHS officer and an incident report forwarded to the contractor. An incident report will be presented within five working days;
- EHS incident reports will include as a minimum, a description of the incident, actions taken to contain any damage to the environment, personnel or the public, and the corrective actions to repair/remediate any damage;
- All construction plant and equipment, tanks and machinery shall be maintained in a good state of repair throughout the construction period
- Equipment maintenance will be carried out on an impermeable surface
- Leakage from equipment will be prevented by regular inspection and repair
- Areas under construction should be clearly demarcated.
- Emergency medical supplies must be available and easily accessible in the case of an incident.
- In the event that the onsite medical supplies are not adequate, the incident needs to be escalated to the hospital.
- In the event that a worker is exposed to hazardous material they should immediately be taken for medical attention

5.0 Community Health & Safety

As stated in the ESMP with framework approach, the Contractor will ensure that the following mitigation measures are followed during construction and operational activities:

- Perform routine checks of health and safety equipment to ensure that they are properly functioning to prevent accidents that can negatively impact the public.
- All persons associated with the project must observe the relevant COVID-19 protocols which include physical distancing, wearing of masks, washing and sanitizing of hands and work spaces.
- Assign an officer with responsibility for community health and safety.
- Construction areas should be clearly demarcated with safety signs and barriers to prevent possible incidents.
- The contractor EHS Manager/ Officer shall ensure that they utilize the consultation plan to inform community members of planned activities and safety protocols that must be adhered to. This

should take place before the start of construction or maintenance works. The community should be informed of the grievance mechanism that is to be utilized if there are any issues or complaints.

- The contractor EHS Manager/ Officer shall maintain a register of all EHS related incidents that have occurred as a result of the activities associated with the contract. EHS incidents that should be recorded include fires, accidents, spills of hazardous materials that contaminate soil or water resources, stop-order notices issued by any Regional Corporation or any other relevant agency, non- compliance with this ESMP.
- Each EHS related incident will be investigated by the client's EHS officer and an incident report forwarded to the contractor. An incident report will be presented within five working days;
- EHS incident reports will include as a minimum, a description of the incident, actions taken to contain any damage to the environment, personnel or the public, and the corrective actions to repair/remediate any damage;
- All construction plant and equipment, tanks and machinery shall be maintained in a good state of repair throughout the construction period.
- Equipment maintenance will be carried out on an impermeable surface
- Leakage from equipment will be prevented by regular inspection and repair
- Areas under construction should be clearly demarcated and restricted access to members of the community.
- Emergency medical supplies must be available and easily accessible in the case of an incident.
- In the event that the onsite medical supplies are not adequate, the incident needs to be escalated to the hospital.
- In the event that a community member is exposed to hazardous material they should immediately be taken for medical attention.

6.0 Environmental Hazards

6.1 Heat Stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual.

Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat stress includes: heat rash, heat cramps, heat exhaustion and heat stroke.

6.2 Biological

Biological hazards include waterborne, air borne diseases such as cholera, Covid-19; diseases spread by vectors such as mosquitos inclusive of Dengue Fever, Zika, Chikungunia, Malaria as well as animal bites from snakes, caiman, scorpions, spiders and other biting insects such as ants, wasps.

7.0 Personal Protective Equipment (PPE)

PPE is required to safeguard project personnel from various hazards. Varying levels of protection may be required depending on the degree of physical hazard and the potential for exposure. These will be determined by Risk Assessment or JHA.

PPE shall be worn at all times on the site, including travel within the site when starting or ending shifts.

- Hard hats are required at all times in the work area areas (i.e., construction, processing/operations, dredging, wharf, marine vessels). The following color code system for hard hats shall be implemented:
    - White hard hats shall be worn by all Executing Agency, Special Purpose Company, EHSM, EHS Monitors and Contractor personnel.
    - Yellow hard hats shall be worn by all visitors.

Hard hats must be worn in the forward direction, unless the hard hat has a swivel suspension and is American National Standards Institute (ANSI) approved to be worn in the reverse direction.

- Appropriate eye protection that complies with ANSI Z87 shall be worn at all times. Safety glasses with side shields are required as a minimum.
- Sensible and safe work clothing/shoes must be worn. This means the wearing of shirts with a minimum four-inch sleeve. Shorts, cut-offs, sleeveless shirts, tank tops, sneakers, and running shoes are strictly prohibited.
- No canvas or leather sneakers (even if equipped with steel toe) or sandals will be worn. All construction boots or shoes designed to accommodate laces must be fully laced.
- Appropriate hearing protection shall be worn in work areas where levels exceed established standards as described in the previous section.
- Suitable gloves must be worn to protect the hands from injury as appropriate for the work to be performed.
- Approved respirators must be used when excessive dust, mist, fumes, gases, or other atmospheric impurities are present.
- Full-body safety harnesses and secured safety lanyards or retractable life lines must be used when working from unguarded work surfaces where falls greater than six feet present a hazard. (NOTE: Site requirements may limit this potential fall length to four feet). Lanyards or retractable lifelines must be secured to separate lifelines and independent connection points capable of withstanding the load of a potential fall.
- Proper personal protective equipment must be worn for welding and burning. Welding screens must be used when welding operations are in the vicinity of other employees.
- Electric insulating protective equipment, such as rubber gloves, blankets, hoses, boots, etc. shall be inspected before use.

8.0 Conformance with the Water and Sewerage Authority's Safety Requirements

The contractor is to ensure that his Safety Systems conform with or are better than existing policies and procedures of the Water and Sewerage Authority. These entail the following:

- Permit to Work Procedure
- Hazard Assessment & Control of Work Procedure
- Confined Space, Rigging & Lifting, Working at Heights, Trenching & Excavation, Respiratory Protection, PPE Selection & Use, Hazard Communication Procedures
- Preparation of Method Statements
- Risk Assessment / Job Safety Analysis
- Emergency Response Plan
- License for all equipment/machinery
- Copies of insurance for all equipment/machinery
- Certification for all specialised equipment/machinery and operators (Grabber, Hiab, Excavator, Crane, Backhoe)
- Certification for specialized skills e.g. welding, erection/inspection and dismantling of scaffolding, electricians, banksman/signaller.
- Organisational Structure/reporting relationship ¬ Listing of expected personnel and vehicles/equipment to be on site. Where special conditions exist at a worksite, additional precautions may be required, for example spark arrestors and any other identified safety features/measures.
- Daily Conduct of Tool Box Meeting and Pre-Task Hazard Assessment
- Daily Site Supervisor Inspections and Job Observations
- Provision of trained First Aider and First Aid Medical Supplies adequate for the number of workers on site
- Vaccination and Drug Testing of all workers.

9.0 Social Requirements

The Contractor should consider all aspects of Construction Worker Management. These may include:

- Ethnic tension between workers and communities.
- Increased risk of prostitution and communicable diseases.
- Worker behaviour within communities.
- Risk of crime, theft, drug and alcohol abuse.
- Market distortion due to temporary inputs to local economy.
- Other local tensions (e.g. noise, dust, disturbance, disruption to stock, etc.)

9.1 Code of Conduct

A Code of Conduct will be developed for the Project, which covers the following issues:

- Security;

- Behavior of workforce;
- Prohibition of illegal or controlled substances, firearms or weapons;
- Appropriate workforce dress;
- Work clothing not to be worn in offices or catering facilities;
- Smoking in designated areas;
- Enforcement of fire/evacuation procedures;
- Adherence to driving procedures;
- Prohibition of pornography;
- Non-business access to surrounding villages or communities; and
- Adherence to Trinidad and Tobago laws and regulations.

Each employee will be informed of the Code of Conduct and will be bound by it while in the employment of the Project or their Contractors. Failure to comply with the Code of Conduct will result in disciplinary action or permanent removal or dismissal from the site.

Annex G – Grievance and Redress Mechanism

Table of Contents

List of Acronyms

AP	Aggrieved Party
CRO	Community Relations Officer
MPU	Ministry of Public Utilities
NGO	Non-governmental Organization
PEU	Project Executing Unit
SPC	Special Purpose Company
WASA	Water & Sewerage Authority

1.0 Introduction

This document is intended to provide a guideline and the procedures for addressing grievances from the public/stakeholders that may result from the activities associated with the proposed Project. Grievance and Redress Mechanism (GRM) is an important part of preventing and managing environmental and social risk. Affected stakeholders, whether individuals or groups, should have access to a transparent, fair, and equitable mechanism that can act with a degree of independence from the project. It also complements and is complemented by stakeholder public consultation processes, community relations and corporate social responsibility initiatives. GRMs serve four purposes:

I. Inform decision making related to project design and development, which means it will be incorporated as part of the project management system;
II. Serve as a mechanism for timely resolution of an issue and prevent escalation of problems into social conflict;
III. Be an accountability mechanism, where people can seek remedy when needed; and
IV. Be embedded in a project's monitoring and evaluation process as well as contribute to institutional learning.

1.1 Definition of Grievance

A grievance is generally defined as any real or imagined factor which causes irritation, dissatisfaction or misunderstanding on the part of the stakeholder/affected members of the public. Stakeholders/affected members of the public must have their grievance communicated to the management of a project for a grievance to become official.

1.2 Objectives

The aim of this Grievance and Redress Mechanism is to establish a system to receive and facilitate resolution of stakeholders' concerns and grievances about the Project's environmental and social performance.

Thus, the overall objective of this mechanism is to ensure that concerns, complaints/ grievances/claims, and suggestions coming from communities or other stakeholders involved in the implementation of the project are promptly received, recorded, analyzed and processed. This makes it possible to detect the causes and take corrective and/or preventive actions to avoid an aggravation, which could go beyond the control of the project and could escalate to greater social conflict thereby leading to reputational risks to the project, MPU and the Bank. It also establishes a mechanism for permanent dialogue between the project and the local communities on the project.

The GRM addresses the methods to receive, record, process and report any concerns of affected individuals, communities and other stakeholders as part of the project's implementation. It is important to highlight that this mechanism does not replace complainants' rights to pursue existing regulatory, administrative or judicial redress mechanisms. General principles that guide an effective grievance mechanism include the following:

- Accessibility: establishing a route of communication between stakeholders
- Impartiality: the complaints must be treated seriously, and a proper management installed to demonstrate the will of the company to fairly handle grievances.

- Confidentiality: complaints must be treated with a level of confidentiality, particularly when there is fear of retaliation
- Transparency: the process should be fully transparent for stakeholders to be able to express their concerns and file grievances.

2.0 Scope

The Grievance Redress Mechanism applies to all phases of the project life cycle. It is intended to address grievances of the stakeholders and the general public.

The GRM applies also to all requests and complaints that might arise from any person (community members or others) who believe that they affected by the Project, including, but not limited to the following:

- damage to public / private assets;
- impact to businesses;
- degradation / deterioration of local infrastructure (e.g. roads);
- improper disposal of waste and/or washing concrete dumping;
- disturbance from noise, dust, traffic accidents, pollution, excessive speed of project's vehicles;
- degradation / pollution of the environment and disturbance of wildlife;
- negative behaviour of construction workforce towards local communities and persons;
- gender-based violence and harassment; and
- conduct of security providers or other service providers/sub-contractors affiliated with the Project;

Generally, all claims from affected communities should be accepted and no judgment made prior to investigation, even if complaints are minor. However, according to best practice, the following claims should be directed outside of project-level mechanisms:

- Complaints clearly not related to the Project: it is sometimes difficult to determine which issues are related to the Project and which are not. If in doubt, grievances should be accepted and investigated;
- Issues related to governmental policy and other government institutions;
- Complaints constituting criminal activity and violence that are not project related; in these cases, complainants should be referred to the justice system;
- Labour-related grievances: these will be managed by the Human Resources of the Contractor, SPC, WASA, MPU in accordance with each entity's Standard Operating Procedures and legal frameworks and international labor standards; and Commercial disputes: commercial matters should be stipulated in contractual agreements and issues should be resolved through a variety of commercial dispute resolution mechanisms or civil courts. Complaints against employees

Complaints on negative behaviour and/or conduct of construction workforce towards local communities and persons, gender-based violence and harassment and conduct of security providers or other service providers/sub-contractors affiliated with the Project are considered as serious offenses and will not be

tolerated. Although complaints of this nature will be initially logged under this GRM, the EA/MPU will ensure that the complaint is investigated and addressed in compliance with and under the Contractor/Sub-Contractor/Company or Agency internal Code of Conduct for its employees, the Human Resources Policies as it applies to violence and harassment, national Industrial Relations (IR) regulations, Collective Agreements of unionized employees and Contracts of the employees.

The Contractor/Sub-Contractor/Company or Agency of the employee(s) against whom the complaint has been made will be responsible for the resolution and if any punitive action is to be taken against the employee. If the complaint is for an action which, by national law is considered a crime (e.g. theft of stakeholder property, threats of or violent acts against members of the public, assault and/or sexual assault of a member of the public etc.), the complaint will be recorded and the aggrieved party will be advised to contact the national police (Trinidad & Tobago Police Service) if they have not already done so. The incident will then be handled by the justice system. Where any Contractor/Sub-Contractor/Company or Agency has evidence of a crime being committed, it will be immediately reported to the police and action taken against the employee in accordance with the respective HR policy.

3.0 Roles & Responsibilities

3.1 Community Relations Officer (CRO)

The designation of a Community Relations Officer (CRO) is a requirement under the Certificate of Environmental Clearance (CEC) issued for the Project as well as being good industry practice. He/she is responsible for the general administration of the Project's Community Grievance Procedure and Redress Mechanism, for coordination with the Executing Agency, Special Purpose Company and Contractors on community grievances, and for overall community relations. As such, he\she is the first point of contact for community members with complaints and grievances. The CRO acts to ensure that these complaints and grievances are received and recorded, brought to the attention of Project's management, where possible, advise on actions that can be taken as well as communicate resolutions to the aggrieved stakeholder/member of the public. The CRO is also responsible for providing Project information to the stakeholders and other affected members of the public. During the Construction Phase of the Project, the CRO will be a member of the MPU-PEU, hired by the Executing Agency and supported by the Corporate Communications personnel of both the MPU and the WASA. During the Operation Phase of the Project, Grievances will be handled by WASA's Customer Care and Corporate Communications.

3.2 Executing Agency (EA)

In relation to the Grievance and Redress Mechanism, the EA shall:

- ensure the overall coordination of the Grievance Redress Mechanism and formulates guidelines for its implementation.
- guarantee the implementation of the Grievance Redress Mechanism through the ESMP.
- Guarantee the updating and modification of the Grievance Redress Mechanism as required.
- allocate necessary resources at all levels to ensure effective management of community grievances.

- ensure that all received complaints are thoroughly considered and reported to identify causes, trends and propose mitigating measures; and
- ensure that the mitigating measures are followed through to completion.

3.3 Special Purpose Company (SPC)

The Special Purpose Company (SPC) is contracted by the EA. The SPC's main role is to participate in the investigation of all grievances that are related to activities associated with the Project, including activities related to the subcontractors and suppliers.

The SPC additionally shall:

- ensure that the required resources (e.g. vehicles, company phones, office materials) are provided to the Community Relations Officer.
- supervise the processing and resolution of all grievances.
- supervise the disclosure of Project information.
- oversee that the grievance redress mechanism is complied with; and
- ensure that the grievance redress mechanism is advertised at the site.

3.4 Contractors & Sub-contractors

- Receive and forward community/public complaints and forward onto the SPC
- Assist in grievance investigations.
- Implement corrective actions identified.
- Intensify mitigation measures as required.

4.0 Procedure for Grievance and Redress Mechanism

4.1 General

All complaints must be treated as important and serious. As such, it is important to undertake the following:

- Record the complaint.
- Diagnose the problem.
- Get the full story.
- Be impartial in your judgment.
- Do not get drawn into an argument.
- Clarify point(s) on which you are not clear.
- Determine the remedy that the aggrieved person is trying to gain.
- Determine what (if any) rule, regulation, law, policy, procedure, etc. was broken or violated.
- Determine and communicate a resolution.
- Where applicable, intensify mitigation strategies to ensure grievance does not recur.

4.2 Process for Grievance and Redress Mechanism

The process outlined below covers the construction phase of the individual projects. The CRO, Contractor, SPC, WASA and MPU will receive complaints and facilitate resolution of the affected communities' or individual members' concerns and grievances about the environmental and/or social performance in

accordance with the GRM. The grievance mechanism is scaled to the risks and adverse potential impacts of the project. It facilitates the prompt address of concerns using an understandable and transparent process that is readily accessible to all segments of the affected communities.

The GRM is being implemented at no cost to community persons and stakeholders and is without retribution to complainants. The mechanism will also not impede access to judicial or administrative remedies. The Executing Agency – MPU, and WASA will inform the affected communities about the mechanism using various methods in order to safeguard both the interest of stakeholders and the project. This includes disclosure of the GRM during the community engagement process and activities for the specific water development subprojects, on its website and social media mechanisms.

The process shown in figure 1 is described below:

Step 1

The first step in the process is receiving grievances, which can be undertaken using varying levels of formality as outlined in Table below. Grievances can be recorded at the construction site office or WASA facility or logged anonymously based on the nature of the problem.

Forms of Complaints	**Example**
Least formal: Oral complaints received face to face	Staff charged with collection of grievances records complaints at group or individual meetings, during field visits, or at designated locations.
Somewhat formalised: Oral complaints received through remote-access methods	Staff receives grievances through a designated telephone line.
More formalised: Written complaints received face-to face	Staff receives written submissions from an individual or a group at groups or individual meetings, during site visits, or at designated locations.
Most formalised: Written complaints received through remote access methods	Complaints submitted via regular mail, internet, or grievance collection boxes (consider having multiple locations). Grievance Collection Boxes are to be placed in an area or building that is accessible, discreet and discreet Complainants submit written grievances to third parties (to be forwarded to the local Contractor or the third party designated to administer the grievance and redress mechanism)

While oral complaints are accepted from stakeholders, a Grievance Collection Form identified at ***Appendix I*** should be completed by the stakeholder following oral face to face or remote communication. This form will be made available at SPC, MPU and WASA's offices and websites. Grievances should be filed within twenty-one (21) days of the event or discovery of the event. This deadline may be extended for good cause (e.g. awaiting police or medical reports etc.) at the discretion of the designated CRO.

Step 2

Step 2 involves logging and addressing of complaints. Once the complaint is logged, it should be addressed by the local Contractor or Project Coordinator who will provide a response to the complainant and

complete the Grievance Monitoring Form (**Appendix II**). In addition, the local contractor or Project Coordinator will provide a monthly report (inclusive of status) to the CRO of all grievances received. Appropriate attention will be given to gender-based grievances. In aggravated matters, the CRO will refer the complainant to the Gender Based Unit of the TTPS. The matter will also be investigated using the appropriate HR procedures of the employer.

Investigation - Designated staff shall investigate all grievances received.

A. Ensure that all alleged violations involving mistreatment, including injuries of unknown source, and misappropriation of Aggrieved Party property are reported immediately to the Contractor, SPC and to other officials in accordance with national law through established procedures.

B. Ensure that any evidence of alleged violations is thoroughly investigated; and

C. Prevent further potential abuse while the investigation is in progress.

D. The results of all investigations shall be reported to the contractor, SPC or his/her designated representative and to other officials in accordance within five working days of the incident, and if the alleged violation is verified, appropriate corrective action must be taken and documented on the Grievance Monitoring Form.

E. At any point in the grievance process, an Aggrieved Party may choose to have another individual to advocate on his/her behalf and/or accompany him/her to any investigative interviews.

F. The grievance investigation shall be completed within seven days of receipt of the written grievance by the designated staff.

G. The Aggrieved Party and/or person filing the grievance on behalf of the Aggrieved Person shall be informed in writing of the results of the investigation and the actions that will be taken to correct any identified problems.

H. The grievance investigation shall be conducted in such a manner as to maintain the confidentiality of the Aggrieved Party. Should the Aggrieved Party request assistance of an outside advocate, access to the Aggrieved Party personal files (if applicable) shall be granted only with the written authorization from the Aggrieved Party.

Step 3

Grievances that cannot be handled in Step 2 will be forwarded within five (5) working days to the SPC/Construction Supervisor by the CRO who will provide both the Grievance Collection Form and the Grievance Monitoring Form. A further root cause analysis should be done to identify the appropriate corrective action. The complainant will then be informed in writing of the decision to correct the action within a fourteen (14) working day period.

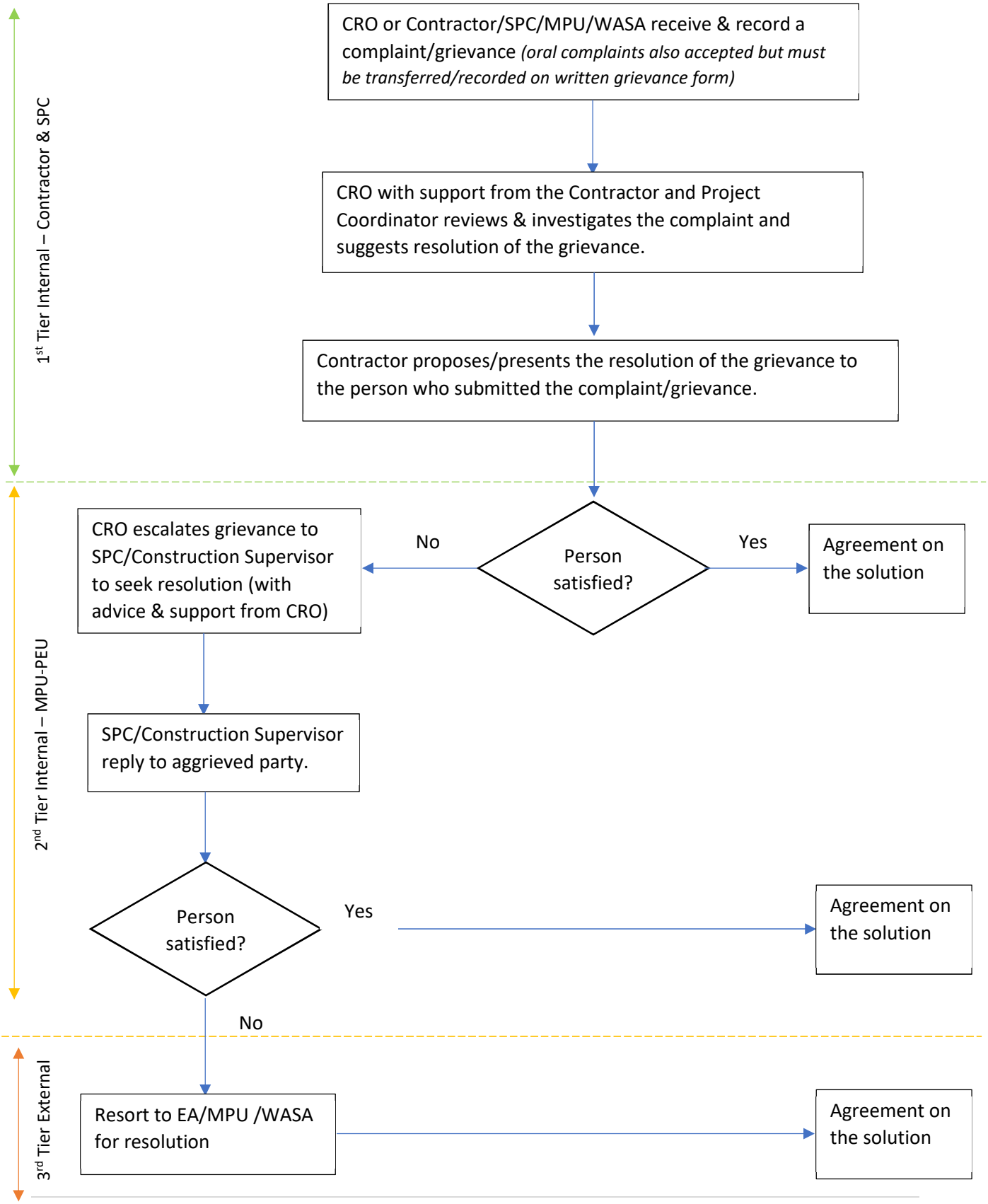
Step 4

If the aggrieved party does not feel that the grievance has been adequately addressed, they can escalate the grievance to the EA.

A. Such a request shall be made in writing and submitted to the EA within seven (7) days of receipt of the notice of the results of the grievance investigation from step 3.

B. The EA shall consider all available information related to the grievance and issue a written decision on the matter within twenty (21) working days of receipt of the reviewed request.
C. The EA's decision is final except where the Aggrieved Party chooses to access the dispute settlement process available in law.

Figure 1: Grievance Redress Process Flowchart



Appendix I – Grievance Collection Form

Grievance Collection Form
(Used by Stakeholder)

Case No. _____

Applicant's Name _____

Sex: [Male] [Female]

Age: _____

☐ I wish to submit complaint anonymously

☐ I demand that my personal details not be disclosed without my consent

Address:_____
_____

Telephone: _____

Email: _____

Description of Comment/Complaint: (Subject of case, when did it occur, location, who is involved, effects of situation)
_____
_____
_____
_____
_____

Date of Incident: _____

☐ One-time incident/complaint (date_____)

☐ Happened more than once (indicate how many times: _____)

☐ Ongoing (a currently existing problem)

According to the applicant, what measures would provide solution to the problem?
_____
_____
_____
_____

_____
_____

Signature: _____

Date: _____

Note: Please forward this form to:

Project Office - Executing Agency
Water and Sewerage Authority
Head Office: Farm Road, St. Joseph
Trinidad and Tobago
Telephone: _____
Email:_____

Appendix II – Grievance Monitoring Form

Grievance Monitoring Form

CASE #: _____

STATUS: Resolved ☐ Unresolved ☐

Applicant Name:	
Sex: ☐ Male ☐ Female ☐ Other	**Age:**
Address:	
Telephone:	**Email:**

Complaint

_____

_____

_____

_____

_____

_____

Root Cause Analysis

- *List all the possible contributing factors*
- *Identify most probable reason.*

_____

_____

_____

_____

_____

Corrective Action

_____

_____

_____

_____

_____

Preventive Action to prevent recurrence

_____

_____

_____

_____

_____

Annex H – Cultural Resources & Archaeological Finds Procedure

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Table of Contents

List of Acronyms

EA	Executing Agency
ESMP	Environmental & Social Management Plan
GPS	Global Positioning System
MPU	Ministry of Public Utilities
SPC	Special Purpose Company
WASA	Water & Sewerage Authority

1.0 Introduction

The following describes the procedures to be followed if, during the execution or implementation of the proposed project, any possible archaeological or cultural heritage artefacts are unearthed/discovered within the project site. These have been prepared in compliance with the National Trust of Trinidad and Tobago Act and the Bank's OP-703, B-9 directive on Cultural Heritage Sites.

While these projects do not convert or degrade critical natural habitats or cultural sites. Verification of presence of cultural resources was done from a desktop review of listed sites prepared by the National Trust of Trinidad and Tobago. Thus, in the likelihood of a chance find; this Procedure will form part of contractual document. The Contractor, Special Purpose Company (SPC) and Executing Agency will be responsible for the following measures to ensure the protection of any cultural/heritage resources during all phases of the project. Appropriate mitigation measures will be devised accordingly.

2.0 Procedures

2.1 Monitoring of earthmoving, excavation, and trenching activities regarding the identification of cultural resources

This section describes steps that will be taken in the event that burials, sacred sites, archaeological (e.g., prehistoric and historic), and paleontological resources are discovered during construction activities. These will be referred to as "cultural resources" or more simply "resources." Locations where these resources occur will be called "sites."

This Plan describes actions that will be taken in:

- Locations where construction activities will affect known resources; and,
- The event that previously undiscovered resources are identified during construction.

Furthermore, this section outlines:

- Responsibilities of the Contractor and Ministry of Public Utilities (MPU) personnel;
- Monitoring during construction;

Notification procedures to be following;

- Procedures for the rapid assessment of discovered resources; and,
- Contractor actions which may be required to minimize impacts to these resources

2.2 Cultural Resource Identification Work

Cultural resource surveys, evaluation of impact assessments, and mitigation of impact work will be completed as needed by the Executing Agency/MPU before and during construction phase utilising the support of a Cultural Heritage Specialist where necessary.

2.3 Government Agreements Related to Cultural Resources

In Trinidad and Tobago, the National Trust of Trinidad and Tobago Act, establishes The Trinidad and Tobago Archaeological Committee which is the authority in charge of protecting cultural properties in Trinidad and Tobago.

2.4 Required Permits/Notifications

The Contractor will provide sufficient notice of earthmoving operations to permit the Executing Agency or its contractor(s) to obtain any necessary permits/clearances from the National Trust of Trinidad and Tobago where required.

2.5 Confidentiality of Cultural Resource Site Locations

Contractor will withhold from disclosure to its general workforce or the public, information related to locations of sites. The exact locations of discovered cultural resources will be handled on a confidential basis in order to minimize the potential for the unauthorized collection of artifacts. All information regarding the location and nature of important sites will be handled on a need-to-know basis and provisions will be taken to limit access to these records. Exact locations of sites will not be released in any public documents without the express written consent of the Executing Agency.

2.6 Qualified Personnel to support management of cultural resources

2.6.1 Personnel Responsibilities

Overall responsibility for interfacing with the Executing Agency concerning the discovery of potentially important cultural resources and ensuring that timely notice is given and that appropriate field actions are implemented, shall be with the Special Purpose Company (SPC).

The SPC will develop coordinating procedures for Contractor's and subcontractor's in-field personnel to report the discovery of cultural resources to Executing Agency within a required 24 hours notification period. The SPC will also develop procedures for Contractor's and subcontractor's personnel to initiate an immediate work-around in the event that potentially important resources are discovered.

All personnel will receive introductory training concerning the importance and treatment of cultural resources as part of their orientation training. Since most cultural resources are discovered during clearing and grading, the Contractor will periodically reinforce the basic cultural resource sensitivity training that heavy equipment operators and on-site environmental monitors had previously received.

This will involve:

- Ensuring that cultural resource training is provided to all employees and subcontractors as part of the overall induction training program described in the ESMP;
- Ensuring that any known cultural resource site to be monitored is flagged and construction personnel notified as to its management/protection requirements;

- Having sufficient training and expertise to be able to recognize the range of cultural resources described in this section; and,
- Reporting any suspected and/or verified cultural resource finds to WASA in a timely manner such that the notification process can be completed within the required 24 hour time period.

Field-based personnel will be required to familiarize themselves with any training materials related to treatment of cultural properties prepared by Contractor. If appropriate, The Contractor may provide additional training to these individuals related to the identification of cultural resources, including pits, chipped stone stools, old pottery, etc.

2.7 Recording and Notification Procedure to follow in the event of an Archaeological Discovery

When cultural resources are identified during pipeline construction-related activities, the Contractor will follow the procedures outlined herein.

a. All construction activity in the vicinity of the find/feature/site will cease immediately (100 meter radius from centre of the find or an area encompassed by a 20 meter distance from the perimeter of the discovery.

b. Inform the SPC and Executing Agency's Environmental Specialist of the discovery.

c. The Executing Agency's Environmental Specialist will delineate the discovered find/ feature/ site area and record the find location. All remains are to be left in place.

d. The site must be secured to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remains, a night guard should be present until the responsible authority takes over.

e. The Executing Agency's Environmental Specialist would notify the responsible authorities, the Archaeology Centre and the Environmental Management Authority (within less than 48 hours) of the discovery.

f. Responsible authorities would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out.

g. An evaluation of the finding will be performed by the Archaeology Centre. The significance and importance of the findings will be assessed according to various criteria relevant to cultural heritage including aesthetic, historic, scientific or research, social and economic values.

h. Decision on how to handle the finding will be reached based on the above assessment and could include changes in the project layout (in case of finding an irrevocable remain of cultural or archaeological importance), conservation, preservation, restoration or salvage.

i. Implementation of the authority decision concerning the management of the finding.

j. Construction work could resume only when permission is given from the Environmental Management Authority on the advice of the Archaeology Centre after the decision concerning the safeguard of the heritage is fully executed.

In general, this may include sites with high densities of chipped stone artifacts, old pottery, and iron making remains. Treatment at sites of this type are usually completed after grubbing, clearing, and grading, providing grading is limited to the top 3-6 inches of soils. For Colonial / Recent Sites in current use a Cultural Heritage Impact Assessment in consultation with the respective traditional community in accordance with the Bank's OP-703.

Note: Although the upper levels of a site may date from colonial or recent times, lower levels of a site may be earlier, and should be assessed and treated as potentially important site types.

2.8 Collection of Artefacts

To the extent feasible, potentially important cultural resources will be left in place until they can be further evaluated. However, any artifact discovered of exceptional or unique importance, where in the best judgment of the Contractor, is likely to disappear following their discovery and recording in the field, may be collected. If necessary, as in the case of human burials, the bones will not be disturbed and a 24-hour guard will be posted until the Executing Agency is notified and directions given as to how to proceed. If an item is collected, the Contractor will complete (at a minimum) a 'Cultural Property Registration Form' (to be developed by the Contractor). The location of the find must be marked in such a manner that the location can be easily relocated to within 2 meters of its original location.

This may include marking with flagging tape, measuring the location to two or more fixed points using a triangulation method, etc. GPS coordinates should be obtained as well as a photo of the location of the find and an identifiable permanent feature or object in the background (if feasible).

If finds are collected by the Contractor, the Contractor will ensure that the finds are maintained in a secure repository until such time as they can be transferred to the Executing Agency.

2.9 Treatment of Human remains & Burials

If human skeletal material is identified, appropriate treatment procedures will be implemented, including:

- Determination of the antiquity and/or modern association of the remains - this may require consultation with a qualified professional;
- Payment of compensation, removal, and reburial of modern remains as determined through consultation with Local groups; and,
- Removal and analysis by qualified professionals if the remains are not of recent origin, and Local groups have expressed no interest in them.

2.10 Ownership of Artefacts

All archaeological and paleontological artifacts recovered are considered the property of the Government of Trinidad and Tobago. Unauthorized collection of artifacts on Project work sites will be strictly prohibited and disciplinary actions will be implemented to enforce this policy.

Annex I – Contractor Management Plan

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Table of Contents

List of Figures

List of Tables

List of Acronyms

CCP	Contractor Control Plan
CEC	Certificate of Environmental Clearance
CIPP	Contractor Implementation Plan & Procedures
CMP	Contractor Management Plan
EA	Executing Agency
EHS	Environmental Health & Safety
ESA	Environmental & Social Assessment
ESMP	Environmental & Social Management Plan
IDB	Inter-American Development Bank
KPI	Key Performance Indicator
MPU	Ministry of Public Utilities
OP	Operating Policy
PEU	Project Executing Unit
WASA	Water & Sewerage Authority

1.0 Introduction

1.1 Purpose & Scope

This document is intended to serve as a Contractors Management Plan (CMP) for the Projects under the Loan TT-L1055.

This CMP is intended to outline the relationship between the Executing Agency – Ministry of Public Utilities (MPU) – the Project Executing Unit (PEU) and the Contractors, and to describe how the overall contract will be managed inclusive of the Contractor management processes that will be implemented by the Project.

The overall purpose of the CMP is to:

- summarise the Contractors' and Subcontractors' engagement and management processes, procedures and systems used;
- define roles and responsibilities for the Implementing Agency and the Contractors and its Subcontractors, as well as the relationship and cooperation between all parties, with regards to all Project activities;
- outline the applicable Project Standards relevant to the Contractors and its Subcontractors;
- set out the processes to ensure the implementation, by the Contractors and its Subcontractors, of all requirements, project commitments, conditions, methods (work statement for the construction phases), and procedures applicable to them, intended to assure the execution of the Project;
- define training requirements;
- define monitoring and reporting procedures, including Key Performance Indicators (KPIs), to monitor the performance of the Contractors and its Subcontractors; and
- define intervention procedures, that is, the way MPU/PEU will liaise with the Contractors to sort out any issues, namely related with non-compliance and/or environmental and social performance.

Any subsequent changes to the Contractor Engagement processes may result in changes to this CMP.

1.2 Relationship to other Plans

The Projects under Loan TT-L1055 are subject to a number of environmental and social requirements in compliance with local legislation and policies, international treaties and IDB operating procedures. The comprehensive Environmental and Social Management Plans (ESMP) with framework approach developed by the IDB as well as the programmatic ESMPs developed by WASA are the parent documents utilized to manage these requirements.

Contractors will be required to design and develop site specific Contractor Control Implementation Plans (CIPPs) to align with the Control Plans contained in the ESMP. These CIPPs will demonstrate how the Contractor will meet the environmental and social requirements for the specific project.

1.3 Policies and Standards

All Contractors and any Subcontractors are subject to the conditions and obligation set out in the national legislative framework, international treaties, applicable IDB OPs, WASA requirements and best practices.

Section 3.0 of the Environmental & Social Assessment (ESA) provides a comprehensive listing of the legislative framework applicable to the Project with which the Contractor must comply.

2.0 Contractor Engagement & Management

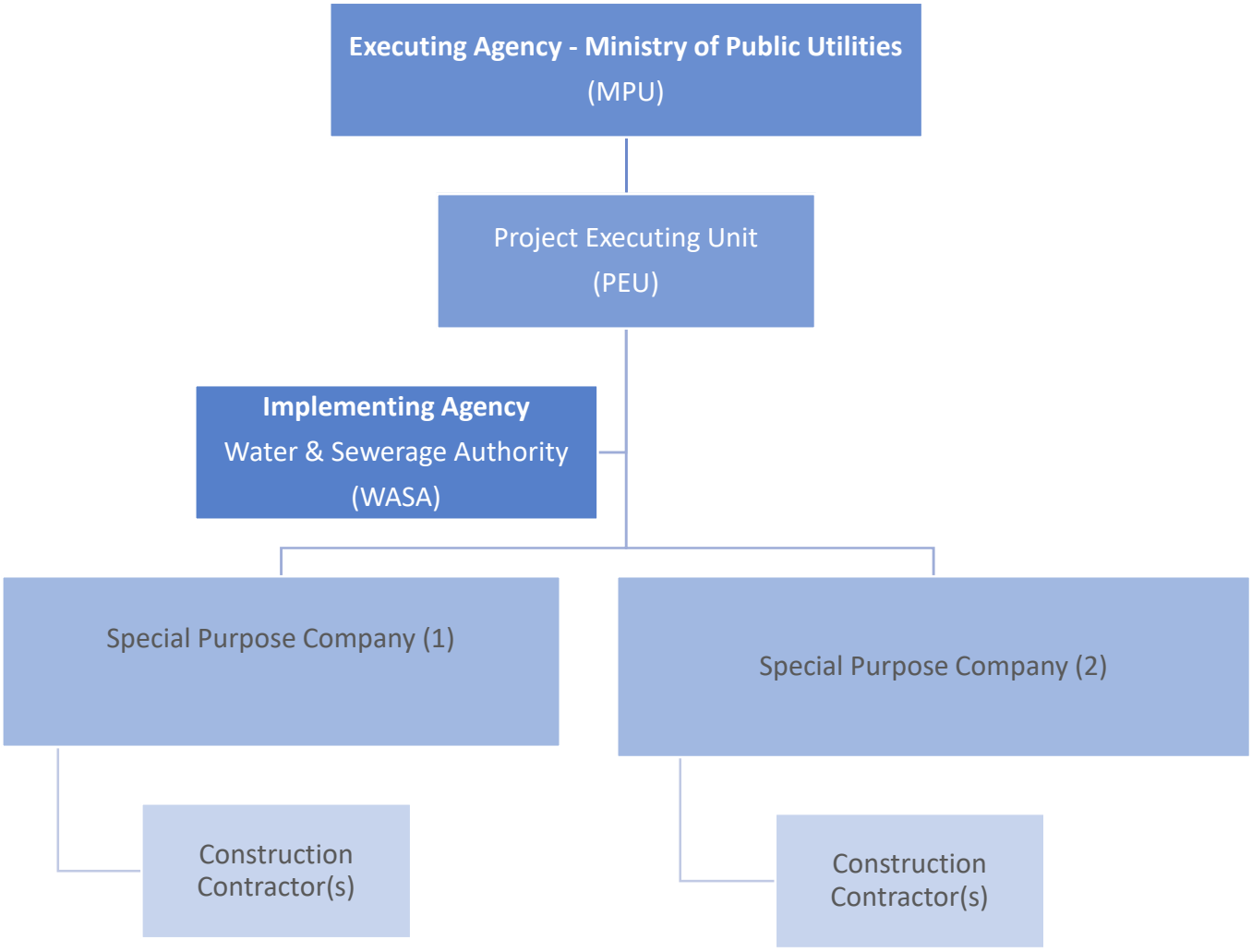
The approach to managing the Project will be based on the following guiding principles:

- MPU/WASA will establish on the bidding documents the conditions and obligation for Contractors;
- a contract will be drawn by the team, jointly with each Contractor taking responsibility for the services outlined in its areas of responsibility;
- effective channels of communications will be clearly defined and established within the contract document;
- each Contractor/Subcontractor will have its responsibilities and authority limits clearly defined in the contract;
- each Contractor will have its deliverables and execution time identified in the contract;
- each Contractor will have the services it is responsible for providing clearly identified and described in the contract;
- all constraints imposed on the Contractor will be clearly identify in the contract, including schedule and budget constraints;
- all environmental, social, health and safety and any cultural heritage constraints imposed on the Contractor will be clearly identify in the contract; -
- each Contractor will have requirements for quality clearly identified within the contract, including the requirement to allow independent quality inspections of materials and work processes;
- all products and services provided by the subcontractor (partners of Contractor) will be subject to the acceptance of MPU/WASA;
- each subcontract will contain appropriate terms and conditions;
- adequate facilities will be provided to meet the needs of the Contractors, and the Contractors will support subcontractors in processing invoices and payments, subject to the invoices being delivered in an acceptable format.
- To this end, MPU-PEU will establish format requirements for invoices in list of Standard Documents;
- the Contractors will be directly responsible for their part of the contract in relation with MPU-PEU, even for the subcontracted parts;
- the Contractors will be obliged to contract only with solvable and reliable subcontractors, and only with the written approval;
- the subcontractors will have no legal relation with MPU-PEU and MPU-PEU will have no obligation towards the subcontractors.
- The MPU-PEU is responsible, for project management, for control and monitoring activities regarding contractors' actions however, WASA has shared responsibility particularly for environmental, social, health and safety, and cultural heritage aspects of the project which are regulated by Certificates of Environmental Clearance (CECs) and any other approvals that have been issued specifically to WASA.

3.0 Roles & Responsibilities

Roles and responsibilities are explained in greater detail in Section 3.0 of the ESMP – Institutional Arrangements. The following diagram however presents a summary of the Institutional Arrangements.

Figure 1: Institutional Arrangements



3.1 Project Executing Unit

The Project Executing Unit (PEU) will be established and report on the Project to the Ministry of Public Utilities (MPU). It is expected to be comprised by persons with expertise in different aspects of project management so that the PEU can effectively operate to execute the project.

Specific responsibilities of PEU/EA will include: (i) preparation, implementation and coordination of the Annual Operating Plans (AOP); (ii) financial administration, Project accounting and preparation of budgets and disbursement requests; (iii) preparation of the Project's annual procurement plan, the procurement of works, goods and services; (iv) coordination of the preparation of technical reports and financial statements; (v) monitoring of the progress of Project activities, environmental and social safeguards compliance, and analysis of variances of actual results against plans; (vi) selection and hiring of the external audit and ensuring that the relevant recommendations are implemented; (vii) hiring of

consultants for the carrying out of external evaluations and ensuring that the recommendations are implemented; and (viii) serving as a liaison for the Project implementation with the IDB.

3.2 Special Purpose Company (SPC)

A firm will be retained in a contractual capacity in accordance with a specific Terms of Reference and approved tender and contractual procedure and shall perform as MPU's representative during the construction works – Special Purpose Company (SPC). The SPC will:

- Develop technical specifications and author technical memorandums and manuals to clarify and enhance the Contractor Control Plans recommendations or requirements to Contractor;
- Review Method Statements, including technical drawings and specifications for performance of special crossings works generated by Contractor.
- Coordinates with Contractor on proposed protection, stabilization, restoration, or re- vegetation efforts (e.g., erosion-control structures, water-body crossings, slope stabilization, seeding plans, etc.);
- Prepare E&S components for the periodic reports;
- Meet with local authorities to find cause and resolution of risks and/or damages to communities.
- Manage all sub consultants and contractors on the project team, directing the flow of information between the Contractors, MPU/PEU and WASA;
- Oversee/monitor the Contractor's management of the environmental, health and safety aspects of its work activities on a regular, on-going basis;
- Ensure that he has sufficient and competent resources to perform duties and responsibilities.

3.3 Contractor(s) & Sub-contractor(s)

The Construction Contractor will be responsible for all construction activities, communication, training, monitoring, and reporting associated with this Project. He will report directly to the SPC and will be responsible for the development of the final site-specific Plans, implementation, monitoring, and corrective actions. These documents shall demonstrate how the Contractors will meet the project's requirements and commitments applicable to them, outlined in the WASA ESMP documents. The Contractors will prepare these work plans in compliance with the Project's requirements. The Construction Contractors will then submit them to the MPU-PEU via the SPC, for approval of their detailed topic and/or activity-specific CIPPs.

Prior to commencement of activities, the Contractor has the responsibility to put together an efficient construction crew and the support staff as well as develop a Roles and Responsibilities matrix for his staff, to cover all aspects associated with the implementation, monitoring, and reporting. It is the Contractor's responsibility to supervise all the construction work during all stages of construction, update and effectively report to the Construction Supervisor.

These Contractors will be responsible for implementation of, and adherence to, all the mitigation measures.

Table 1 lists the topic and/or activity-specific CIPPs to be produced by the Contractors as a minimum.

Table 1: CIPPs to be produced by selected Contractors.

Management Plan	ESMP Reference
Waste Management Plan	Annex D
Traffic Management Plan	Annex C
Emergency Response Plan	Annex E
Health & Safety Plan	Annex F
Mitigation Plan	Section 4.0 of the ESMP
Monitoring Plan	Section 5.0 of the ESMP

4.0 Management & Mitigation

As stated in the ESMP with framework approach developed by the IDB for the Project, the Implementing Agency will ensure that the following measures are put in place to manage all contractors throughout the project:

- The Implementing Agency will provide the Contractors Management Plan with attributes for all parts, requirements to Contractors and also a Work Statement for the various phases of work including models for standard documents.
- The Contractor is expected to abide by this Contractors Management Plan.
- The Contractors will enter into a business partnership with the Implementing Agency after completing a successful tender process following the government procurement guidelines.
- Each contractor will have a legally binding, written contract that defines specific terms and conditions.
- The Contractor will provide the integrated solution for execution of the work phases, including the economic, environmental and social approach.
- The Contractor will abide by the management actions and mitigations measures provided in the Environmental and Social Management Plan associated with the project.
- The Contractors will present to the Implementing Agency, all the information for all subcontractors and the procedures for verification and validation services.
- Each Contractor will have a single point of contact to the Implementing Agency for contractual matters. The contact points, for each site, will monitor the activities.
- The Point of Contact will ensure compliance of the Project against the General Commitments Register. Weekly they will report about achievements and problems and the current situation to the Implementing Agency.
- Each Contractor/Subcontractor will identify the responsibilities and authorities of the Project staff. This information will be published in a project contact sheet and approved by the Implementing Agency.
- Each Contractor will have requirements for quality assurance clearly identified within the Statement of Work, including the requirement to allow independent quality inspections of materials and work processes;
- All products and services provided by the subcontractor (partners of Contractor) will be subject to the acceptance of the Implementing Agency;
- Each subcontract will contain appropriate terms and conditions;

- Adequate facilities will be provided to meet the needs of the Contractors, and the Contractors will support subcontractors in processing invoices and payments via standards and templates set by the Implementing Agency;
- The Contractor is responsible for project management, for control and monitoring activities regarding constructors' actions and has overall responsibility for environmental, social, health and safety, and cultural heritage aspects of the project.
- The Contractors will prepare work plans in compliance with the project's requirements and submit to the Implementing Agency for their Approval. These workplans should include site specific method statements for work in protected areas and sensitive habitats.
- Contractors must nominate the following employees:
  - representative for site coordination;
  - representatives for EHS responsibilities;
  - representatives for technical execution, budget, Project phases;
  - first aid competent person;
  - representative for waste management;
  - team for guarding the site; and
  - team responsible for intervention on accidental pollution events.
- Any changes in execution of work will be approved by the Implementing Agency.
- All Contractors are also required to comply with all relevant national regulatory requirements.
- Each week, the Contractors will prepare and deliver to the Implementing Agency a weekly progress report for each aspect of the work.
- Each week, the Contractors will prepare and deliver to the Implementing Agency weekly progress reports on environmental, social and health and safety performance including reports on the KPIs presented in the Environmental and Social Management Plan.

4.1 Monitoring Frequency

Weekly monitoring of the Contractor will be conducted during the Construction Phase. During the Operations Phase it is not anticipated that Contractors will be utilized, WASA personnel will be responsible for monitoring and maintenance of the Wells and associated transmission pipelines.

5.0 Reporting

5.1 Environment & Social Reporting

Each week, the Contractors will prepare and deliver to the SPC weekly progress reports on environmental, social and health and safety performance. The report will identify:

- performance against Key Performance Indicators (KPIs)
- incidents within the period and investigation findings
- planned activities
- a textual description of progress,
- a list of internal milestones attained,
- a brief description of any problems encountered

The weekly Reports will be reviewed by Contractors and the SPC.

5.2 Monthly Progress Reports

Once a month, the SPC unit will prepare a Progress Report for submission to the MPU-PEU and WASA. A copy will be provided to the Contractors. This report will present the progress of Project elements, expressed as a percentage complete, and an indication of whether the work is ahead of or behind schedule. Clear points of visibility into the work that the Contractors are doing is crucial to reducing the risk of inappropriate work being done resulting in unplanned, costly rework. These points of visibility are established at regular periodic intervals and at key project milestones.

5.3 Contractor Issues Meetings

Every two weeks, the SPC Project Manager or his representative will meet with delegates of the Contractor organizations to discuss issues of concern to either party. The Contractors delegate shall be a senior or intermediate employee of the Contractor, who is not directly involved in the delivery of the Project products or services. The purpose of these meetings is to facilitate the project and to remove any roadblocks to success.

5.4 Milestone Reviews

At key contractual milestones, a formal review will be conducted to provide visibility into the direction of the project to all parties. Topics covered depend on the milestone, but could include such items as:

- where we are in the overall project schedule;
- an overview presentation of the key points contained in the project deliverables that comprise that milestone;
- a briefing on the quality of work achieved to date;
- a briefing on the budget and schedule status with major variances clearly highlighted and plans for corrective action presented; and
- a briefing on the current configuration status (baseline status, status of approved baseline change requests, etc.).

6.0 Acceptance Process

6.1 Acceptance by the SPC

All products and services provided by the Contractors including the reports and information relating environmental and social and health and safety issues will be subject to approval by SPC. However, issues that are directly related to CEC requirements must also be reviewed by WASA.

6.2 Quality Assurance Review

SPC Quality Assurance staff will review all Contractors deliverables for adherence to content requirements and standards. The evaluation report prepared by the Quality Assurance staff will identify any significant deficiencies that would preclude the acceptance of the deliverable. Each identified deficiency must be addressed to the satisfaction of the Quality Assurance staff. The Quality Assurance staff will indicate their satisfaction in writing to the SPC Project Management.

6.3 Deliverable Acceptance

The Contractor is to prepare a Deliverable Acceptance Form and submit it with the deliverable. When the deliverable is deemed to be acceptable by the SPC, MPU-PEU and WASA (including Quality Assurance staff), the Deliverable Acceptance Form will be signed by the MPU.

7.0 Key Performance Indicators (KPI)

The following KPIs in the Table below have been selected in order to evaluate the effectiveness of the contractor management process.

Table 2: Key Performance Indicators

KPI	How it will be monitored/measured	Responsibility
Weekly Report on achievements and problems	Review and inspection of documentation	Contractor. Results to be presented to the SPC, PEU
Reports on quality inspections	Quality inspections of materials and work processes	Contractor. Results to be presented to the SPC, PEU and WASA
Weekly progress reports on each aspect of the work	Review and inspection of documentation	Contractor. Results to be presented to the SPC, PEU
Weekly progress reports on environmental, social and health and safety performance	Review and inspection of documentation	Contractor. Results to be presented to the SPC, PEU and WASA
Work plan	Review and inspection of documentation	Contractor. Results to be presented to the SPC, PEU

Annex J – Corrective Action Plan

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Table of Contents

List of Acronyms

CAP	Corrective Action Plan
CAR	Corrective Action Report
CCP	Contractor Control Plan
CEC	Certificate of Environmental clearance
CIPP	Contractor Implementation Plan and Procedures
EMA	Environmental Management Authority
ESMP	Environmental & Social Management Plan
ETR	Environmental Technical Report
FO	Field Observation
HSE	Health, Safety & Environment
IDB	Inter-American Development Bank
MPU	Ministry of Public Utilities
NCR	Non-compliance Report
PEU	Project Executing Unit
SPC	Special Purpose Company
TWSR	Temporary Work Stoppage Report
WASA	Water & Sewerage Authority
WIN	Work Improvement Notice

1.0 Introduction

1.1 Purpose

This Environmental & Social Compliance Assurance and Corrective Action Plan serves to identify the means by which WASA will verify that the Contractor is meeting the goals, objectives and expected performance criteria identified in the Environmental & Social Management Plan. The Contractor is expected to develop a Contractor Implementation Plan and Procedures (CIPP) document based on this Control Plan (CCP) including inspection/audit forms and protocols to be used and demonstrate compliance with all aspects of this Plan.

1.2 Scope

The Plan shall be utilized to assess the performance of all environmental and social activities throughout the construction phase of the Project.

2.0 Assurance Methods

2.1 Special Purpose Company (SPC)

The Special Purpose Company will exercise oversight of the Project and ensure that the Contractor is implementing the Contractor Implementing Project Plans. The SPC is required to present a Monthly Environmental Technical Report (ETR). This report shall summarize any compliance monitoring and incidental investigations as it pertains to the following environmental aspects:

- Air quality monitoring inclusive of black smoke, exhaust emissions and odors;
- Traffic – damage to infrastructure, soiling of roads and complaints;
- Biological – flora as it applies to dust deposition, disturbed vegetation and hazardous material spills
- Health & Safety
- Soil and Land – erosion control & sediment retention and turbidity
- Summary of Audits conducted
- Incident investigation reports

The ETR is also expected to summarize the results of water quality monitoring, air quality monitoring and noise monitoring reports (submitted as individual reports).

Additionally, a report on all non-compliances, status of corrective action taken and outcomes of corrective actions must also be included in the ETR. All updates and accepted changes to approved Contractor Implementation Plans and Procedures (CIPP) must also be highlighted in the ETR.

Where information contained in the ETR is deemed unsatisfactory it will be flagged by the Ministry of Public Utilities - Project Executing Unit for “Action” by the SPC. This “Action” may be (a) the supply of further information or clarification of information submitted or (b) the need to change/modify a method/procedure used by the Contractor. The SPC will be required to consult with the Contractor to generate an appropriate response/solution which will be submitted to the PEU in an out-of-cycle report. Where a modification is requested, if satisfied with the proposals contained in the out-of-cycle report, the Contractor will be required to officially change the CIPP.

2.2 Contractor Monitoring & Self Audits

The selected Contractor will be required to conduct:

a) Daily checks/assurance monitoring of site equipment, machinery, performance of mitigation measures
b) Self audits – of policies, procedures, documents, processes etc
c) Audits of any sub-contractors

The results of which will be submitted to the MPU PEU for review via the SPC.

2.2.1 Daily checks/assurance monitoring

Daily checks/assurance monitoring is an important element of the overall Contractor assurance monitoring to verify implementation of the agreed mitigation measures and provide information on their effectiveness. It will be conducted by appropriately qualified/certified Contractor HSE personnel and where mitigation measures are not effective or appropriate to a given situation, they will be reviewed, and alternative strategies suggested. Suggestions will be submitted to the Contractor, who in consultation with the SPC will discuss its appropriateness. Before any changes can be implemented however, these changes will have to be submitted to MPU-PEU.

Daily checks/assurance monitoring will generate tangible evidence to demonstrate whether Project commitments are being met effectively, i.e. are avoiding and minimizing environmental and social impacts as intended, or where work practices require revision. Specific objectives of the Daily checks can be summarized as follows:

- Ensure timely completion and review of the Contractors Environmental and Social Implementation Plans and Procedures, and Contractor Method Statements, as required.
- Verify Contractor's performance in implementing commitments for effective avoidance or mitigation of impacts.
- Determine whether mitigation measures or avoidance controls are adequate.
- Identify effective corrective actions should mitigation measures or avoidance controls do not deliver the anticipated level of performance.
- Identify whether additional mitigation measures or avoidance controls are required to manage unexpected impacts.

Contractor HSE personnel (environmental supervisors and field technicians) will provide descriptions of field conditions and processes, at work fronts, pipeyards, waste management areas, and their construction support sites and access roads (if needed). Additionally, they will provide a useful method of checking housekeeping practices and basic standards of compliance. The Contractor HSE personnel shall complete daily reports to record findings, **see section 3.0 - Non-Compliance Reporting.** The reports provide a formal link between the field and MPU-PEU.

2.2.2 Self-Audits

Being in compliance with the requirements of the ESMP (CEC, IDB requirements etc.) is an ongoing task and challenge. As such, the Contractor will be required to conduct self-audits of CIPPs, procedures and policies, documentation and records, reporting and processes employed to ensure that work is conducted in compliance and that any non-conformances are detected, and once detected, addressed in a timely

manner. It is recommended that these self-audits be conducted on a quarterly basis (specific interval determined by the duration of the Project). The results of self-audits conducted by the Contractor will be forwarded to the SPC for inclusion in the ETR.

2.2.3 Assessments of Sub-contractors

The Contractor will also be required to conduct audits of all sub-contracted firms to ensure that they comply with the CEC and ESMP requirements. Assessment checklists used for this purpose must be reviewed and approved by the SPC to ensure that they are robust and thorough.

2.3 MPU-PEU Inspections of the Contractor(s)

2.3.1 Monthly Inspections

Monthly Inspections will be performed in the form of a site walk-around, observing conditions and identifying non-compliances utilizing a standard inspection sheet for each area inspected. The Environmental Specialist (MPU and/or WASA) shall lead the inspections and shall be accompanied by Contractor personnel to obtain the benefits of a "One Team Approach". An example of an Inspection Checklist for a Pipeline Project, Well Project and Water Treatment Plant project is attached in **Annex 1**.

Non-compliances will be itemized on the inspection sheet. Contractor HSE Personnel will identify appropriate corrective actions for agreement with the MPU/WASA Environmental Specialist. Topics to be covered by the inspections may include all of the following that are applicable to the Project:

- Erosion Control
- Sedimentation & Stormwater
- Waste management (hazardous and non-hazardous) – excavated materials, drill cuttings and drilling muds, general construction wastes etc;
- Hazardous Material Storage inclusive of chemical storage, oil and lubricant storage;
- Fuel supply, storage and vehicle refilling operations;
- Stockpile and non hazardous material storage
- Spill response equipment;
- Vehicle maintenance;
- Housekeeping;
- Community Health & Safety protection
- Noise and dust; etc.

Before performing an inspection at a particular site, the previous inspection report for that area will be reviewed for any outstanding items or actions.

2.3.1.1 Inspection Procedure

The Inspection team leader will conduct the inspection and ensure the following activities as a minimum are completed:

- Development of an inspection and assessment protocol and form
- Convene the inspection opening meeting
- Instruct inspection team members on their areas of responsibility during the inspection

- Review all inspection findings
- Hold the closing meeting
- Raise appropriate non compliance reports
- Issue the inspection report
- Follow up to close out of all findings

MPU-PEU and/or WASA shall, to the extent feasible, provide the Contractor with a 14-day notice of all upcoming internal inspections to ensure that all appropriate staff available for the process and all associated documentation and monitoring records are readily available.

2.3.1.2 Inspection compliance

If non-compliances are identified during the inspections, they must be closed out by performing the following actions:

- Documented evidence closing out the non-compliance
- Follow-up inspection confirming non-compliances are closed out

MPU-PEU and or WASA team leader will specify the method for non-compliance close out at the closing meeting. If after receiving the documentary evidence of the close out, the inspection leader is not satisfied a follow-up audit should be scheduled.

As a result of the inspection findings, the inspection team leader can reschedule the next periodic inspection by increasing or decreasing its frequency, dependant on the findings. The inspection schedule will be updated as required.

2.3.1.3 Inspection Reports

Each inspection carried out will be documented in the form of a written report. This will include all identified non-compliances and observations. Where good practices are observed these will also be recorded. All inspection reports will be retained by MPU-PEU and WASA E&RC Department for the length of the construction phase (Certificates of Environmental Clearance [CECs] has been issued to WASA; these records must be kept in compliance with CEC requirements and produced upon request from the Environmental Management Authority [EMA]).

2.4 Third-Party Inspections & Audits

Third party audits of the Project will also be conducted, including the following:

- Audits by regulators (e.g. EMA) to check compliance with Project approval conditions. These may be undertaken by appropriately qualified third party auditors, approved by and acting on behalf of the Regulatory Agency
- The Lender (Project Financing) Group, will undertake periodic environmental and social audits of Project activities and work sites. Such audits will be undertaken in accordance with a predetermined protocol to be agreed with MPU-PEU.

3.0 Non-compliance Reporting

The MPU-PEU Environmental Specialist and other WASA HSE personnel shall utilize the Non-Conformance and Corrective Action (NCR/CAR) Procedure for recording and reporting of all non-compliant situations. It is expected that the Contractor will adopt the same or similar procedure to be used during Contractor Self-Audits, Sub-Contractor Audits and Daily Checks/Assurance Monitoring.

Checks/Assurance monitoring personnel will characterize deficiencies according to their hierarchical degree of severity:

Level 1

- Corrective Action Requests (CAR)
- Non-Conformance Reports (NCR)
- Temporary Work Suspension Reports (TWSR)

Level 2

- Work Improvement Notices (WIN)
- Field Observations (FO)

Level 1 deficiencies are considered as needing immediate attention and/or requiring moderate to significant resources to address e.g. TWSR issued for work being conducted within 100m radius from an archaeological find; NCR issued for single employee working unsupervised in a trench; CAR issued for leaking fuel containers stored on pervious/grassy surface , while level 2 deficiencies are less immediate and can be addressed requiring minimum resources e.g. FO for personnel not wearing PPE in a Mandatory Zone; WIN for sediment traps that require maintenance.

Non-compliances will be recorded in printed files and also stored in an electronic database/filing system. NCR should, at a minimum, record a description, location, date identified, originator, source, responsible person, target completion date, status, lessons learnt and priority. Links to photographic evidence of non-compliances will also be provided as well as to any complaints received from stakeholders with regards to this particular non-compliance and any resolutions arrived at to address the stakeholders concern (if different from corrective action required).

All new and outstanding non-compliances will be discussed during the regularly scheduled construction progress meetings.

4.0 Corrective Actions

A corrective action is a term that encompasses the process of reacting to product problems, stakeholder complaints or other nonconformities and fixing them. The process includes:

- Reviewing and defining the problem or nonconformity
- Finding the cause of the problem
- Developing an action plan to correct the problem and prevent a recurrence

- Implementing the plan
- Evaluating the effectiveness of the correction.

It is expected that the Contractor will follow a similar process to implement corrective actions.

4.1 Corrective Actions Procedure

Implementing an effective corrective action capable of satisfying compliance assurance and regulatory documentation requirements is accomplished in seven basic steps:

1. The ***Identification*** of the problem, nonconformity, or incident or the potential problem, nonconformity, or incident.
2. An ***Evaluation*** of the magnitude of the problem and potential impact on the company.
3. The development of an ***Investigation*** procedure with assignments of responsibility.
4. Performing a thorough ***Analysis*** of the problem with appropriate documentation
5. Creating an ***Action Plan*** listing all the tasks that must be completed to correct and/or prevent the problem.
6. The ***Implementation*** the plan.
7. A thorough ***Follow up*** with verification of the completion of all tasks, and an assessment of the appropriateness and effectiveness of the actions taken

4.1.1 Identification

The initial step in the process is to clearly define the problem. It is important to accurately and completely describe the situation as it exists now. This should include the source of the information, a detailed explanation of the problem, the available evidence that a problem exists.

Report Source

The specific origin of the information that initiated this action is recorded. Documenting the source of the information can be very useful when conducting an investigation into the problem and implementing the action plan that is created. It will also provide data for evaluating the effectiveness of the quality system and facilitate communicating the completion of the action to the appropriate individuals or departments.

This information may come from many possible sources. For example, situations that require corrective actions may come from external sources such as customer concerns or service requests. Internal quality audits, staff observations, quality assurance inspections, trending data, and management review are all examples of possible internal sources of information.

Other sources are possible and will depend on the circumstances.

Explanation of the Problem

A complete description of the problem is written. The description should be concise but must contain sufficient information to assure that the problem can be easily understood from reading the explanation.

Evidence

List the specific information available that demonstrates that the problem does exist.

4.1.2 Evaluation

The situation that has been described and documented in the "Identification" section should now be evaluated to determine first, the need for action and then the level of action required. The potential impact of the problem and the actual risks to the company and/or customers must be determined. Essentially, the reasons that this problem is a concern must be documented.

Potential Impact

Part of the evaluation is a specific explanation of specifically why the problem is a concern. This may include the possible impact that the problem may have in terms of costs, function, product quality, safety, reliability, and customer satisfaction.

Assessment of Risk

Using the result of the impact evaluation, the seriousness of the problem is assessed. The level of risk that is associated with the problem may affect the actions that are taken. For example, a problem that presents a serious risk to the function or safety of equipment may be assigned a high priority and require immediate remedial action. On the other hand, an observation that a particular machine is experiencing an increasing level of downtime each month may have a lower priority.

Remedial Action

Based on the outcome of the impact and risk evaluations above, it may be determined that immediate remedial action is required to remedy the situation until a thorough investigation and a permanent solution is implemented. If remedial actions are necessary, the actions and the resources required should be listed. The steps that must be taken immediately to avoid any further adverse effects should be explained.

The actions that are taken should be documented. This documentation will become part of the 'Action Implementation' and 'Follow Up' sections of the CAP action.

In some instances it may be determined that the remedial action is all that is needed. In that case, a rationale is written for that decision, appropriate follow up is done (see Follow Up section), and the CAP closed out.

4.1.3 Investigation

In this step of the process a procedure is written for conducting an investigation into the problem. A written plan helps assure that the investigation is complete and nothing is missed. The procedure should include: an objective for the actions that will be taken, the procedure to be followed, the personnel that will be responsible, and any other anticipated resources needed.

Objective

The first step in the investigation is to state an objective for the action. In the "Identification" section the problem was defined and the current situation stated. The objective is a statement of the desired outcome of the corrective action. State what the situation will be when the action is complete. This may be a statement in the form of: "the problem will be corrected, all effects of the problem identified and rectified, and controls will be in place to prevent the situation from happening again."

Investigation Procedure

A set of specific instructions are created that outline what must be done to determine the contributing and root cause of the problem. The investigation procedure will vary depending on the circumstances but must incorporate a comprehensive review and analysis of all of the circumstances related to the problem. Consider equipment, materials, personnel, procedures, design, training, software, and external factors.

Responsibilities & Resources

An important part of the investigation procedure is to assign responsibility for conducting each aspect of the investigation. Any additional resources that may be required is also identified and documented. For example, specific testing equipment or external analysis may be required.

4.1.4 Analysis

The goal of this analysis is primarily to determine the root cause of the problem described, but any contributing causes are also identified. This process involves collecting relevant data, investigating all possible causes, and using the information available to determine the cause of the problem. It is very important to distinguish between the observed symptoms of a problem and the fundamental (root) cause of the problem.

Possible Causes/Data Collection

A list of all possible causes is created. This will form the basis for collecting relevant information, test data, etc. By considering all possible causes, appropriate information and data can be collected that will be ultimately be used to determine the root cause of the problem.

Results & Data

The results of the data collection are documented and organized. The resulting documentation should be complete and address all of the possible causes that were previously determined. This information is used to determine the root cause of the problem.

Root Cause Analysis

Determining the root cause often requires answering a series of 'why?' questions and digging deep into the situation until the fundamental reason for the problem is found. The root cause of the problem is documented. This will be essential for determining the appropriate corrective and/or preventive actions that must be taken.

4.1.5 Action Plan

By using the results from the Analysis, the optimum method for correcting the situation (or preventing a future occurrence) is determined and an action plan developed. The plan should include, as appropriate: the items to be completed, document changes, any process, procedure, or system changes required, employee training, and any monitors or controls necessary to prevent the problem or a recurrence of the problem. The action plan should also identify the person or persons responsible for completing each task.

Actions to be completed

List all of the activities and tasks that must be accomplished to either correct the existing problem or eliminate a potential problem. For a CAP program to be effective, it is very important to take a very global approach. Make sure to identify all actions that will be required to address everything related to the situation.

Document or Specification changes

List any documents that will be modified and describe in general terms what the modifications will be.

Process, Procedure, or System changes

If any changes to processes, procedures, or systems must be made they should be described. Enough detail should be included so that it is clearly understood what must be done. The expected outcome of these changes should also be explained.

Employee Training

Employee training is an essential part of any change that is made and should be part of the action plan. To assure that the actions taken will be effective, any modifications made to documents, processes, etc. must be effectively communicated to all persons or departments that will be affected.

4.1.6 Action Implementation

The corrective action plan that has been created is now implemented. All of the required tasks listed and described in the action plan are initiated, completed, and documented.

Implementation Summary

All of the activities that have been completed as required in the "Action Plan" should be listed and summarized. This section should contain a complete record of the actions that were taken to correct the problem and assure that it will not recur. This includes changes, preventive measures, process controls, training, etc.

Documentation

All documents or other specifications that have been modified are listed. Typically the documentation would be attached to a final printed report of this CAP action. This will facilitate verification of the changes for the follow up.

4.1.7 Follow-Up

One of the most fundamental steps in the CAP process is an evaluation of the actions that were taken. Several key questions must be answered:

i. Have all of the objectives of this CAP been met? (Did the actions correct the problem and are there assurances that the same situation will not happen again?)
ii. Have all recommended changes been completed and verified.

iii. Has appropriate communications and training been implemented to assure that all relevant employees understand the situation and the changes that have been made?

iv. Is there any chance that the actions taken may have had any additional adverse effect on the product or service?

Verification Results

The implementation and completion of all changes, controls, training, etc. must be verified. The evidence that this has been done must be recorded. Appropriate information should be recorded to document that all actions have been completed successfully.

Results / Effectiveness of the Actions

Another important aspect of any CAP action is to make sure that the actions taken were effective. A thorough evaluation must be done to make sure that the root cause of the problem has been solved, that any resulting secondary situations have been corrected, that proper controls have been established, and that adequate monitoring of the situation is in place. This evaluation must also include an investigation to determine if the actions taken could result in any other adverse effects. This investigation and the results should be documented.

Annex 1 – Inspection Checklist Example

Note: The following forms are designed for general use and may not be exhaustive; each project component type (Well, WTP, pipeline) will have its own Inspection Checklist with each specific Project having a slightly modified version of the checklist based on site specific requirements that may have been identified by WASA or by the EMA in the CEC. These modifications and additions may be necessary to suit individual project sites and to address specific environmental issues and associated mitigation measures. The forms in this Annex will require additional modifications and serve as examples of inspection forms per Project Type. (bold font – CEC requirement; italic font – best practices requirements of the Authority/industry)

Environmental Audit Checklist – Pipeline Projects

Project :		Site Location :	
Construction stage / status during inspection :		Inspection No.:	
Inspection Date :		Inspection Time :	
Inspected by :		Weather :	

	Environmental Component	Assign as follows			
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	**Comments**
	TRAFFIC MANAGEMENT				
1.	*Have residents of the area or users of the roads lodged any complaints with regards to traffic delays created by the project?*				
2.	*Have alternative routes been clearly demarcated?*				
3.	*Does the project create unnecessary traffic?*				
4.	*Are the most disruptive activities scheduled for off peak hours and weekends?*				
5.	*Are there members of the national police or WASA officials involved in directing traffic on the major roadways particularly during peak traffic hours?*				
6.	*Is there a designated area to park trucks and equipment so that they do not obstruct the flow of traffic?*				
7.	*Are open trenches clearly labeled?*				
8.	*Has the public been notified via the newspapers, radio or other media of the works being conducted?*				
9.	*Is adequate signage available on-site?*				
	AIR POLLUTION/DUST CONTROL				
10.	**Stockpiled aggregates are maintained in a damp condition especially during periods of dry conditions.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
11.	**No excessive application of water so as to reduce the potential for the generation of turbid run-off.**				
12.	**Stockpiles located downwind of sensitive receptors**				
13.	**Adoption of a speed limit for vehicles on unpaved surfaces within the construction zone**				
14.	**No use of ozone depleting chemicals – aerosol, fumigants, foams etc.**				
15.	*Have residents of the area lodged complaints with regards to dust generated by the pipelaying activities? If yes, how many complaints have been received?*				
16.	*Measures have been implemented on-site to reduce dust generation such as:* ▪ *Frequent wetting of exposed surfaces;* ▪ *Frequent wetting of roads;* ▪ *Covering of stockpiles of materials;* ▪ *Covering of exposed/excavated/un-vegetated surfaces* ▪ *Other*				
17.	*Are vehicles/equipment serviced and inspected regularly to ensure that they are in good working order?*				
18.	*Vehicles do not generate black smoke and other offensive/noxious vehicular emissions for the duration of their operation.*				
19.	*Materials transported to and from the jobsite securely covered to minimize spills while in transit*				
20.	*Current dust control measures are sufficient to mitigate the impacts of dust.*				
	SOLID WASTE MANAGEMENT				
21.	**Uncontaminated excavated material removed for infrastructural works are stockpiled and reused to the extent practical, for backfilling and landscaping on-site.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
22.	**Un-used excess excavated material is removed from the site for disposal at an appropriate facility operated by the relevant Municipal Corporation.**				
23.	**At the end of construction, the project site is cleared of all scrap material and debris.**				
24.	**Washings from premix concrete trucks are not discharged into any municipal drains or watercourses.**				
25.	**Non-hazardous solid waste such as domestic garbage is collected, sorted and disposed of at an appropriate landfill.**				
26.	**Non-hazardous construction material is collected, stored and disposed of at an appropriate site/landfill.**				
27.	**Hazardous wastes such as lead-acid batteries, waste chemicals, used oils are segregated from non-hazardous wastes.**				
28.	**Hazardous wastes are stored securely and disposed of by persons with appropriate licenses, permits and training to do so.**				
29.	**Contaminated materials and substances generated from spill response are handled as hazardous waste.**				
30.	**Partially used or un-used chemicals and their containers are stored in accordance with the MSDS and returned to the supplier for recovery or disposal.**				
31.	**Records for disposal, removal or remediation of hazardous waste are kept on file.**				
32.	**All process fluids, chemicals and wastes are stored within secondary containment. SDS for chemicals are available on-site.**				
33.	**Spill Response Kit is readily accessible on-site with suitable sorbents and related supplies.**				
34.	**Leaks and spills in excess of 10L treated as hazardous materials**				
35.	*Have workers been educated/informed on proper disposal of wastes i.e. to avoid indiscriminate dumping of refuse?*				
36.	*No burning of trash, removed vegetation, construction wastes etc. on-site.*				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
37.	*There are designated collection containers for non-hazardous wastes generated on-site.*				
38.	*These containers are appropriately sized equipped with covers and emptied on a regular basis to avoid littering of the ground by scavengers?*				
39.	*All used oil drums, lubricant containers and bitumen drums are stored in a secured site for removal and disposal by an appropriate contractor. (See similar item under Water Pollution) As these drums contain contaminants, the Authority advises against washing these drums on-site as it may lead to water pollution.*				
40.	*Portable toilets are maintained in good working condition by the Contractor.*				
41.	*Have there been any major spills of oils, fuels etc. that have resulted in the contamination of soils?*				
	NOISE POLLUTION				
42.	**Works confined to the period between the hours of 7:00 am and 11:00 pm of the same day**				
43.	**Noise Variation obtained before proceeding with any activities that may exceed the levels as stipulated in the NPCR.**				
44.	**Tools, equipment and machinery fitted with noise emission control systems where applicable.**				
45.	*Have residents in the area lodged complaints about noise generated from the pipelaying activity? If yes, how many complaints have been received?*				
46.	*Have any specific actions been taken to reduce the noise generated by the aforementioned activities?*				
	WATER POLLUTION				
47.	**Equipment, aggregate and other raw materials are stored on-site in specially designated areas and not along public roadways.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
48.	**Area allocated for the storage of aggregates is bermed and places at a location where there is minimal impact on any municipal drain or natural watercourse**				
49.	**Sediment retention measures such as sediment sieves or silt traps on drains exiting the site are utilized.**				
50.	**Stockpiles of erodible material are protected using geotextiles and or geo-membrane materials**				
51.	**Weekly inspection of sediment retention measures and within 24-hours following periods of intense rainfall.**				
52.	**Records of inspection of sediment retention measures kept on file.**				
53.	**Hydrostatic test water is released at a controlled rate so as to not cause erosion and or flooding of the receiving drainage system.**				
54.	**Hydrostatic test water is treated/neutralized to comply with the permissible levels of the Second Schedule of the WPR, 2019.**				
55.	*There is a special area designated for the refueling of vehicles?*				
56.	*Are there signs of fuel and oil spillages in and around the site?*				
57.	*Are there any leaking equipment, tools, and vehicles operating on-site?*				
58.	*Are leaking equipment and vehicles immediately (within a reasonable time frame e.g.: by end of the workday) taken out of operation and moved off-site for repairs?*				
59.	*Are hydraulic oils, bitumen paints as well as empty containers/drums etc. stored on-site? If yes, what storage arrangements exist for these items?*				
60.	*Are excavated materials reasonably stored away from drainages lines and other natural waterways or areas where they cannot easily enter a nearby water course?*				
61.	*Are there signs of sediment moving offsite into nearby drains or watercourses?*				
	PUBLIC HEALTH & SAFETY				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
62.	**Visible warning signs, hazard notices, exclusion areas (preventing unauthorized entry) are posted**				
63.	**Lighting measures to illuminate hazards and warning signs are utilized (as needed)**				
64.	**Construction hoardings and or fences consistent with the nature of the site are utilized**				
65.	**Trench walls are sloped and shoring provided in accordance with good engineering technique**				
66.	**Pipeline trench backfilled immediately following the conclusion of pipelaying activities**				
67.	**Legible warning signs, lights/reflectors placed where there are open trenches**				
68.	**Excavated materials not stored at the edge of trenches to minimize instability and risk of cave-ins**				
69.	**Trench walls inspected immediately after rainfall events to determine if maintenance or additional stabilizing systems or protection is needed**				
	PUBLIC ENGAGEMENT/GENERAL CONCERNS				
70.	**Activities coordinated with other entities and utilities that operate in the area**				
71.	**Community Relations Officer responsible for interacting with stakeholder e.g. residents has been designated**				
72.	**Affected stakeholders notified at least 5 days prior to the commencement of works**				
73.	**EMA notified at least 10 working days prior to the start of works**				
74.	**Lighting system designed/installed in such a manner so as to not adversely affect residents or sensitive flora and fauna in the area**				
75.	**Any archaeological materials or other evidence of past human habitation is reported to the relevant authorities as applicable.**				
76.	*The construction zone is clearly demarcated*				
77.	*All personnel in the construction zone wear appropriate PPE*				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
78.	*There are signs informing the public of the work taking place e.g. Agency undertaking the project, name of the project etc.*				
79.	*The site is washed/swept at the end of the workday.*				
80.	*The site looks tidy and well maintained.*				
81.	*The vehicles look tidy and well maintained.*				
82.	*Residents' access to their property is not adversely affected.*				

0= needs immediate attention

Total NA		
Total Score (1's)		
Total Score (2's)	+	__ (x2= ___)
Final Score	=	
Highest Possible Score	÷	126
	=	
	x	100
% Compliance	**=**	

Environmental Audit Checklist – Well Projects

Project :		Site Location :	
Construction stage / status during inspection :		Inspection No.:	
Inspection Date :		Inspection Time :	
Inspected by :		Weather :	

	Environmental Component	Assign as follows			
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	**Comments**
	WATER				
1.	**A minimum setback distance of 25m from natural watercourses**				
2.	**Areas not unnecessarily and cleared areas immediately re-vegetated/landscaped after serving the purpose for being cleared**				
3.	**Equipment, aggregate and other raw materials are stored on-site in specially designated areas and not along public roadways.**				
4.	**Ensure that approach roads are kept clear of mud, debris, gravel and other materials**				
5.	**Installation of stone-stabilised pad or temporary gravel entrance**				
6.	**Drainage system designed and maintained to minimize unnecessary accumulation of water on the project site**				
7.	**Drains/roadway ditches well maintained and kept clear to allow an unobstructed flow of water at all times**				
8.	**Sediment retention measures such as sediment sieves or silt traps on drains exiting the site are utilized.**				
9.	**Weekly inspection of sediment retention measures and within 24-hours following periods of intense rainfall.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
10.	**Stockpiles of erodible material are protected using geotextiles and or geo-membrane materials**				
11.	**Records of inspection of sediment retention measures kept on file.**				
12.	**Hydrostatic test water is released at a controlled rate so as to not cause erosion and or flooding of the receiving drainage system.**				
13.	**Adequate sizing of mud storage/settling tanks**				
14.	**Routine dewatering of accumulated water within trenches as a result of rainfall and or groundwater seepages**				
15.	**Inlets to drains are protected by installation of suitable filtering devices**				
16.	**Implementation of strategies for the protection of water bodies:** • **Maintaining natural drainage paths and restoring them when necessary;** • **Limiting instream and bank disturbance;** • **Attenuating surface run-off from high precipitation events**				
17.	**Monitoring of the quality of the water used for disinfection prior to discharge to the environment**				
18.	*There is a special area designated for the refueling of vehicles?*				
19.	*Are there signs of fuel and oil spillages in and around the site?*				
20.	*Are there any leaking equipment, tools, and vehicles operating on-site?*				
21.	*Are leaking equipment and vehicles immediately (within a reasonable time frame e.g.: by end of the workday) taken out of operation and moved off-site for repairs?*				
22.	*Are hydraulic oils, bitumen paints as well as empty containers/drums etc. stored on-site? If yes, what storage arrangements exist for these items?*				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
23.	*Are excavated materials reasonably stored away from drainages lines and other natural waterways or areas where they cannot easily enter a nearby water course?*				
24.	*Are there signs of sediment moving offsite into nearby drains or watercourses?*				
	AIR				
25.	**Stockpiled aggregates are maintained in a damp condition especially during periods of dry conditions.**				
26.	**No excessive application of water so as to reduce the potential for the generation of turbid run-off.**				
27.	**Use of dust reduction – dust screens near sensitive receptors**				
28.	**Use of dust reduction – location of stockpiles downwind of built development or receptors**				
29.	**Adoption of a speed limit on unpaved surfaces**				
30.	**Use of non-toxic dust suppressants**				
31.	*Have residents of the area lodged complaints with regards to dust generated by the pipelaying activities? If yes, how many complaints have been received?*				
32.	*Are vehicles/equipment serviced and inspected regularly to ensure that they are in good working order?*				
33.	*Vehicles do not generate black smoke and other offensive/noxious vehicular emissions for the duration of their operation.*				
34.	*Materials transported to and from the jobsite securely covered to minimize spills while in transit*				
35.	*Current dust control measures are sufficient to mitigate the impacts of dust.*				
	NOISE				
36.	**Works confined to the period between the hours of 7:00 am and 11:00 pm of the same day**				
37.	**Noise Variation obtained before proceeding with any activities that may exceed the levels as stipulated in the NPCR.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
38.	**Tools, equipment and machinery fitted with noise emission control systems where applicable.**				
39.	*Have residents in the area lodged complaints about noise generated from the pipelaying activity? If yes, how many complaints have been received?*				
40.	*Have any specific actions been taken to reduce the noise generated by the aforementioned activities?*				
	SOLID WASTE MANAGEMENT				
41.	**Uncontaminated excavated material removed for infrastructural works are stockpiled and reused to the extent practical, for backfilling and landscaping on-site.**				
42.	**Un-used excess excavated material is removed from the site for disposal at an appropriate facility operated by the relevant Municipal Corporation.**				
43.	**No burning of trash, removed vegetation, construction wastes etc. on-site.**				
44.	**At the end of construction, the project site is cleared of all scrap material and debris.**				
45.	**Washings from premix concrete trucks are not discharged into any municipal drains or watercourses.**				
46.	**Non-hazardous solid waste such as domestic garbage is collected, sorted and disposed of at an appropriate landfill.**				
47.	**Non-hazardous construction material is collected, stored and disposed of at an appropriate site/landfill.**				
48.	**Hazardous wastes such as lead-acid batteries, waste chemicals, used oils are segregated from non-hazardous wastes.**				
49.	**Hazardous wastes are stored securely and disposed of by persons with appropriate licenses, permits and training to do so.**				
50.	**Contaminated materials and substances generated from spill response are handled as hazardous waste.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
51.	**Partially used or un-used chemicals and their containers are stored in accordance with the MSDS and returned to the supplier for recovery or disposal.**				
52.	**Records for disposal, removal or remediation of hazardous waste are kept on file.**				
53.	**All process fluids, chemicals and wastes are stored within secondary containment. SDS for chemicals are available on-site.**				
54.	**Spill Response Kit is readily accessible on-site with suitable sorbents and related supplies.**				
55.	**Leaks and spills in excess of 10L treated as hazardous materials**				
56.	**Well casing, piping and surface equipment removed from the well transported to facilities to facilities with appropriate personnel, equipment insurance for disposal/sale/recycling.**				
57.	**All drilling muds used are treated using non-hazardous mud dispersants and recycled as far as practicably possible**				
58.	*Have workers been educated/informed on proper disposal of wastes i.e. to avoid indiscriminate dumping of refuse?*				
59.	*There are designated collection containers for non-hazardous wastes generated on-site.*				
60.	*These containers are appropriately sized equipped with covers and emptied on a regular basis to avoid littering of the ground by scavengers?*				
61.	*All used oil drums, lubricant containers and bitumen drums are stored in a secured site for removal and disposal by an appropriate contractor. (See similar item under Water Pollution) As these drums contain contaminants, the Authority advises against washing these drums on-site as it may lead to water pollution.*				
62.	*Portable toilets are maintained in good working condition by the Contractor.*				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
63.	*Have there been any major spills of oils, fuels etc. that have resulted in the contamination of soils?*				
	SOCIAL/PUBLIC HEALTH/GENERAL/OTHER CONCERNS				
64.	**Visible warning signs have been posted e.g. no unauthorized entry, hazard notices etc.**				
65.	**Lighting measures to ensure illumination of hazards, warning signs and notices have been provided**				
66.	**Construction hoardings consistent with the nature of the site have been established**				
67.	**Proper maintenance of all measures to ensure functionality for the duration of the project**				
68.	**Excavated materials not stockpiled at the edge of trench to minimize instability and cave-ins**				
69.	**Trench walls are inspected immediately following heavy rainfall**				
70.	**Community Relations Officer responsible for interacting with stakeholder e.g. residents has been designated**				
71.	**Affected stakeholders notified at least 5 days prior to the commencement of works**				
72.	**EMA notified at least 10 working days prior to the start of works**				
73.	**Lighting system designed/installed in such a manner so as to not adversely affect residents or sensitive flora and fauna in the area**				
74.	**Any archaeological materials or other evidence of past human habitation is reported to the relevant authorities as applicable.**				
75.	**All sampling and analysis are in accordance with good GLP**				
76.	**Construction of the pipeline is in compliance with AWWA and ASTM international standards or other acceptable codes that meet OSH and Fire Services requirements.**				
77.	*All personnel in the construction zone wear appropriate PPE*				
78.	*The site is washed/swept at the end of the workday.*				
79.	*The site looks tidy and well maintained.*				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
80.	*The vehicles look tidy and well maintained.*				
81.	*Residents' access to their property is not adversely affected.*				
	TRAFFIC MANAGEMENT				
82.	*Have residents of the area or users of the roads lodged any complaints with regards to traffic delays created by the project?*				
83.	*Have alternative routes been clearly demarcated?*				
84.	*Does the project create unnecessary traffic?*				
85.	*Are the most disruptive activities scheduled for off peak hours and weekends?*				
86.	*Are there members of the national police or WASA officials involved in directing traffic on the major roadways particularly during peak traffic hours?*				
87.	*Is there a designated area to park trucks and equipment so that they do not obstruct the flow of traffic?*				
88.	*Are open trenches clearly labeled?*				
89.	*Has the public been notified via the newspapers, radio or other media of the works being conducted?*				
90.	*Is adequate signage available on-site?*				

0 = needs immediate attention

Total NA		
Total Score (1's)		
Total Score (2's)	+	___(x2 =___)
Final Score	=	
Highest Possible Score	÷	102
	=	|____ |
	x	100
% Compliance	**=**	

Environmental Audit Checklist – WTP Projects

Project :		Site Location :	
Construction stage / status during inspection :		Inspection No.:	
Inspection Date :		Inspection Time :	
Inspected by :		Weather :	

	Environmental Component	Assign as follows			
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	**Comments**
	WATER				
1.	**A minimum setback distance of 25m from natural watercourses**				
2.	**Areas not unnecessarily and cleared areas immediately re-vegetated/landscaped after serving the purpose for being cleared**				
3.	**Equipment, aggregate and other raw materials are stored on-site in specially designated areas and not along public roadways or near water courses.**				
4.	**Ensure that approach roads are kept clear of mud, debris, gravel and other materials**				
5.	**Installation of stone-stabilised pad or temporary gravel entrance**				
6.	**Drainage system designed and maintained to minimize unnecessary accumulation of water on the project site**				
7.	**Drains/roadway ditches well maintained and kept clear to allow an unobstructed flow of water at all times**				
8.	**Sediment retention measures such as sediment sieves or silt traps on drains exiting the site are utilized.**				
9.	**Weekly inspection of sediment retention measures and within 24-hours following periods of intense rainfall.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
10.	**Stockpiles of erodible material are protected using geotextiles and or geo-membrane materials**				
11.	**Records of inspection of sediment retention measures kept on file.**				
12.	**Hydrostatic test water used for water tightness testing of treatment units is released at a controlled rate so as to not cause erosion and or flooding of the receiving drainage system.**				
13.	**Routine dewatering of rainwater accumulated in tanks to grassy area or through sediment sieve**				
14.	**Routine dewatering of accumulated water within excavations as a result of rainfall and or groundwater seepages**				
15.	**Inlets to drains are protected by installation of suitable filtering devices**				
16.	**Implementation of strategies for the protection of water bodies:** • **Maintaining natural drainage paths and restoring them when necessary;** • **Limiting instream and bank disturbance;** • **Attenuating surface run-off from high precipitation events**				
17.	**Monitoring of the quality of the water used for disinfection prior to discharge to the environment**				
18.	*There is a special area designated for the refueling of vehicles*				
19.	*There are signs of fuel and oil spillages in and around the site*				
20.	*There is any leaking equipment, tools, and vehicles operating on-site*				
21.	*Are leaking equipment and vehicles immediately (within a reasonable time frame e.g.: by end of the workday) taken out of operation and moved off-site for repairs?*				
22.	*Are hydraulic oils, bitumen paints as well as empty containers/drums etc. properly stored on-site? If yes, what storage arrangements exist for these items?*				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
23.	*Are excavated materials reasonably stored away from drainages lines and other natural waterways or areas where they cannot easily enter a nearby water course?*				
24.	*Are there signs of sediment moving offsite into nearby drains or watercourses?*				
	AIR				
25.	**Stockpiled aggregates are maintained in a damp condition especially during periods of dry conditions.**				
26.	**No excessive application of water so as to reduce the potential for the generation of turbid run-off.**				
27.	**Use of dust reduction – dust screens near sensitive receptors**				
28.	**Use of dust reduction – location of stockpiles downwind of built development or receptors**				
29.	**Speed limit adopted and enforced**				
30.	**Use of non-toxic dust suppressants**				
31.	*Residents of the area have lodged complaints with regards to dust generated by the pipelaying activities? If yes, how many complaints have been received?*				
32.	*Vehicles/equipment serviced and inspected regularly to ensure that they are in good working order?*				
33.	*Vehicles do not generate black smoke and other offensive/noxious vehicular emissions for the duration of their operation.*				
34.	*Materials transported to and from the jobsite securely covered to minimize spills while in transit*				
35.	*Current dust control measures are sufficient to mitigate the impacts of dust.*				
	NOISE				
36.	**Works confined to the period between the hours of 7:00 am and 11:00 pm of the same day**				
37.	**Noise Variation obtained before proceeding with any activities that may exceed the levels as stipulated in the NPCR.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
38.	**Tools, equipment and machinery fitted with noise emission control systems where applicable.**				
39.	*Have residents in the area lodged complaints about noise generated from the pipelaying activity? If yes, how many complaints have been received?*				
40.	*Have any specific actions been taken to reduce the noise generated by the aforementioned activities?*				
	SOLID WASTE MANAGEMENT				
41.	**Uncontaminated excavated material removed for infrastructural works are stockpiled and reused to the extent practical, for backfilling and landscaping on-site.**				
42.	**Un-used excess excavated material is removed from the site for disposal at an appropriate facility operated by the relevant Municipal Corporation.**				
43.	**No burning of trash, removed vegetation, construction wastes etc. on-site.**				
44.	**At the end of construction, the project site is cleared of all scrap material and debris.**				
45.	**Washings from premix concrete trucks are not discharged into any municipal drains or watercourses.**				
46.	**Non-hazardous solid waste such as domestic garbage is collected, sorted and disposed of at an appropriate landfill.**				
47.	**Non-hazardous construction material is collected, stored and disposed of at an appropriate site/landfill.**				
48.	**Hazardous wastes such as lead-acid batteries, waste chemicals, used oils are segregated from non-hazardous wastes.**				
49.	**Hazardous wastes are stored securely and disposed of by persons with appropriate licenses, permits and training to do so.**				
50.	**Contaminated materials and substances generated from spill response are handled as hazardous waste.**				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
51.	**Partially used or un-used chemicals and their containers are stored in accordance with the MSDS and returned to the supplier for recovery or disposal.**				
52.	**Records for disposal, removal or remediation of hazardous waste are kept on file.**				
53.	**All process fluids, chemicals and wastes are stored within secondary containment. SDS for chemicals are available on-site.**				
54.	**Spill Response Kit is readily accessible on-site with suitable sorbents and related supplies.**				
55.	**Leaks and spills in excess of 10L treated as hazardous materials**				
56.	**Equipment/decommissioned items removed from the site and transported to facilities to facilities with appropriate personnel, equipment insurance for disposal/sale/recycling.**				
57.	**Waste parts from facility stored in a manner to not be a risk to public health and safety**				
58.	*Have workers been educated/informed on proper disposal of wastes i.e. to avoid indiscriminate dumping of refuse?*				
59.	*There are designated collection containers for non-hazardous wastes generated on-site.*				
60.	*These containers are appropriately sized equipped with covers and emptied on a regular basis to avoid littering of the ground by scavengers?*				
61.	*All used oil drums, lubricant containers and bitumen drums are stored in a secured site for removal and disposal by an appropriate contractor. (See similar item under Water Pollution) As these drums contain contaminants, the Authority advises against washing these drums on-site as it may lead to water pollution.*				
62.	*Portable toilets are maintained in good working condition by the Contractor.*				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
63.	*Have there been any major spills of oils, fuels etc. that have resulted in the contamination of soils?*				
	SOCIAL/PUBLIC HEALTH/GENERAL/OTHER CONCERNS				
64.	**Visible warning signs have been posted e.g. no unauthorized entry, hazard notices etc.**				
65.	**Lighting measures to ensure illumination of hazards, warning signs and notices have been provided**				
66.	**Construction hoardings consistent with the nature of the site have been established**				
67.	**Proper maintenance of all measures to ensure functionality for the duration of the project**				
68.	**New equipment and materials brought to site are stored in a safe manner**				
69.	**Community Relations Officer responsible for interacting with stakeholder e.g. residents has been designated**				
70.	**Affected stakeholders notified at least 5 days prior to the commencement of works**				
71.	**Lighting system designed/installed in such a manner so as to not adversely affect residents or sensitive flora and fauna in the area**				
72.	**Any archaeological materials or other evidence of past human habitation is reported to the relevant authorities as applicable.**				
73.	**All sampling and analysis are in accordance with good GLP**				
74.	**Works executed are in compliance with AWWA and ASTM international standards or other acceptable codes that meet OSH and Fire Services requirements.**				
75.	*All personnel in the construction zone wear appropriate PPE*				
76.	*The site is washed/swept at the end of the workday.*				
77.	*The site looks tidy and well maintained.*				
78.	*The vehicles look tidy and well maintained.*				
79.	*Residents' access to their property is not adversely affected.*				

	Environmental Component	Assign as follows			Comments
No.	**Item**	**0 Needs immediate attention**	**1 Needs attention**	**2 Good/NA**	
80.					
81.					
	TRAFFIC MANAGEMENT				
82.	*Have residents of the area or users of the roads lodged any complaints with regards to traffic delays created by the project?*				
83.	*Have alternative routes been clearly demarcated?*				
84.	*Does the project create unnecessary traffic?*				
85.	*Are the most disruptive activities scheduled for off peak hours and weekends?*				
86.	*Are there members of the national police or WASA officials involved in directing traffic on the major roadways particularly during peak traffic hours?*				
87.	*Is there a designated area to park trucks and equipment so that they do not obstruct the flow of traffic?*				
88.	*Are open trenches clearly labeled?*				
89.	*Has the public been notified via the newspapers, radio or other media of the works being conducted?*				
90.	*Is adequate signage available on-site?*				

0 = needs immediate attention

Total NA		
Total Score (1's)		
Total Score (2's)	+	___(x2 =___)
Final Score	=	
Highest Possible Score	÷	102
	=	|____ |
	x	100
% Compliance	**=**	

Annex 2 – Non-Compliance Record Sheet – example

Note: All items with a score of 0 or 1 must have a non-compliance completed

Item #	**Non-compliance** (to be completed by WASA Inspector)	**Corrective Action** (to be completed by CONTRACTOR)	**Responsible Person**	**Close-out Date**

Annex 3 – Corrective Action Plan Example Forms

Corrective Action Request Form

Date:	☐ Corrective Action	☐ Preventive Action
Request Source:	☐ Complaint (external) ☐ Employee Observation ☐ Risk Assessment ☐ Project Working Group Review	☐ Audit (WASA) ☐ Inspection ☐ Specific Activity Monitoring Data ☐ Audit (Third Party)
Description of Problem/non-compliance:		
Evidence Observed: *Reference Pictures nos.:*		
Preliminary Assessment of Risks/Impacts:		
Action initiated by: Contact:		

Remedial Action Required Form

CAP Reference #:_____

Date:	☐ Corrective Action	☐ Preventive Action
Description of Problem:		
Evidence observed:		
Potential Impact of Problem:		
Remedial Actions Required:		
Actions completed:	Date:	By:
Results:		

Investigation Procedure Form

CAP Reference #:_____

Date:	
Objectives of Action:	
Instructions:	
Investigation Assigned to:	
Expected completion date:	
Approved: _____ _____	Date: _____ _____

Problem Analysis Form

CAP Reference #:_____

Date:
List of Possible Causes and Supporting Data:
Analysis Results & Data:
Supporting Documents Attached: ☐ yes ☐ no List:
Root Cause Determination:
Supporting Documents Attached: ☐ yes ☐ no List:
Analysis Complete: Date: By:

Action Plan Form

CAP Reference #:_____

ANNEX J – CORRECTIVE ACTION PLAN

Date:	
Actions to be completed:	
Document changes required:	
Procedure, Process or System Changes Required:	
Training required:	
Action Plan assigned to:	
Expected completion date:	
Approval by: _____ _____	Date: _____ _____

Annex 4- Sample Daily Environmental Assurance Monitoring Report

DAILY ENVIRONMENTAL & SOCIAL MONITORING REPORT
Project Name:
DAY OF THE WEEK:
Date:

1. GENERAL PROJECT DATA

Project Phase:
Project Number:
Client: WASA

Project Manager:	Contact:
Construction Supervisor:	Contact:
Environmental Specialist:	Contact:
Field Monitor:	Contact:
CONTRACTOR:	General Manager: Contact:
Environmental Officer:	Contact:

2. DAILY SUMMARY:

3. ASSURANCE MONITOR'S NOTES

Record Code	Construction Activity	Km	Co-ordinates		Site Description	Comments	Photos Reference No.
			mE	mN			

ANNEX J – CORRECTIVE ACTION PLAN

ANNEX K - STAKEHOLDER ENGAGEMENT PLAN (SEP)

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Table of Contents

List of Tables

List of Acronyms

CBO	Community Based Organization
CCLIP	Conditional Credit Line for Investment Programme
CF	Consulting Firm
DMA	District Metered Area
DOMA	Downtown Owners and Merchants Association
EA	Executing Agency
ESA	Environmental & Social Assessment
ESMP	Environmental & Social Management Plan
GORTT	Government of the Republic of Trinidad and Tobago
HDC	Housing Development Corporation
IADB	Inter-American Development Bank
IWRM	Integrated Water Resource Management
KPI	Key Performance Indicator
MPU	Ministry of Public Utilities
NGO	Non-governmental Organization
NRW	Non-revenue Water
PAP	Project Affected Parties
PEU	Project Executing Unit
PIU	Project Implementing Unit
PMA	Pressure Management Area
SCADA	Supervisory Control And Data Acquisition
SEP	Stakeholder Engagement Plans
SPC	Special Purpose Company
SWIT	Smart Water Infrastructure Tools
WASA	Water and Sewerage Authority
WTP	Water Treatment Plant

1.0 Introduction

The Water and Sewerage Authority (WASA) is responsible for the supply of water and sewerage services to the population of Trinidad and Tobago. However, over the years there have been - increasing challenges in meeting this mandate, resulting in the reduction of both the quantity and quality of supply to some areas. Ageing infrastructure resulting in increased non-revenue water (NRW), and the effects of climate change have significantly impacted the volume of water available. This has resulted in a need for water scheduling with some areas receiving a one in nine days supply.

The Authority seeks to address this situation and improve supply to the affected areas to at least a 24/3, that is, a 24-hour supply at least three days per week. Several projects across the twin islands have been developed under the National Water Sector Transformation Program, inclusive of the drilling of six (6) new wells to provide an additional supply to underserved areas, rehabilitation of five (5) water treatment plants, establishment of two (2) new water treatment plants and five (5) pipeline projects.

The Inter-American Development Bank (IADB) was approached by the Government of the Republic of Trinidad & Tobago (GORTT), with the Ministry of Public Utilities (MPU) as the executing agency, to secure funding, in part, for this National Water Sector Transformation Program, which would serve to address the on-going problem of an inadequate supply of potable water. The proposal was submitted to the IADB for consideration to access funding under the IADB Conditional Credit Line for Investment Projects (CCLIP). The project was accepted and the Loan TT-L1055 approved on 2022-12-14 and Loan Contract Agreements between the Government of the Republic of Trinidad & Tobago (GORTT) and the IADB was signed on 2023-03-07.

As a conditions precedent, programmatic Environmental & Social Management Plans (ESMPs) inclusive of Stakeholder Engagement Plans (SEPs), for the specific projects guided by the IADBs ESMP Frameworks prepared for the TT-L1055 loan, must be completed and a no objection approval granted by the IADB before the project can progress.

As such, this SEP focuses on the drilling of six (6) new wells, rehabilitation of five (5) water treatment plants, establishment of two (2) new water treatment plants, and five (5) pipeline replacement projects, only.

2.0 Project Description

2.1 Project Aims and Objectives

The general objectives of the National Water Sector Transformation Program are to improve the efficiency, quality, sustainability and resilience of potable water supply service and water security in Trinidad and Tobago (T&T). The specific objectives of the first operation are to:

a) Improve operational efficiency and reliability of water supply services;
b) Develop capacity and provide institutional strengthening to the Ministry of Public Utilities (MPU) and the Water and Sewerage Authority of Trinidad and Tobago (WASA) to improve governance and sustainable management of water resources; and
c) Improve access to water services for underserved communities in T&T.

To achieve these objectives, it will be necessary to effectively upgrade and manage water production, transmission and distribution and reduce water losses; and utilize innovative technology, digital transformation and data driven management systems. Achieving these objectives will contribute to eliminating the need for Government support to meet operational expenditure and reduce reliance on desalinated water.

2.2 Project Components

The Program will be comprised of three (3) components as outlined below:

1) Component 1: Water Stabilization and Improvement: (Cost: US$44.0 Million).

This component will finance the development of a comprehensive program to urgently stabilize water supply services to prevent further service decline throughout the country and improve access to water to unserved and underserved households. The activities to be financed to increase the treatment capacity and meet projected water demands include:

a) Construction of new water treatment infrastructure in two (2) locations, namely Santa Cruz-Green Meadows and Goldsborough River (Tobago), inclusive of intakes;
b) Refurbishment and upgrading of the water treatment infrastructure for five (5) Water Treatment Plants (WTPs) at Freeport, North Oropouche, Guanapo, Navet, and Chatham;
c) Drilling and equipping of three (3) new wells at Freeport; and
d) Drilling and equipping new wells at Penal (Clark Road), Chatham/Palo Seco, and Tucker Valley.

2) Component 2: Support for Water Sector Transformation Plan: (US$2.74 Million).

The objective of this component is to develop capacity and provide institutional strengthening to MPU and WASA to improve governance and promote sustainable management of water resources. This component will finance the application of the Bank's AquaRating performance evaluation tool, which will be initiated following the establishment of a suitable team from WASA to utilize the tool.

The results of the evaluation will inform the process to restructure and transform WASA, including addressing focal areas such as:

a) Gender equality, diversity and inclusion at the company level;

b) Development of a Self-Esteem and Leadership Training Plan;

c) Development of a Technical Capacity Building Plan, aimed at the women within the company, to promote participation in technical, operational, engineering and leadership roles;

d) Treatment of Persons with Disabilities within the workspace including access, involvement and opportunities, based on the Convention on the Rights of Persons with Disabilities; and

e) Building Resilience to Climate Change and Natural Disasters and Risk Management.

This Component will also finance a Study, which will provide recommendations to improve the Ministry of Public Utilities' (MPU) technical oversight capacity for coordination of the water sector transformation and stabilization. Furthermore, the component will finance the development and implementation of a plan to manage disaster risk and climate change. In addition, institutional strengthening will be carried

out to separate the water resources management function from WASA and implement Integrated Water Resources Management (IWRM) framework approach, supported by a HydroBID1 based information system.

3) Component 3: Network Optimization (US$31.0 Million).

This component will finance priority works to optimize network performance and reduce non-revenue water. These works will be executed through a Co-Management Performance Based Contract with a specialized consulting firm (CF), which would involve WASA and the CF working together as a single Project Team to deliver the targeted results. This would allow for the seamless knowledge transfer and expertise to WASA that is crucial to the long-term sustainability and success of the project. The CF will be required to prepare and commence the implementation of a Non-Revenue Water Reduction Strategy and Program for the country. The proposed water audit (under ATN/OC-18337-TT) will provide crucial data related to production and transmission flows and pressure, as well as hydraulic models to inform the NRW Program. Reduction of commercial and physical losses will be also implemented as part of the NRW Reduction Program.

The CF will also provide strategic advice and technical support to the Executive Team of WASA in the transformation of WASA. Under this Component, flow and pressure monitoring and water loss reduction and monitoring will be achieved through:

a) The replacement of aged and fragile transmission and distribution network to reduce water loss and high leakages in several areas including: La Cuesa Road - Freeport, Nelson Street – Port of Spain, Morequito Avenue – Valsayn South, Riverside Road – St. Augustine, and Freeport Todd's Road;
b) Procurement and installation of three hundred and twenty (320) bulk meters and procurement of three hundred and twenty (320) data loggers with installation of one hundred and ninety-six (196) loggers2, to monitor production for various production facilities (water treatment plants, wells and booster stations) throughout T&T;
c) Selective implementation of District Metered Areas/Pressure Management Areas (DMAs/PMAs), targeted leak detection and repair, smart water infrastructure tools (SWIT), and management information systems;
d) Implementation of remote monitoring and control SCADA3 automation for real-time analysis of the most critical areas around T&T; and
e) Training and capacity building of WASA personnel in water loss management and SWIT.

2.3 Programme Activities

For the purpose of this SEP, focus will be placed on interventions to be undertaken under **Component 1** and **Component 3(a)**. These projects will include in the following:

i. Construction of new water treatment infrastructure in two (2) locations, namely Santa Cruz-Green Meadows and Goldsborough River (Tobago), inclusive of intakes;
ii. Refurbishment and upgrading of the water treatment infrastructure for five (5) Water Treatment Plants (WTPs) at Freeport, North Oropouche, Guanapo, Navet, and Chatham;
iii. Drilling and equipping of three (3) new wells at Freeport;
iv. Drilling and equipping new wells at Penal (Clark Road), Chatham/Palo Seco, and Tucker Valley; and
v. Replacement of aged and high leakage pipelines at: La Cuesa Road - Freeport, Nelson Street – Port of Spain, Morequito Avenue – Valsayn South, Riverside Road – St. Augustine, and Freeport Todd's Road.

In Freeport and Chatham, where there are several projects, it was recommended that two cluster projects be considered for environmental and social management. This is due to the relatively close physical proximity (under 10km Radius) of the wells, pipelines and water treatment plant, with water treatment being done at one plant in the region, and the population to benefit for each area being the same. Also, for each area, the projects are interconnected and thus operate synergistically. Further, having multiple consultations within a relatively small proximity, would be inefficient, ineffective and may result in confusion and annoyance within the community.

Thus, it was recommended that there be two cluster projects in Freeport and Chatham as noted below:

Freeport Cluster:

- Freeport #22 Well
- Freeport #23 Well
- Freeport #24 Well
- Freeport Todd's Road Pipeline Replacement
- La Cuesa Road Freeport Pipeline Replacement
- Freeport Water Treatment Plant Upgrade

Chatham Cluster:

- Chatham Well #15
- Chatham Water Treatment Plant Rehabilitation

2.4 Project Beneficiaries

The expected beneficiaries from the projects are as follows:

- Freeport cluster – 21,724 persons
- Chatham cluster – 23,333 persons
- North Oropouche Refurbishment – 185,962 persons
- Guanapo Refurbishment – 15,163 persons
- Navet Refurbishment – 271,000 persons
- Santa Cruz-Green Meadows – 14,270 persons
- Goldsborough (Tobago) – 17,079 persons
- Clark Road Penal Well – 2025 persons
- Tucker Valley Well – 2700 persons
- Nelson Street, Port of Spain – 1668 persons
- Morequito Avenue, Valsayn South – 536 persons
- Riverside Road, St. Augustine – 800 persons

In addition to households, the projects will also benefit schools, health institutions, government agencies, businesses, farmers, religious organizations and NGOs.

2.5 Project Implementation

Ministry of Public Utilities (MPU) shall be the Executing Agency (EA) and will have oversight of the Program's entire execution. MPU will be ultimately responsible for the overall technical, environmental and social, fiduciary and administrative management and monitoring, evaluation, and reporting of the Program. The EA will act as the direct counterpart of the Inter-American Development Bank (IADB) with respect to all aspects of the Program.

The MPU will establish and host a dedicated Project Executing Unit (PEU), which will act as the vehicle through which the MPU will discharge its functions and responsibilities within the framework of the Program and will serve as the liaison point with the Bank. The MPU-PEU will represent the central pillar for the day-to-day management, administration and execution of the Program including Program coordination and monitoring of all aspects of the Program implementation, including social and environmental safeguards, and report preparation. The MPU, through the PEU, will be ultimately responsible for procurement and financial management under the loan. MPU-PEU will contract the SPC to perform procurement and project/contract management with respect to Component 2.

The Water and Sewerage Authority (WASA) will be a Sub-Executing Agency and will be responsible for providing technical engineering input, procurement oversight, general oversight and auditing of scope of completed works of Components 1 and 3. The Special Purpose Company's responsibilities will include:

final validation/approval of designs, technical specifications, selection and contracting of works and consulting services, certify payments and the supervision of agreed upon water supply infrastructure works.

All contracts under Components 1 and 3 will be signed by the MPU/PEU and the contractors. The Special Purpose Company will certify payments, which will be paid by the MPU/PEU to the contractors. The Special Purpose Company's management fees will be paid with the GORTT's own resources. Additionally, the Special Purpose Company will be required to apply IDB's procurement policies.

3.0 Objectives and Scope of the Stakeholder Engagement Plan

The Stakeholder Engagement Plan (SEP) is aimed at providing equitable and timely access to information as it relates to the Project. The engagement strategy should create platforms for maximum participation of stakeholders and create avenues for two-communication. Stakeholders will be representatives from the various, regional corporations, communities, civic groups and organizations, religious and business entities, along with the office of the Member of Parliament, Local Government Councilors, non-governmental organizations (NGOs) and community-based organizations (CBOs) who may be directly or indirectly affected by the proposed Projects. The transparent engagement process between the project and the stakeholders is aimed at enhancing project acceptance and will contribute significantly to the project's successful development and implementation.

3.1 Objectives

- To capture the views and perceptions of people who may be affected or have an interest in the project, which can be used as inputs to improve the project design and implementation;
- To assist in validating and verifying the data obtained elsewhere for use in the ESA/ESMP;
- To enable people to understand their rights and responsibilities in relation to a project, by providing appropriate information on environmental and social risks and impacts of the project in a timely, understandable, accessible manner and format;
- To provide greater transparency and involvement of stakeholders, to build trust and project acceptance;
- To provide stakeholders with accessible and inclusive means to raise grievances and allow for their appropriate response and management.
- To identify vulnerable groups within the project area with a view of avoiding increased hardship.

3.2 Scope

This SEP is aimed at providing a program for stakeholder engagement and other interested parties to support projects under the National Water Sector Transformation Program. It will include stakeholders related or relevant to Component 1 and Component 3(a) of the program.

The engagements will include the dissemination of information, consultations, and access to a grievance mechanism during the life of the projects. The SEP outlines various communication lines used to achieve optimal public participation.

The SEP seeks to:

a) Provide guidance for stakeholder engagement in line with IDB standards;
b) Identify key stakeholders;
c) Identify and outline effective dissemination of information, communication methods, timings, processes and structures for stakeholder consultations and feedback;
d) Establish a formal grievance mechanism;
e) Identify roles and responsibilities for the implementation of the SEP; and
f) Identify monitoring measures to ensure the effectiveness of the SEP.

3.3 Requirements

The stakeholder engagement process is intended to be continuous and last throughout the project's life cycle, commencing from the project development, and continue in a timeframe that enables meaningful consultation with stakeholder through to completion. The nature, scope, and frequency of stakeholder engagement will be proportionate to the nature and scale of the project, its development and implementation timeline, and its potential risks and impacts.

The engagement will seek to include meaningful consultations with stakeholders and provide stakeholders with timely, relevant, understandable, and accessible information, and should consult with them in a culturally appropriate manner, free of manipulation, interference, coercion, discrimination, and intimidation.

Stakeholder engagement involves the following steps:

a) Planning – Identify and analyze the project stakeholders and craft messaging explaining the need to consult. Resources are identified, sourced and consultation strategy developed.
b) Process – Carefully outline the strategy and consultation methods. Where will meetings be held? How will information be disseminated prior to meeting for review and discussion? How will data be recorded? Ensure full disclosure of relevant information and maintain a fully inclusive process.
c) Presentation – Consult all stakeholders. Analyze any data received prior to community meeting and address the same at the meeting. Outline procedure to address grievances. Ensure presentation is in a language easily consumed by stakeholders.
d) Promise – Report back to all stakeholders using feedback received. Monitor stakeholder views and document and respond to changes over time.

4.0 Stakeholder Identification and Analysis

4.1 Stakeholder Identification

The project stakeholders are persons who have a role in the project, could be affected by the project, or who are interested in the project. The project stakeholders are identified as follows:

Table 1 - Stakeholder Identification

Category of Stakeholder	Characteristics
Project Affected Parties (PAP)	These are the primary stakeholders who are likely to be impacted directly or indirectly, positively or adversely by the project and who are most likely to be susceptible to change associated with the project. These stakeholders are to be closely engaged in identifying impacts and their significance, and mitigation and management measures. Affected parties for this project will include residents, customers, motorists and businesses.
Interested Parties or Influencer	These are stakeholders whose interest may be affected by the project and who have the potential to influence the project outcomes in any way, but who may not experience the direct impacts of the project. Interested parties for the purpose of this stakeholder engagement will include, but not limited to service providers that are likely to be interested in the opportunities that project may provide. Members of the decision-making and administrative bodies that can impact the project. These stakeholders include the MPU, the Regional Corporations, Parliamentary Representative Offices, Village Councils, Business Associations and Community Based Organizations.
Disadvantaged/Vulnerable Individuals or Groups	These are any person(s) who may be disproportionately impacted or further disadvantaged by the project as compared with any other group. This group may require special engagement measures that will ensure equal representation in the stakeholder engagement process. Among the vulnerable/disadvantaged groups identified at this stage of the project are women, children, the elderly, people living with disabilities and migrants.

4.2 Stakeholder Analysis

The stakeholder identification analysis is aimed at identifying stakeholders in the four above-mentioned categories and the expected outcome from their engagement.

Table 2 - Stakeholder Analysis

Category	Stakeholder	Characteristics	Expected or Potential Project Impact/Interest
Project Affected Parties	Residents/ Community members	Community members in close vicinity of the project sites	Can be impacted by dust and noise emissions. May be exposed to safety risks. May be affected by an increase in traffic. May be impacted by damages to community roads and other infrastructure during project.
	Businesses, Roadside Vendors, Farmers/Gardeners	Business entities and persons engaged in farming or gardening production	Can be impacted by dust and noise emissions. May be exposed to safety risks. May be affected by an increase in traffic. May be impacted by damages to community roads and other infrastructure during project. Can suffer loss of earnings or produce due to disruptions from pipeline works.
	Community members seeking employment	Members of the community, both skilled and unskilled, who may wish to be employed by the project.	Employment during pipeline construction works in particular.
Interested Parties	Parliamentary, Local Government and Community Representatives	Members of Parliament, Regional Corporations and Councillors, Village Councils and Community groups with jurisdiction over the areas within which the project interventions are located.	Can provide input on key components of the project, including recommendations on the implementation. Will benefit from improved water service to residents within their jurisdiction. Infrastructure such as roads within communities may be damaged. Monitor the presence and activities of the contractors. Address any conflict which may arise.
Disadvantaged/ Vulnerable Individuals or Groups	Migrants	Members of migrant Spanish speaking population.	May not understand project information issued to impacted communities.

5.0 Engagement Methods and Tools

To create a platform for impactful stakeholder engagement, methods and techniques should be tailored to the specific needs of targeted groups.

The consultation exercise should meet the general requirements on accessibility. Consideration will be made for persons in remote and rural locations by ensuring engagements are held in reasonably centralized locations that are easily accessible, with person-to-person engagement being a key tool to ensure inclusivity.

Consultations should be conducted in an adequate and timely manner. Special attention should be paid to the engagement needs of the disadvantaged/vulnerable groups that may need alternative consultation arrangements and materials. These groups should be consulted using the best practices in accordance with their specific needs.

5.1 Approach to Engagements

The consultations/engagements employed for each project will be specifically curated for that demographic. The cookie-cutter approach will give way to a context-specific consultation documented in detailed Project Consultation Plans. All tools chosen will be accessible to the relevant stakeholders.

The following are key parameters of the process:

a) **Advance notification of consultation engagement** - All relevant stakeholders should have basic project information. This can be achieved via primary means such as direct emails, calls, and direct traditional mail delivery. This notification is inclusive of any project information, agendas, clearly defined scope of issues, and project proposal that might be relevant at the time. Responses such as regrets, and confirmations to meeting attendance should be kept on file for accountability purposes. Other notification measures that may be utilized for interested parties/target groups can include; advertisement in public places as well as newspaper and radio advertisements. In some communities, such as those in the Freeport Cluster, placement of notices in local shops and store fronts is a proven tactic to disseminate community relevant information. The PIU is expected to provide information readily to any member of the public, who may seek clarification on the project's status. A comprehensive list of stakeholders will be compiled for each project area ahead of the consultation engagement.

b) **Selection of the appropriate communication method** – Tools curated for the engagement process must stimulate an environment to Inform, Consult, Involve, Collaborate and Empower. This is critical to the stakeholder engagement process and the project's overall success. Selected tools should facilitate the two-way communication that is necessary for overall success.

c) **Agenda to be drafted for each consultation/meeting** – The Agenda document will lend structure as a measure of keeping the meeting in line with the objectives of the SEP. The

agenda should include the main message/purpose, sequence, project personnel and designation, issues/topics to be discussed, and the format for discussion. Following the formal presentation of the information, an adequate amount of time should be allocated for a question-and-answer segment, with a free speaking format facilitated by the moderator/chairperson to encourage the exchange of ideas and feedback. A record of all comments made during the engagement would be kept by the PIU, to be analyzed and used to action necessary and relevant recommendations and feedback. The recorded comments and outcomes should be used in regular reporting of the project. For engagements to be conducted prior to the establishment of the PIU, assigned personnel from the MPU/WASA should prepare the documentation and reports on the consultations.

d) **Creating and maintaining an attendance list** – This will be a key feature at all consultations. The attendance list should provide information on the participants, their contact information, and affiliation.

e) **The Presentation Document –** The introductory comments and project description should be delivered in a clear and concise manner, free from excessive technical terms and jargons. It is recommended that the presentation be conducted using visual aid, such as power-point presentations and handout materials such as pamphlets and posters, where relevant. Whenever technical specifics of the project's particular activities or solutions are required to be delivered in a greater level of detail, it will be ensured that the information conveyed remains comprehensible to all members of the audience and the description of complex technicalities is translated to their understanding, thereby enabling productive feedback and effective discussion.

f) **Record keeping** - To accurately capture the output of the stakeholder engagement sessions, proper record keeping should be ensured using the following methods:
   i. Taking minutes of meetings by an assigned person from the PIU;
   ii. Recording of meeting held virtually; and
   iii. Photographs.
   iv. A final report will be prepared for onward submission to the Bank. This will be a comprehensive report inclusive of an analysis of concerns raised and the manner in which these and all other concerns (Environmental and Social) have been addressed.

5.2 Equal Opportunity

The elderly, indigenous, children and people living with disabilities are categorized as vulnerable groups in the SEP. Therefore, special measures for the stakeholder engagement with such groups and individuals is considered important and will be done in accord with their sociocultural characterizations. Advance contact would be made with the administration of the identified groups that represent people living with disabilities, as a measure to inform the groups about the project and its intention to engage with them as stakeholders. Groups should also be asked to recommend the

most effective ways of communicating and consulting with the stakeholders and the PIU can utilize this feedback in the planning of the consultations. The MPU should be responsible for making available special resources, such as equipment and services that maybe required to effectively communicate to persons living with disabilities.

Where migrants such as members of the Spanish speaking Venezuelan community are identified as affected persons, special measures should be undertaken to provide the project information in a manner that is understandable to these individuals. This may mean producing Spanish versions of handout material such as pamphlets and posters, as well as translators at consultations/meetings with such persons in attendance.

6.0 Stakeholder Mapping & Engagement Methods for Projects under Components 1 and 3(a)

Table 3 - Projects & Detailed Stakeholder Characteristics

Component	PROJECT	STAKEHOLDERS
1/3(a)	Freeport Cluster	**Residents** - 252 **Businesses** – 29 (1 Lotto Centre, 2 Warehouses, 2 Contracting Companies, 1 Dialysis Centre, 2 Groceries, 6 Shops/parlors, 1 Hardware, 1 Mechanic Shop, 1 Car Painting Place, 1 Transport Company, 1 Sand/Gravel Company, 1 Breakfast Place, 1 Pharmacy, 2 Bars, 2 Poultry Shops, 1 Fabricating Shop, 1 Plant Shop (home), 1 Woodworking Shop (home) 1 Car Alignment/Computing Centre for vehicles). **Roadside vendors** – 5 (2 Vegetable Shops, 1 fruit stall, 1 coconut, 1 pie shop). **Farmers/gardeners** -16
1/3(a)	Chatham Cluster	**Residents** - 134 **Businesses** – 12 (1 Food Shop, 6 Mini Marts, 1 Barber Shop, 1 Car Care Shop, 1 Plant Shop, 2 Bars) **Roadside Vendors** - 2 (Vegetable) **Association** – Chatham Village Council **Others** - Chatham Youth Development & Apprentice Centre
1	North Oropouche Refurbishment	**Residents** - 40 **Businesses** - 0
1	Guanapo Refurbishment	**Residents** - 40 **Businesses** – 1 shop **Churches** – 1 (Agape Bible Ministry) **Homes** – 1 (Home of the Age Memisa Centre) **Farmers/gardeners** - 5 Farms (Chicken) **Association** – 1

1	Navet Refurbishment	**Residents** – 1 **WASA Quarters** – 8 (only 1 Quarter in use) **Businesses** - 0 **Farmers/gardeners** – 6 Farmers (Short term crop)
1	Santa Cruz-Green Meadows	**Residents** - 42 **Businesses** - 0
1	Goldsborough (Tobago)	**Residents** - 150 **Businesses** – 8 (1 grocery/bakery, 1 auto parts shop, 1 food outlet, 1 shop, 2 garage, 1 carpenter workshop, 1 guesthouse) **Other** - National Energy Skill Centre; Division of Food Security, Natural Resources, the Environment, and Sustainable Development- Tissue Culture; Division of Infrastructure, Quarries, and Urban Development; Pembroke Heritage Park. **Farmers/gardeners** - 45
1	Clarke Road Penal Well	**Residents** - 350 **Businesses** – 23 (1 Moulding Shop, 1 Photography Studio, 6 Mechanics, 1 Gym, 1 Bar, 3 Supermarkets, 3 Shops, 2 Plant Shops, 1 Car Wash, 1 Clothing Store, 1 Food Court, 1 Hardware and 1 Construction Company). **Churches** – 3 (Penal Christian Centre, Faith Holiness Church and Saraswatie Baal Vidyali Temple) **Roadside vendors** – 5 (3 vegetable stalls and 2 shops)
1	Tucker Valley Well	**Residents** - 0 **Businesses** – 5 (Kid's Zip Line, Chaguaramas Petting Zoo/Safari Eco Park, The Arboretum, U-Pick Farm, Chaguaramas Golf Course). **Other Facilities**: Ministry of Agriculture Land & Fisheries, Shooting Range, Trinidad and Tobago Defence Force, CDA Police Headquarters, Macqueripe Beach Facility.
3(a)	Nelson Street, Port of Spain Pipeline Replacement	**Residents** – 23 & 10 HDC Apt. Buildings **Businesses** – 12 (2 Lotto Booths, 6 small shops 2 Car Parks, William H. Scott, Holder Brother Company Ltd). **Schools** – 2 (South East POS Secondary School & Nelson Street R.C School) **Churches** – 2 (Port of Spain Cathedral & Universal Church) **Other Facilities:** Desperados Pan Theater **Associations** – 1 – Downtown Owners and Merchants Association (DOMA) **(This is a High-Risk Area due to ongoing criminal activity)**
3(a)	Morequito Avenue, Valsayn South Pipeline Replacement	**Residents** - 4 **Businesses** - 5 (National Petroleum Gas Station, Superpharm, Valsayn Medical Centre, Spa Euphoria,

		Mall - Valpark Shopping Plaza). **Associations** – 1 (South Valsayn Association)
3(a)	Riverside Road, St. Augustine Pipeline Replacement	**Residents** - 110 **Businesses** – 13 (Royal Castle, Codec Pharmacy, Leslie Chang Household Store, Farida's Roti Shop, Aneal Supermarket, 3 Bars, 3 Shops, Barber Shop, Chicken Depot). **Churches** – 1 (Agape Bible Ministry) **Roadside vendors** - 3

7.0 Engagement Methods and Techniques

Based on the above Stakeholder Mapping for the various projects, as well as the nature and scope of the projects under Components 1 and 3(a), Table 4 below identifies the stakeholder engagement methods and techniques that should be used for each project.

Table 4 - Engagement Methods & Techniques

Method/ Tool	Description and Use	Contents	Dissemination Method	Target Group
Community Meetings	Assembly of stakeholders for sharing project information and specifics on plans. Also used to receive feedback and create databases of vulnerable persons	Project outline, benefits, potential disruption and mitigation strategies. Particularly useful strategy for projects with relatively wide geographical impact.	Targeted invitations to community members, media advertisements, social media postings, and local announcements.	Affected parties, Key stakeholders, Other interested parties, Disadvantage/ vulnerable groups
Key Informant House to House Sensitization	Used to engage affected parties and disadvantaged/ vulnerable groups directly.	Project specific activities and plans, and impact mitigation/management measures that require detailed discussion with affected stakeholders. Any emerging issue or concern during construction can be discussed and grievance mechanism explained.	House to house visits. Very useful for projects where a high number of residents will be impacted.	Affected parties and Disadvantage/ vulnerable groups
Focus Group Discussions	Used to facilitate discussion on the project details with various groups of stakeholders.	Specific project activities and plans, solutions and impact mitigation/ management measures that require detailed discussion with affected stakeholders. Useful in areas of high prevalence of non-residential entities	Announcements of forthcoming meetings widely circulated to participants in advance. Targeted invitations are sent out to stakeholders.	Key Stakeholders, Disadvantaged/ vulnerable groups
Internet/ Digital Media	Use of digital platforms to provide information and updates on the	Information on project, updates, community relations, community updates, employment and	Limitation: Not all parties/stakeholders have access to the	Affected parties, Key stakeholders, Other interested parties,

	overall project, impact assessment and management process, procurement, as well as project engagement activities. Project digital space should have a built-in feature that allows visitors to leave comments or ask questions.	procurement, environmental and social aspects	internet. However, this strategy will be used across all projects	Disadvantage/ vulnerable groups
Direct Mail Delivery	Used for sharing project information and specifics on plans	Provides project outline, precursor to community meeting and can be employed for project updates.	Hand delivery to homeowners, businesses and mailboxes.	Affected parties and Disadvantage/ vulnerable groups
Loud Speaker Public Announcements	Pre-recorded messages delivered in specified areas	Alerts community to potential disruptions, informs on dates, times and location for community meeting	Transducer affixed to hood of motor vehicle and amplifies pre-recorded messages whilst traversing the community	Affected parties and Disadvantage/ vulnerable groups
Public Notice	Poster-type Print Advertisement. Issued to inform national community of project to be undertaken.	Brief project outline, where project is proposed and	One publication in a daily Newspaper.	National community
Community Liaison Team	Assembly of at least Five (5) individuals spanning the project zone. They will become the virtual eyes representing the community's interest	Real time updates on challenges faced as a result of project implementation	A WhatsApp group will be created for the sole purpose of information sharing.	Affected parties and Disadvantage/ vulnerable groups
Shopkeeper Engagement	Engage shopkeepers, within the project zone, to display project	Information on meetings, disruptions, traffic re-direction, etc.	Public Notices, Posters, Flyers	Local traffic patronizing local shops/stores

	relevant communication tools in their establishments			
WhatsApp Groups	Text/Video/Audio Messaging using mobile networks.	Project progress updates can be sent to independent Community groups/Councils	WhatsApp Messages sent to Group Chats	Community Councils/Watch Groups/Farmers Chat Groups/Etc.

Table 5 - Stakeholder Engagement Method/Project

PROJECT	STAKEHOLDER ENGAGEMENT METHOD	VENUE – COMMUNITY MEETING	STAKEHOLDERS
Chatham Cluster of Projects	• Public Notice • Key Informant House to House Sensitization • Digital/Social Media • Direct Mail Delivery • Community Meeting	Chatham Community Centre	• National Community • Residents • Businesses • Unemployed • Local Contractors • Elected Representatives • Local Government • Community Based Organizations
Freeport Cluster of Projects	• Public Notice • Key Informant House to House Sensitization • Direct Mail Delivery • Internet/Digital/Social Media • Loud Speaker Public Announcements • Community Liaison Team • Strategic Community Partners • WhatsApp Messaging	Preysal Secondary School	• National Community • Residents • Businesses • Agricultural Community • Unemployed • Local Contractors • Elected Representatives • Local Government

	• Shopkeeper Engagement • Community Meeting		
North Oropouche Refurbishment			
Guanapo Refurbishment			
Navet Refurbishment			
Santa Cruz-Green Meadows			
Goldsborough (Tobago)			
Clarke Road Penal Well			
Tucker Valley Well			
Nelson Street, Port of Spain Pipeline Replacement			
Morequito Avenue, Valsayn South Pipeline Replacement			
Riverside Road, St. Augustine Pipeline Replacement			

8.0 Information Disclosure

The dissemination of project information must be carefully managed to ensure transparency and credibility. Stakeholder engagement will be facilitated to encourage feedback and solicit community input. An information disclosure strategy will prevent any premature public perception and registration of grievances by the stakeholders. The key objective here is to eliminate misinformation and engender a sense of project ownership by all stakeholders.

Table 6 - Information Disclosure Matrix

Project Stage	Information to be Disclosed	Engagement Method	Expected Outcome
Project Pre-implementation	Proposed construction plans including project scope and timeline. Disclosure of safeguards instruments including ESA and ESMP, and SEP inclusive of GRM.	Virtual/in person consultations with project affected persons.	Awareness of the project and its expected impacts. Informed feedback and recommendations.
Project Implementation	Regular updates on project activities and work program. ESHS management system Information on works to contractors Advertisement of bids for constructions and other services and materials Information on available GRM	Virtual/in person consultations and meetings with affected persons. Advertisement in newspaper, radio, internet and other social media platforms. Hotline numbers, direct GRM email address	Awareness of the project and its expected impacts Equal opportunity and open sourcing of construction and other services and material relevant to the project.
Close of Project	Closing report of the project	Virtual/in person consultations and meetings with affected persons. Advertisement in newspaper, radio, internet, and other social media platforms. Hotline numbers, direct GRM email address.	Realization of project benefits

9.0 Project Resources and Implementation Responsibility

Stakeholder Engagement Plan Implementation

The SEP should be administered and implemented by the MPU/PEU. Once established, the PIU through the Environmental and Social Specialist, should lead the implementation of the SEP.

Budget

The cost associated with the implementation of the SEP will be covered by the MPU. An estimated budget will be prepared once all the project details are finalized. The following should be covered under the budget:

- Coordination and logistics;
- Preparation of materials;
- Communication;
- Implementation;
- Media Planning and Booking;
- Supervision, monitoring, and reporting;
- Travel of project personnel to consultation meetings;
- Provisions for IPs and disadvantage/vulnerable groups to attend consultations; and
- Unforeseen future expenses.

10.0 Grievance Mechanism

The Grievance Mechanism (GRM) is aimed at providing an open and transparent system for complaints and grievances to be resolved regarding any project related matter. The process must be timely, effective and efficient with clearly outlined steps that are shared with all stakeholders. The GRM is a critical tool in building trust and collaboration with the community and as a means of enabling remedial actions. The GRM is detailed in **Annex G**.

11.0 Monitoring and Reporting

The SEP will be a living document, revised and updated during every phase of project implementation. This will ensure lines of communication remain open and communications tools remain relevant. Project Consultation Plans are individually created with monitoring and Evaluation Frameworks to ensure adherence to timelines and any major changes to the project related activities and to its schedule should be duly reflected in the SEP.

Monthly summaries and internal reports on public grievances, enquiries and related incidents, together with the status of implementation of associated, corrective/preventative actions should be collated by PIU's Environmental and Social Personnel. The monthly summaries should provide a mechanism for assessing both the number and nature of complaints and requests for information, along with the

project's ability to address those in a timely and effective manner. It should also include any engagement activity conducted during the month.

At the end of each Community Meeting a comprehensive report will be submitted to the Bank. This report will give an account of engagement activity prior to the meeting as well as meeting notes, pictures, record of concerns and measures activated to assuage these concerns.

A number of Key Performance Indicators (KPIs) should also be monitored by the project on a regular basis, including the following parameters:

a) Number of consultation meetings and other public discussions/forums conducted within a reporting period (e.g. monthly, quarterly, or annually);
b) Frequency of public engagement activities;
c) Geographical coverage of public engagement activities;
d) Number of locations and communities covered by the consultation process;
e) Number of grievances received within a reporting period (e.g. monthly, quarterly, or annually) and number of those resolved within the prescribed timeline;
f) Type of grievances received; and
g) Number of materials published/broadcasted in the local, national and digital media.

12.0 Conclusion

The SEP is aimed at providing open and effective two-way communication and dialogue with the project related stakeholders and seeks to ensure that the project is executed in a transparent and open manner. Stakeholder Engagement is a key factor in the successful completion of the project and should therefore be recognized as an invaluable resource in the project's SEP. Implementation of the SEP should commence upon completion of the ESMP and should continue throughout the duration of the project. Updates to the SEP will be done periodically to ensure it remains relevant and effective.

Annex L – Water Resources Assessment

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WATER RESOURCES AGENCY

April 2023 Report

Water Resources Assessment of Selected Sub-Aquifers in Trinidad

WRA-GW-2023/004

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Table of Contents

DocuSign Envelope ID: 7CDA5D51-C436-41A1-99D6-A051901945D8

Executive Summary

This report presents an overview of the potential available groundwater resources and the identification of potential new wells in the following selected aquifers in Trinidad:

- Tucker Valley Bedrock
- Central Sands S2, S3 and S4
- Erin Sands 9 and
- Upper Morne L'Enfer I

Groundwater resources have been evaluated within the consolidated and unconsolidated aquifer systems of Trinidad and Tobago. Prior to 2000, exploitation of groundwater was primarily conducted within sedimentary formations of the Northern and Central Basins, and within the older sandstones of the Southern Basin. Assessments of the exploitation of these traditional groundwater systems in late 2000, alluded to production being close to or at the sustainable yield level in most of these systems. Within recent times, groundwater wells have been developed in fractures and fissures of the Northern Range and in the volcanic rocks of Tobago.

The discovery of groundwater in the bedrocks in North Trinidad, coupled with the application of the Geographic Information Systems (GIS) technology that is utilized by the Water Recourses Agency (WRA) in water resources assessment, has led recently to the identification of higher levels of untapped groundwater potential in many traditional aquifers.

Some of these aquifers, having additional groundwater withdrawal potential, were selected to address the demand supply deficit in underserved and unserved areas of Trinidad. The following Table summarizes the groundwater potential of the selected aquifers and proposed wells to utilize some of the untapped potential.

Aquifer/Subaquifer	Sustainable Yield (IMGD)	Surplus (IMGD)	Proposed New Wells	
			Name	**Estimated Production (IMGD)**
Tucker Valley Bedrock	2.64	2.64	Tucker Valley #34	0.22
Central Sands S2	6.16	6.16	Freeport Well #24	0.42
Central Sands S3	3.42	2.88	Freeport Well #23	0.42
Central Sands S4	6.73	3.84	Freeport Well #22	0.42
Erin Sands 9	1.41	1.41	Chatham #15	0.20
Upper Morne L'Enfer I	0.57	0.43	Clarke Road #9	0.14
Total	**20.93**	**17.36**		**1.82**

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1 Introduction

The Water Resources Agency (WRA) assesses the country's available groundwater resources on an annual basis. These groundwater sources in Trinidad are shown in Figure 1 below.

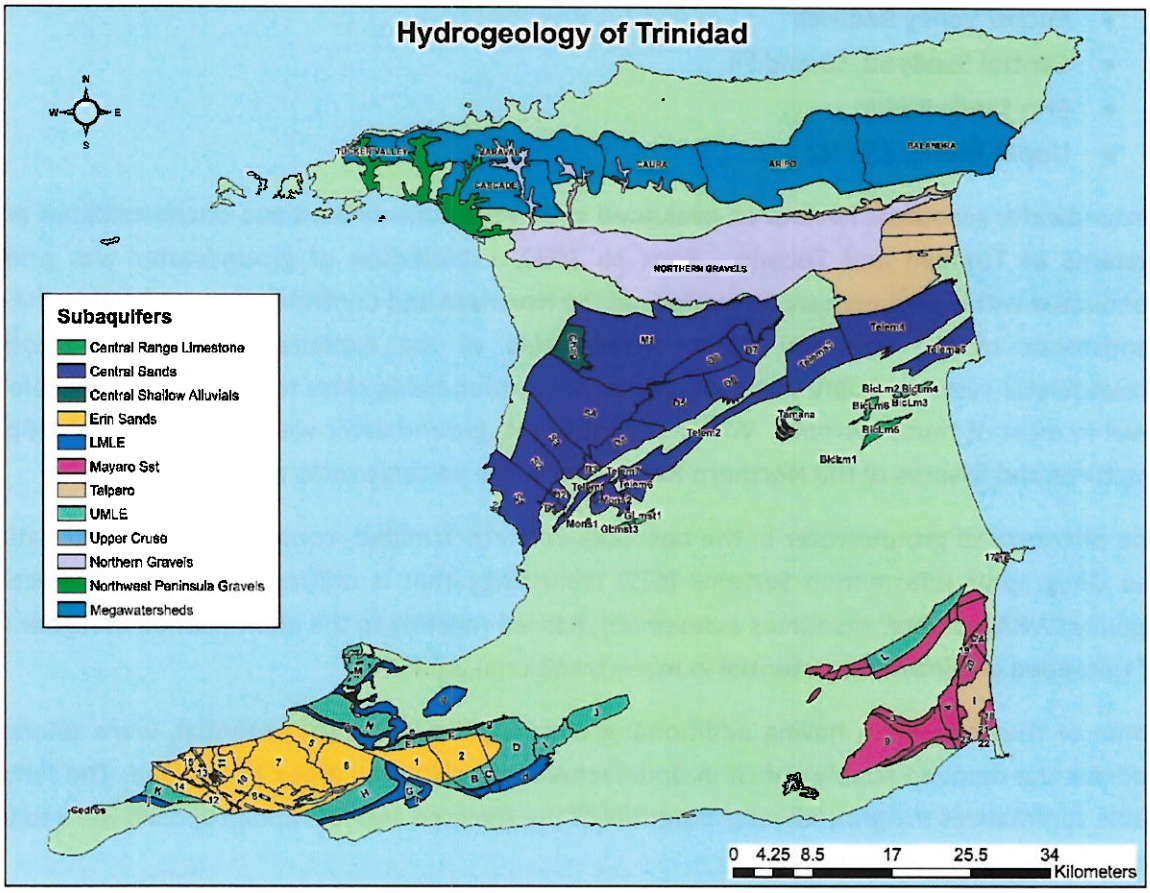

Figure 1: Groundwater Sources of Trinidad

This report presents an overview of the potential available groundwater resources and the identification of potential new wells in the following selected aquifers in Trinidad:

- Tucker Valley Bedrock;
- Central Sands S2, S3 and S4;
- Erin Sands 9 and;
- Upper Morne L'Enfer I.

The Sustainable Yields were determined and existing production in the systems were deducted to estimate the available surpluses which can be safely exploited. Proposed new wells were then sited, according to the WRA's Standard Operating Procedures (SOPs), while ensuring that the cones of influence do not overlap with other wells.

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2 Aquifer Descriptions

The major aquifers in Trinidad as shown in Figure 1 are the:

- Northwest Peninsula Gravels;
- Northern Gravels;
- Northern Range Bedrocks (Megawatersheds)
- Central Sands and;
- Southern Sands.

The Northwest Peninsula Gravels consist of alluvial and piedmont deposits in valleys (with a north-south orientation), in the western part of the Northern Range, extending from Chaguaramas (in the west) to Port of Spain (in the east). Furthermore, there are some water bearing limestone areas in the Northern Range, e.g. St. Ann's, Dorrington Gardens and Paramin. The main aquifers are:

- Tucker Valley Gravels (buried valley of the Cuesa River);
- Diego Martin Valley Gravels and;
- Port of Spain Gravels.

The Northern Gravels consist of wedge-shaped alluvial deposits and gravel-fans and are derived from erosion of the Northern Range rocks which are situated along the southern foothill of the Northern Range. They extend from east of Port of Spain to approximately three kilometres east of Arima, and southward onto the Caroni Plain. The main aquifers are the:

- El Socorro Gravels;
- Valsayn Gravels;
- Tacarigua Gravels;
- Arouca Gravels and;
- Arima Gravels.

These gravel-fan aquifers are recharged by rivers as they flow over them on their way to the Caroni River. There is a lateral connection between the El Socorro, the Valsayn and the Tacarigua Gravel aquifers.

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The Northern Range Bedrocks/Megawatersheds System includes: (1) Tucker Valley Megawatershed, (2) Maraval Megawatershed, (3) Caura Megawatershed, (4) Aripo Megawatershed, (5) Balandra Megawatershed and (6) the fracture Cascade aquifer system. They are metamorphic rocks which comprise two (2) aquifer types, structural (i.e., fracture-hosted) and carbonate.

The fracture-hosted aquifers are located in the Northern Range metamorphic rocks that have sedimentary protoliths. In these protoliths, metamorphism has destroyed all primary porosity, permeability, and original grain shape and size. Original protolith mineralogy has been altered to greenschist facies metamorphic minerals. Since metamorphism does not alter the elemental composition of the rocks, protolith mineralogy has a strong influence on metamorphic rock composition and the development of metamorphic cleavage. The latter may play a major role in recharge infiltration and bulk hydraulic storage in these rocks.

The carbonate rock units derive tertiary porosity from hydraulically connected systems of dissolved rock pore spaces and also possess significant secondary porosity. Much of the dissolution of carbonate rocks tends to focus along fractures, bedding planes, and foliation planes, leading to the formation of extraordinarily productive aquifers and megawatersheds in the Northern Range carbonate schists.

The Central Sands aquifers consist of blanket-sands, and are differentiated as:

- Sum Sum Sand (unseparated, Upper and Lower);
- Mahaica Sand;
- Durham Sand.

The Central Sands are located on the southern limb of the Caroni Syncline. They outcrop at irregular intervals in a band extending diagonally from Claxton Bay in a north-easterly trend towards the Cumuto area, and dip in a north-westerly direction towards the Gulf of Paria. The entire region is heavily faulted. The faults tend to be cemented and are relatively impervious. The sands are divided into a series of isolated pockets, which are generally not hydraulically interconnected. The division between the Sum Sum and the Mahaica Sands is marked by a large structural shift.

The Southern Sands are multiple-sand aquifers, which can be divided on the basis of age:

- Erin Formation: sands of Pleistocene Age and;
- Morne L'Enfer Formation: sandstones of Pliocene-Pleistocene Age.

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The area is heavily faulted, dividing both the Morne L'Enfer and the Erin Formations into a series of hydraulically discontinuous basins. The major faultline is in NW-SE direction. The general aquifer characteristics of the Southern Sands are as follows:

Erin Sand: Aquifer consists of fine and very fine sands; well bedded and lenticular as well as sheet sands; age of Formation: Pleistocene; aquifer is confined.

Morne L'Enfer Sand: Aquifer consists of sands with thin layers of silt and silty clay with lignite; well bedded massive lenticular sands; divided by the Lot 7 Silts into an upper and a lower part; age of Formation: Pliocene-Pleistocene; aquifer is confined.

The major source of recharge is direct infiltration of rainfall into the pervious soils.

This report provides an overview of the groundwater assessments conducted in the Tucker Valley Bedrock, Central Sands S2, S3 and S4, Erin Sands 9 and Upper Morne L'Enfer I Sandstone.

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3 Methodology

The methodology used in the assessment of the country's aquifers consist of the following steps:

1. Identification of the aquifer recharge area.
2. Compilation of aquifer hydrological parameters (rainfall, runoff coefficient, evapotranspiration).
3. Evaluation of aquifer's water quality.
4. Determination of aquifer recharge (water balance method):

   The Water Balance Equation is given by: $P = R + Et + I$

   Where; P = precipitation

   R= runoff

   ET= evapotranspiration

   I = infiltration

   Consequently: $Re = I * A$

   Where; Re = recharge

   A = areal extent of the recharge area

5. Computation of Sustainable Yield (SY) using either:
   a. Eighty (80) percent of aquifer recharge or
   b. The method of Zero Net Groundwater Fluctuation (called Maximum SY Method). In this method, the SY is the average annual net draft when groundwater elevation at the beginning and end of a period of time is the same. The method utilizes the following data:
      i. Water levels from observations wells in the aquifer;
      ii. Withdrawals for all production wells in the aquifer.
6. Identification of existing production wells and review of their production profiles.
7. Determination of any surplus water available for additional withdrawal using the difference between the Sustainable Yield and the Total Withdrawal for the aquifer.
8. Estimation of average production rates for proposed wells in the aquifer.

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9. Computation of radii of influence for proposed and existing wells in aquifer.
10. Siting of proposed wells (only if aquifer has surplus water) considering;
    a. hydrogeology,
    b. topography,
    c. radii of influence of proposed and existing wells
    d. water quality
    e. availability of supporting infrastructure
    f. land availability

These steps were carried out in accordance with the WRA's SOPs.

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4 Groundwater Potential and Proposed Wells

The groundwater assessments and proposed wells for the selected aquifers are summarized in the Tables 1 to 4 below.

Table 1A: Tucker Valley Bedrock Available Surplus

Sub Aquifer	Well Name & No.	Original Maximum Well Yield		Current Abstraction		Sustainable Yield		Surplus		Drainage Radius (m)	Well Depth (ft)	Screen Interval (ft)	Total Screen (ft)
		m3/mth	imgd	m3/mth	imgd	m3/mth	imgd	m3/mth	imgd				
Tucker Valley Megawatershed	-	-	-	-	-	442,600	3.2	442,600	3.2	-	-	-	-

Table 1B: Tucker Valley Bedrock Proposed Wells

Sub Aquifer	Well Options	Estimated Production		Location		Location	Estimated Distance from WTP (m)	Estimated Pipeline Distance to Nearest Production well (m)	Recommendations (Estimated Depths and Screens) (ft)
		m^3/mth	imgd	Easting	Northing				
Tucker Valley Bedrock	Tucker Valley #34 (Drill at TV #13 site)	30,429	0.22	651646.71	1186245.63	Tucker Valley Road	3,498m	780m from Tucker Valley #10	-
Tucker Valley Megawatershed	Tucker Valley #35	30,428	0.22	653235.32	1186172.699	Tucker Valley Road	3,815m	3,052m to Tucker Valley #25	-

N.B. Wells highlighted in red have been selected for high priority drilling.

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Table 2A: Central Sands Available Surplus

Sub Aquifer	Well Name & No.	Original Maximum Well Yield		Current Abstraction		Sustainable Yield		Surplus		Drainage Radius (m)	Well Depth (ft)	Screen Interval (ft)	Total Screen (ft)
		m3/mth	imgd	m3/mth	imgd	m3/mth	imgd	m3/mth	imgd				
Sum Sum, S2 Sands	-	-	-	-	-	-	6.16	-	6.16	-	-	-	-
Sum Sum, S3 Sands	Freeport #12	33,195	0.24	12,448	0.09	472,725	3.42	398,494	2.88	332	1,190	959.97 - 1040.03; 1060.04 - 1080.05; 1095.8 - 1105.97; 1140.09 - 1160.11	130
	Freeport #15	58,091	0.42	62,241	0.45					1,266	890	590 - 870	280
	TOTAL	91,286	0.66	74,689	0.54					-	-	-	-
Sum Sum, S4 Sands	Carlsen Field #1	-	-	49,792	0.36	930,281	6.75	531,664	3.85	-	-	-	-
	Carlsen Field #3	-	-	40,111	0.29					-	-	-	-
	Carlsen Field #5	63,624	0.46	48,409	0.35					-	-	-	-
	Carlsen Field #10	45,643	0.33	41,494	0.30					-	-	-	-
	Carlsen Field #11	63,624	0.46	56,708	0.41					-	-	-	-
	Carlsen Field #12	88,520	0.64	58,091	0.42					-	-	-	-
	Carlsen Field #13	53,708	0.41	45,643	0.33					-	-	-	-
	Ministry of Food Production (Well # 1)	-	-	-	-					-	-	-	-
	Ministry of Food Production (Well # 2)	-	-	-	-					-	-	-	-
	Seereeram Brother's	1,383	0.01	0.00	0.00					-	-	-	-
	Freeport #17	45,643	0.33	41,494	0.30					1,530	460	299.02 - 429	130
	Freeport #18	45,643	0.33	16,597	0.12					1,045	670	452 - 652	200
	Association of Jehovah's Witnesses	4,149	0.03	0.00	0.00					-	-	-	-
	El Chico Farms	5,533	0.04	0.00	0.00					-	-	-	-
	TOTAL	420,670	3.04	398,340	2.88								

Table 2B: Central Sands Proposed Wells

Sub Aquifer	Well Options	Estimated Production		Location	Land Tenure	Risk & Challenges	Estimated Distance from Freeport WTP (m)	Estimated Pipeline Distance to raw water line (m)	Recommendations (Estimated Depths and Screens)
		m^3/mth	IMGD						
Sum Sum, S2 Sands	Option 1 Freeport #19	58,260	0.42	671549.23 E 1153017.67 N	State	High Iron	1,563	2,532	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S2 Sands	Option 2 Freeport #24	58,260	0.42	671757.59 E 1151275.38 N	State		2,964	2,129	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S2 Sands	Option 4 Freeport #20	58,260	0.42	669939.24 E 1153063.97 N	State		3,098	3,959	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S3 Sands	Option 3	58,260	0.42	674624.45 E 1157701.73 N	State		4,123	3,792	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S3 Sands	Option 7 Freeport #23	58,260	0.42	671547.00 E 1154520.00 N	Private		1,542	2,861	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S4 Sands	Option 5 Freeport #22	58,260	0.42	677416.0 E 1157427.0 N	State		5,129	1,832	1,500 ft. TD 200 ft. Total Screen

N.B. Wells highlighted in red have been selected for high priority drilling.

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Table 3A: Erin Sands 9 Available Surplus

Sub Aquifer	Well Name & No.	Original Maximum Well Yield		Current Abstraction		Sustainable Yield		Surplus		Drainage Radius (m)	Well Depth (ft)	Screen Interval (ft)	Total Screen (ft)
		m3/mth	imgd	m3/mth	imgd	m3/mth	imgd	m3/mth	imgd				
Erin Sands 9	-	-	-	-	-	195,237	1.41	195,237	1.41	886	1240	-	262

Table 3B: Erin Sands 9 Proposed Well

Sub Aquifer	Well Options	Estimated Production		Location		Drainage Radius (m)	Location	Estimated Distance from WTP (m)	Estimated Pipeline Distance to Nearest Production well (m)	Recommendations (Estimated Depths and Screens) (ft)
		m^3/mth	imgd	Easting	Northing					
Erin Sands 9	Chatham #15	30,428	0.22	6377074.62	1120997.921	886	Bobby Trace, Chatham North Rd	2,418	1,125m from Chatham #16	1240 ft with 262 ft of screen

N.B. Wells highlighted in red have been selected for high priority drilling.

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WATER & SEWERAGE AUTHORITY
WATER RESOURCES AGENCY

Reviewed & Approved By:

DocuSigned by:
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Keith Meade, MSc Water Resources Management
Senior Manager
Water Resources Agency

Date

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Table 4A: Upper Morne L'Enfer I Available Surplus

Sub Aquifer	Well Name & No.	Original Maximum Well Yield		Current Abstraction		Sustainable Yield		Surplus		Drainage Radius (m)	Well Depth (ft)	Screen Interval (ft)	Total Screen (ft)
		m3/mth	imgd	m3/mth	imgd	m3/mth	imgd	m3/mth	imgd				
UMLE I	Clarke Road #7	16,598	0.12	11,065	0.08	78,453	0.57	60,001	0.44	773	536	416 - 516	100
	Clarke Road #8	13,831	0.10	6,916	0.05					494	446	295 - 426	131
	TOTAL	30,429	0.22	17,981	0.13								

Table 4B: Upper Morne L'Enfer I Proposed Wells

Sub Aquifer	Well Options	Estimated Production		Location		Land Tenure	Risk & Challenges	Estimated Pipeline Distance to Distribution Line (m)	Recommendations (Estimated Depths and Screens) (ft)
		m^3/mth	IMGD	Easting	Northing				
UMLE I	Option 1	19,808	0.14	672033.01	1122920.02	State [1]	Land availability High iron Hydrocarbons	738	110-140; 205-225; 325-395
	Option 2	19,808	0.14	672330.47	1122613.11	State	Land availability High iron Hydrocarbons	490	
	Option 3 (Clarke Rd #9)	19,808	0.14	672869.33	1122982.33	Private	Land availability High iron Hydrocarbons	36	

N.B. Wells highlighted in red have been selected for high priority drilling.

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WATER RESOURCES AGENCY

Annex I:
Tucker Valley Bedrock Aquifer
New Wells Report
June 2021

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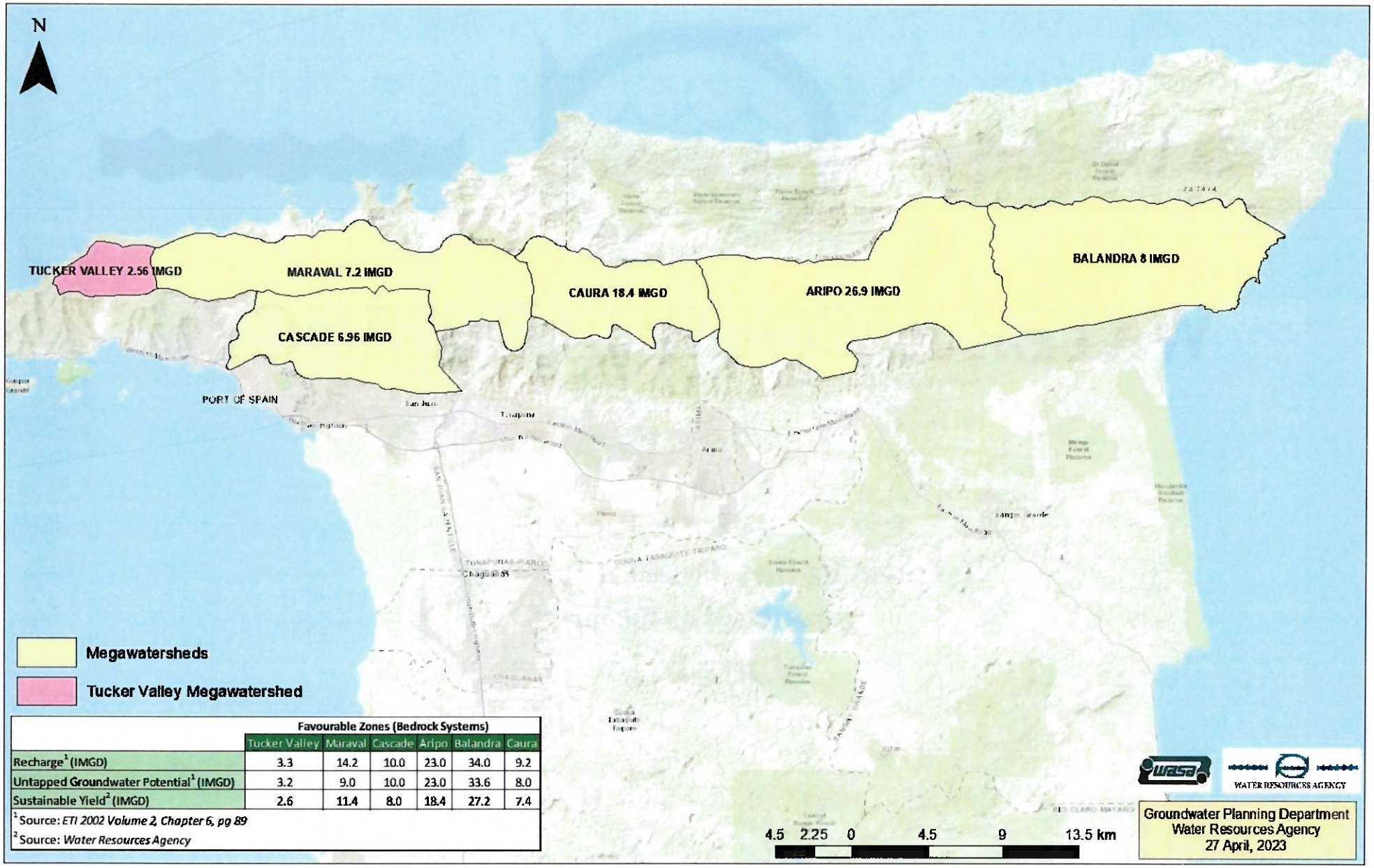
"Water Security for Every Sector
Deliver it. Sustain it."

Sustainable Yield of Trinidad's Megawatersheds



	Favourable Zones (Bedrock Systems)					
	Tucker Valley	Maraval	Cascade	Aripo	Balandra	Caura
Recharge[1] (IMGD)	3.3	14.2	10.0	23.0	34.0	9.2
Untapped Groundwater Potential[1] (IMGD)	3.2	9.0	10.0	23.0	33.6	8.0
Sustainable Yield[2] (IMGD)	2.6	11.4	8.0	18.4	27.2	7.4

[1] Source: *ETI 2002 Volume 2, Chapter 6, pg 89*
[2] Source: *Water Resources Agency*

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Tucker Valley Bedrock Production Well

Sub Aquifer	Well Name & No.	Original Maximum Well Yield		Current Abstraction		Sustainable Yield		Surplus		Drainage Radius (m)	Well Depth (ft)	Screen Interval (ft)	Total Screen (ft)
		m3/mth	imgd	m3/mth	imgd	m3/mth	imgd	m3/mth	imgd				
Tucker Valley Megawatershed	-	-	-	-	-	**442,600**	**3.2**	**442,600**	**3.2**	-	-	-	-

According to the ETI the Tucker Valley Megawatershed includes both fractured bedrock and sand and gravel aquifers.

There is 14.6 ML/day (3.2 imgd) of untapped groundwater potential in Tucker Valley that has yet to be explored (*ETI 2002. Volume II, Chapter VI, Page 89.)*

There are ten production wells in the Tucker Valley Alluvials
There are no production wells in the bed rock aquifer.

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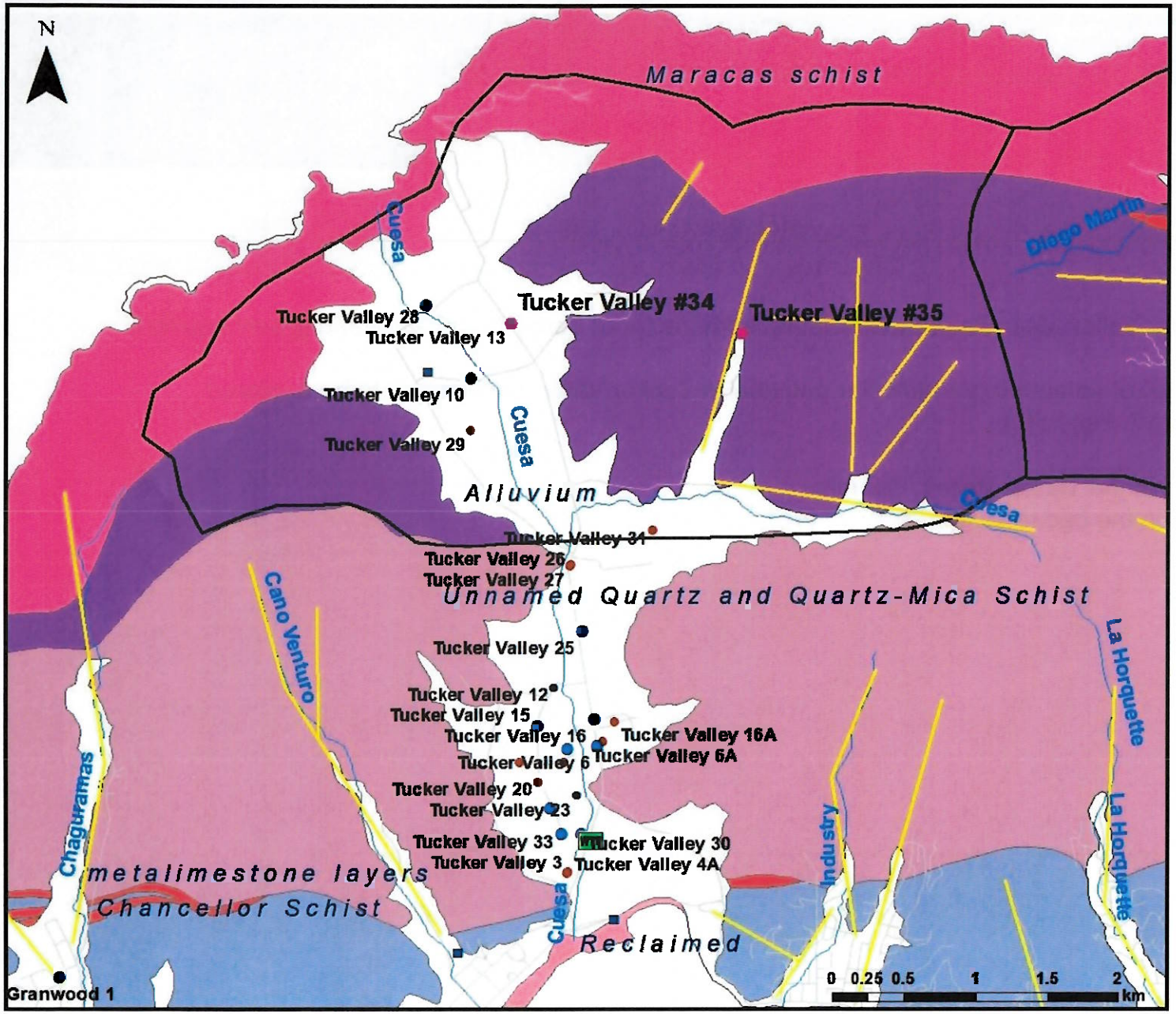
Location of Existing Tucker Valley Wells and Proposed Wells(#13, #28 and #34)



- Production (Active)
- Observation
- Abandoned
- Proposed Wells
- Water Treatment Plant
- lineaments
- Major Rivers
- Roads
- Megawatershed

WATER RESOURCES AGENCY

Groundwater Planning Department
Water Resources Agency
27 April, 2023

DocuSign Envelope ID: 7CDA5D51-C436-41A1-99D6-A051901945D8

Tucker Valley Proposed Bedrock Wells

Sub Aquifer	Well Options	Estimated Production		Location		Location	Estimated Distance from WTP (m)	Estimated Pipeline Distance to Nearest Production well (m)	Recommendations (Estimated Depths and Screens) (ft)
		m^3/mth	imgd	Easting	Northing				
Tucker Valley Bedrock	Tucker Valley #34 (Drill at TV #13 site)	30,429	0.22	651646.71	1186245.63	Tucker Valley Road	3,498m	780m from Tucker Valley #10	-
Tucker Valley Megawatershed	Tucker Valley #35	30,428	0.22	653235.32	1186172.699	Tucker Valley Road	3,815m	3,052m to Tucker Valley #25	-

NB. Tucker Valley #13 status is an observation well at present.

Wells highlighted in red have been selected for high priority drilling.

Production of proposed wells estimated from wells in the Maraval Favourable Zone (bedrock). (See Slide 6).

Recommendations for total depth and screens are only estimates. Hydrogeological and lithological subsurface characteristics at the proposed well sites, can only be confirmed by actual drilling. Distances between proposed well and WTP can be reduced by connecting wells in a chain.

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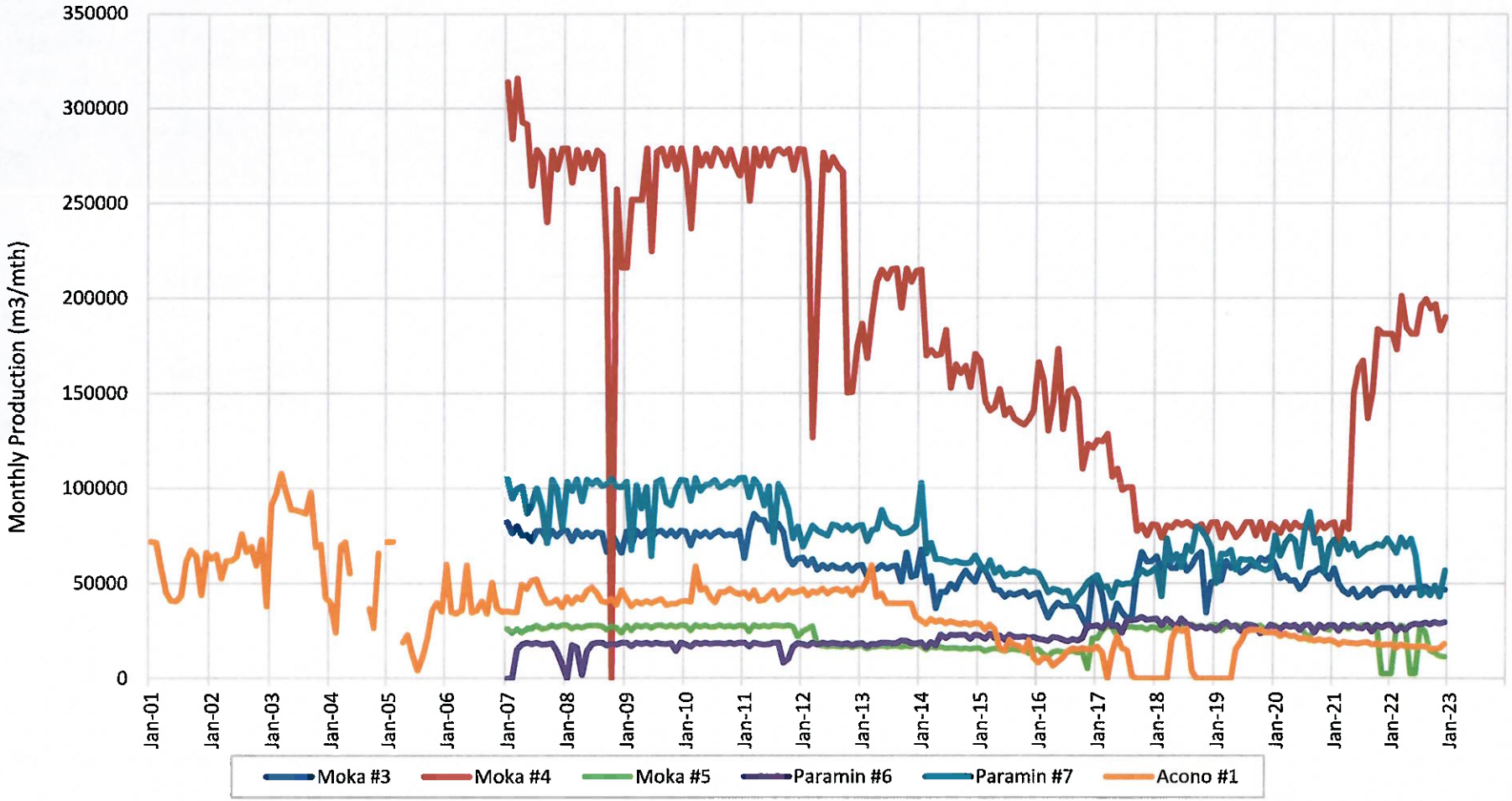
Production Profiles: Maraval Favourable Zone



Paramin #6 and Moka #5 are used to estimate the production. These wells were selected as the most stable wells in the Maraval Favourable Zone (bedrock) and both have a value of 0.2 IMGD for stabilized production.

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WATER RESOURCES AGENCY

Annex 2:
Central Sands S2, S3 & S4
Freeport New Wells Report

2022 November 09

DocuSign Envelope ID: 7CDA5D51-C436-41A1-99D6-A051901945D8

Central Sands (S2, S3, S4) Production Well Summary

Sub Aquifer	Well Name & No.	Original Maximum Well Yield		Current Abstraction		Sustainable Yield		Surplus		Drainage Radius (m)	Well Depth (ft)	Screen Interval (ft)	Total Screen (ft)
		m3/mth	imgd	m3/mth	imgd	m3/mth	imgd	m3/mth	imgd				
Sum Sum, S2 Sands	-	-	-	-	-	-	**6.16**	-	**6.16**	-	-	-	-
Sum Sum, S3 Sands	Freeport #12	33,195	0.24	12,448	0.09	**472,725**	**3.42**	**398,494**	**2.88**	332	1,190	959.97 - 1040.03; 1060.04 - 1080.05; 1095.8 - 1105.97; 1140.09 - 1160.11	130
	Freeport #15	58,091	0.42	62,241	0.45					1,266	890	590 - 870	280
	TOTAL	**91,286**	**0.66**	**74,689**	**0.54**					-	-	-	-
Sum Sum, S4 Sands	Carlsen Field #1	-	-	49,792	0.36	**930,281**	**6.73**	**531,664**	**3.85**	-	-	-	-
	Carlsen Field #3	-	-	40,111	0.29					-	-	-	-
	Carlsen Field #5	63,624	0.46	48,409	0.35					-	-	-	-
	Carlsen Field #10	45.643	0.33	41,494	0.30					-	-	-	-
	Carlsen Field #11	63,624	0.46	56,708	0.41					-	-	-	-
	Carlsen Field #12	88,520	0.64	58,091	0.42					-	-	-	-
	Carlsen Field #13	53,708	0.41	45,643	0.33					-	-	-	-
	Ministry of Food Production (Well # 1)	-	-	-	-					-	-	-	-
	Ministry of Food Production (Well # 2)	-	-	-	-					-	-	-	-
	Seereeram Brother's	1,383	0.01	0.00	0.00					-	-	-	-
	Freeport #17	45,643	0.33	41,494	0.30					1,530	460	299.02 - 429	130
	Freeport #18	45,643	0.33	16,597	0.12					1,045	670	452 - 652	200
	Association of Jehovah's Witnesses	4,149	0.03	0.00	0.00					-	-	-	-
	El Chico Farms	5,533	0.04	0.00	0.00					-	-	-	-
	TOTAL	**420,470**	**3.04**	**398,340**	**2.88**								

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Central Sands (S2, S3, S4) Proposed Wells

Sub Aquifer	Well Options	Estimated Production		Location	Land Tenure	Risk & Challenges	Estimated Distance from Freeport WTP (m)	Estimated Pipeline Distance to raw water line (m)	Recommendations (Estimated Depths and Screens)
		m^3/mth	IMGD						
Sum Sum, S2 Sands	Option 1 Freeport #19	58,260	0.42	671549.23 E 1153017.67 N	State	High Iron	1,563	2,532	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S2 Sands	Option 2 Freeport #24	58,260	0.42	671757.59 E 1151275.38 N	State		2,964	2,129	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S2 Sands	Option 4 Freeport #20	58,260	0.42	669939.24 E 1153063.97 N	State		3,098	3,959	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S3 Sands	Option 3	58,260	0.42	674624.45 E 1157701.73 N	State		4,123	3,792	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S3 Sands	Option 7 Freeport #23	58,260	0.42	671547.00 E 1154520.00 N	Private		1,542	2,861	1,500 ft. TD 200 ft. Total Screen
Sum Sum, S4 Sands	Option 5 Freeport #22	58,260	0.42	677416.0 E 1157427.0 N	State		5,129	1,832	1,500 ft. TD 200 ft. Total Screen

California #3 which is in the S2 sub-aquifer is to be equipped with pump and related accessories, electrical and pipeline. Estimated production is 0.15 IMGD

- Options in black have already been tendered while those in purple have been relocated to state land to expedite the land acquisition process.
- Option in blue was sited in the first iteration of this report and can be utilized if needed
- Recommendations for total depth and screens are only estimates. Hydrogeological and lithological subsurface characteristics at the proposed well sites, can only be confirmed by actual drilling.

Wells highlighted in red have been selected for high priority drilling.

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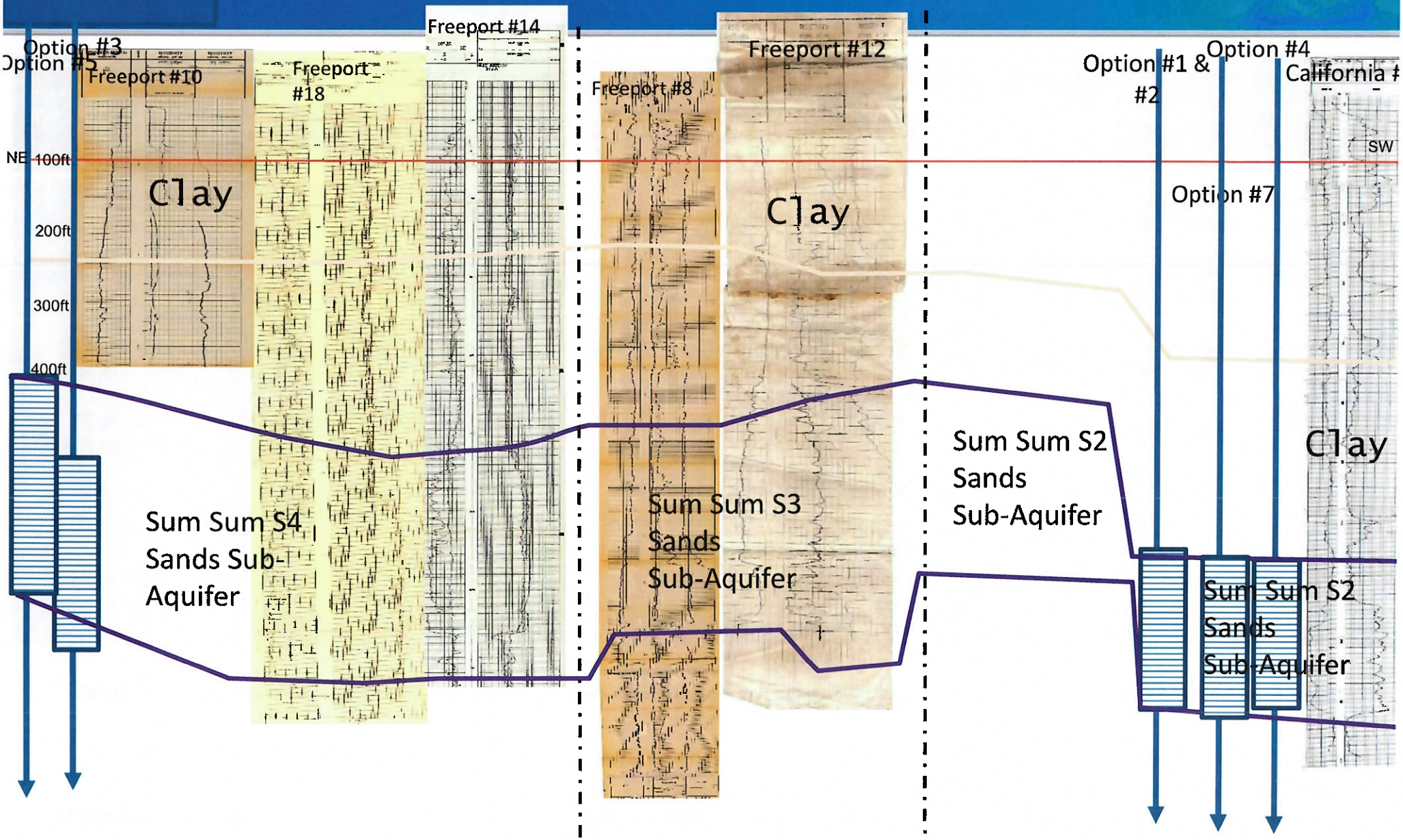
Freeport Cross Section A (Sum Sum Sub-aquifers)



- The direction of dip for the Sum Sums Sands trends westwards towards the Gulf of Paria. The dip gets steeper in the south-west.

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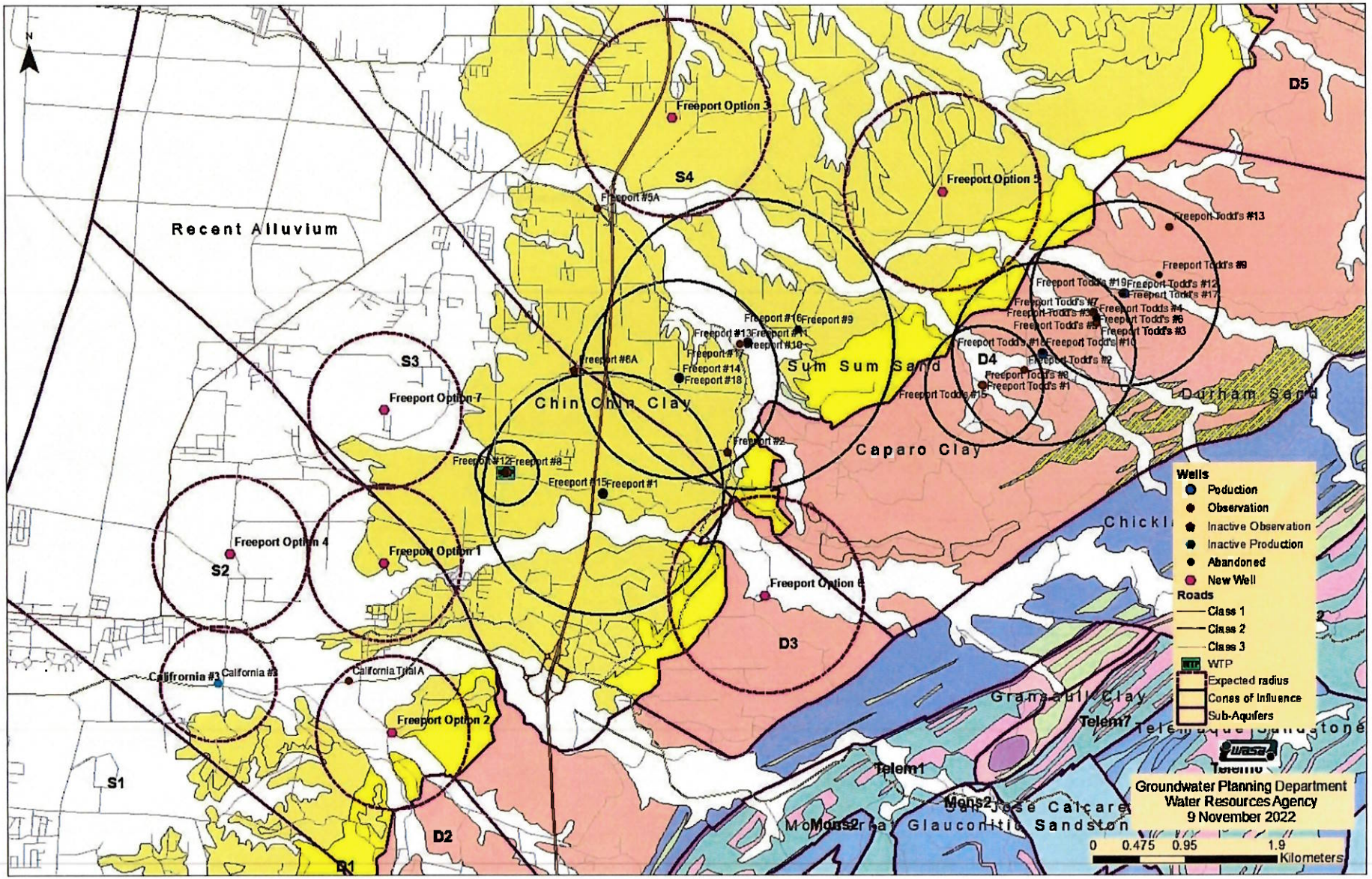
Location of Freeport Proposed Wells in S2, S3, S4 & D3



- Recommendations for total depth and screens are only estimates. Hydrogeological and lithological subsurface characteristics at the proposed well sites, can only be confirmed by actual drilling.

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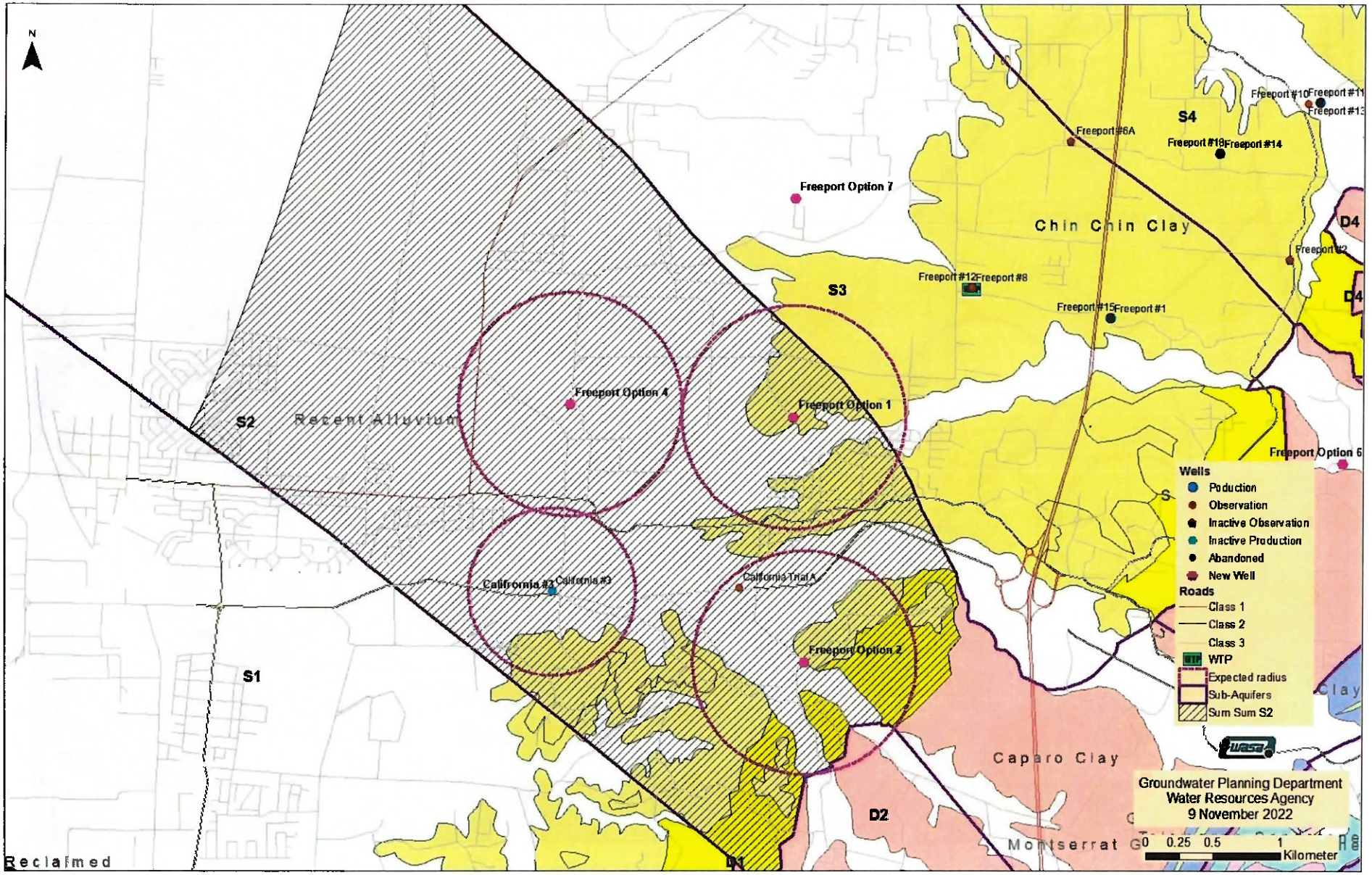
Location of Freeport Proposed Wells in Sum Sum S2 Sub-Aquifer



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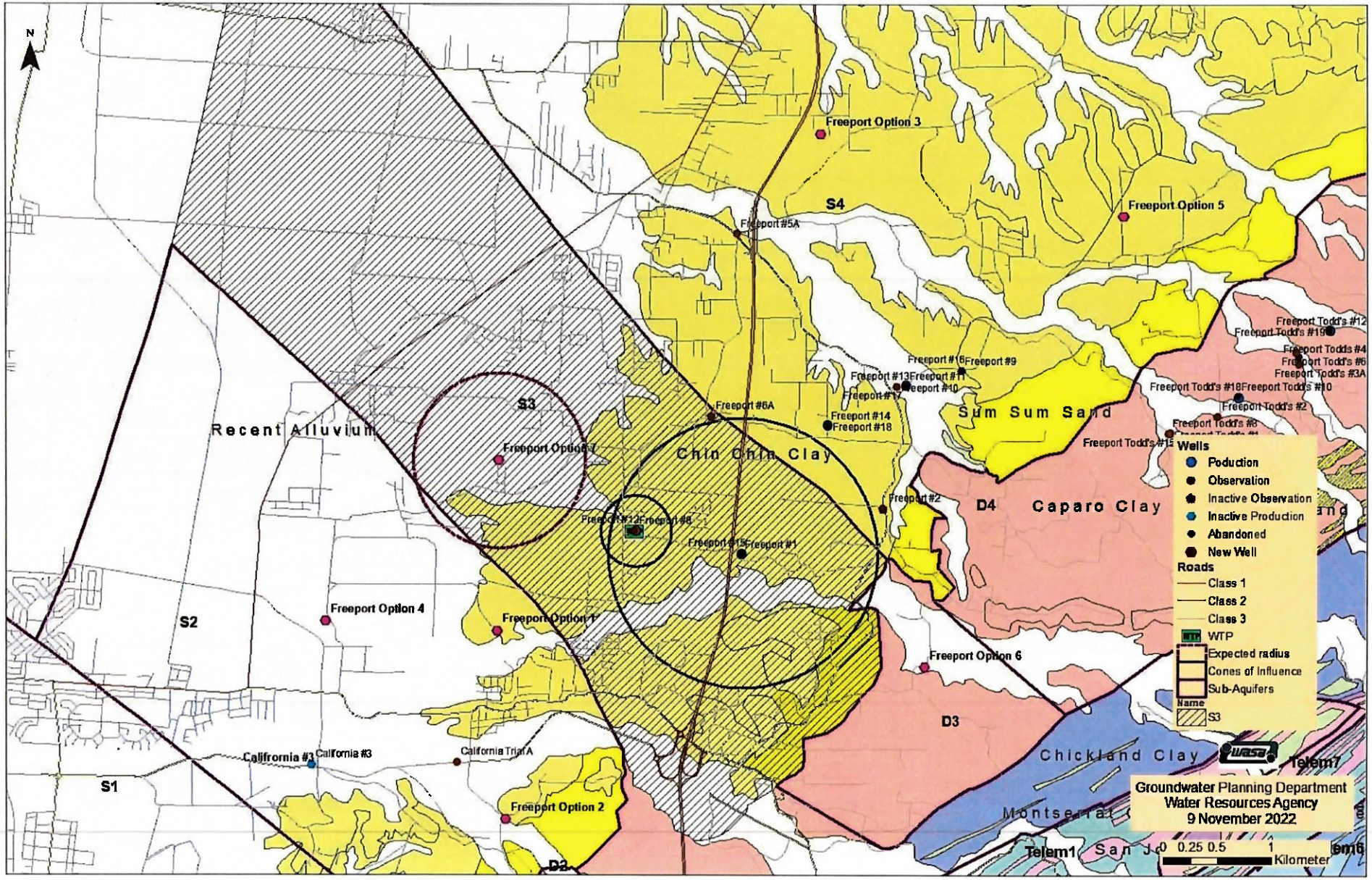
Location of Freeport Proposed Wells in Sum Sum S3 Sub-Aquifer



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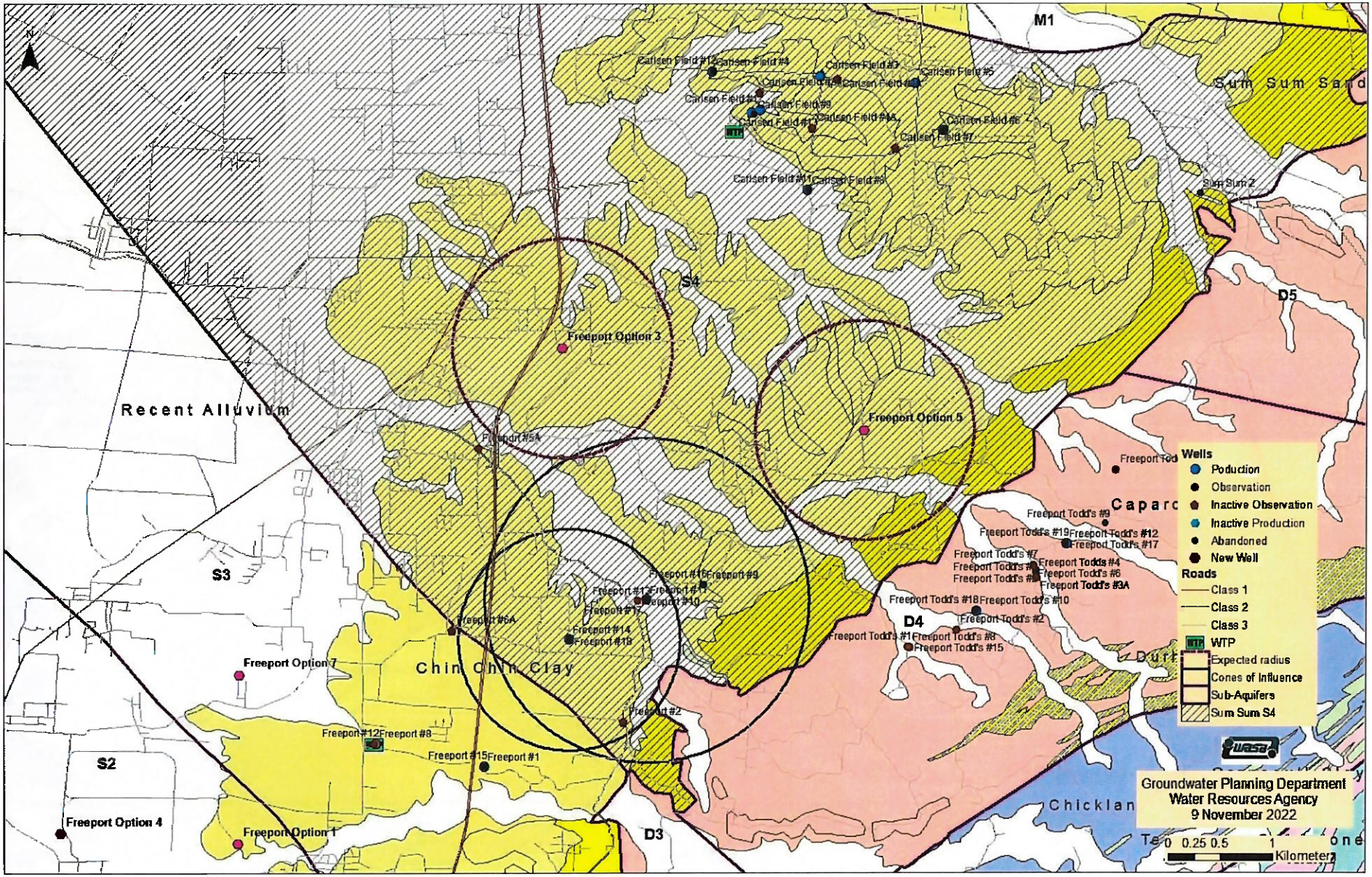
Location of Freeport Proposed Wells in Sum Sum S4 Sub-Aquifer



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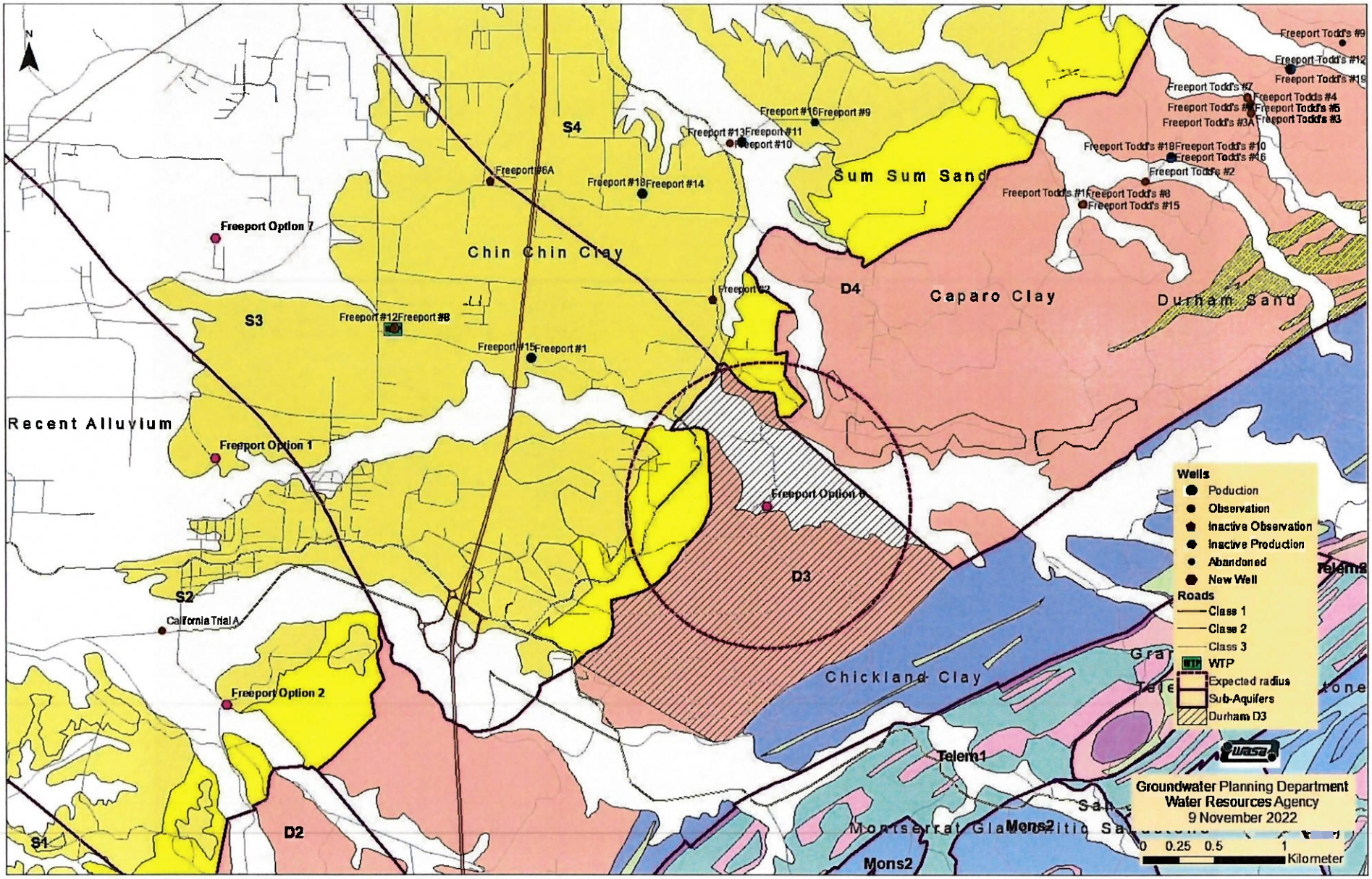
Location of Freeport Proposed Wells in Durham D3 Sub-Aquifer



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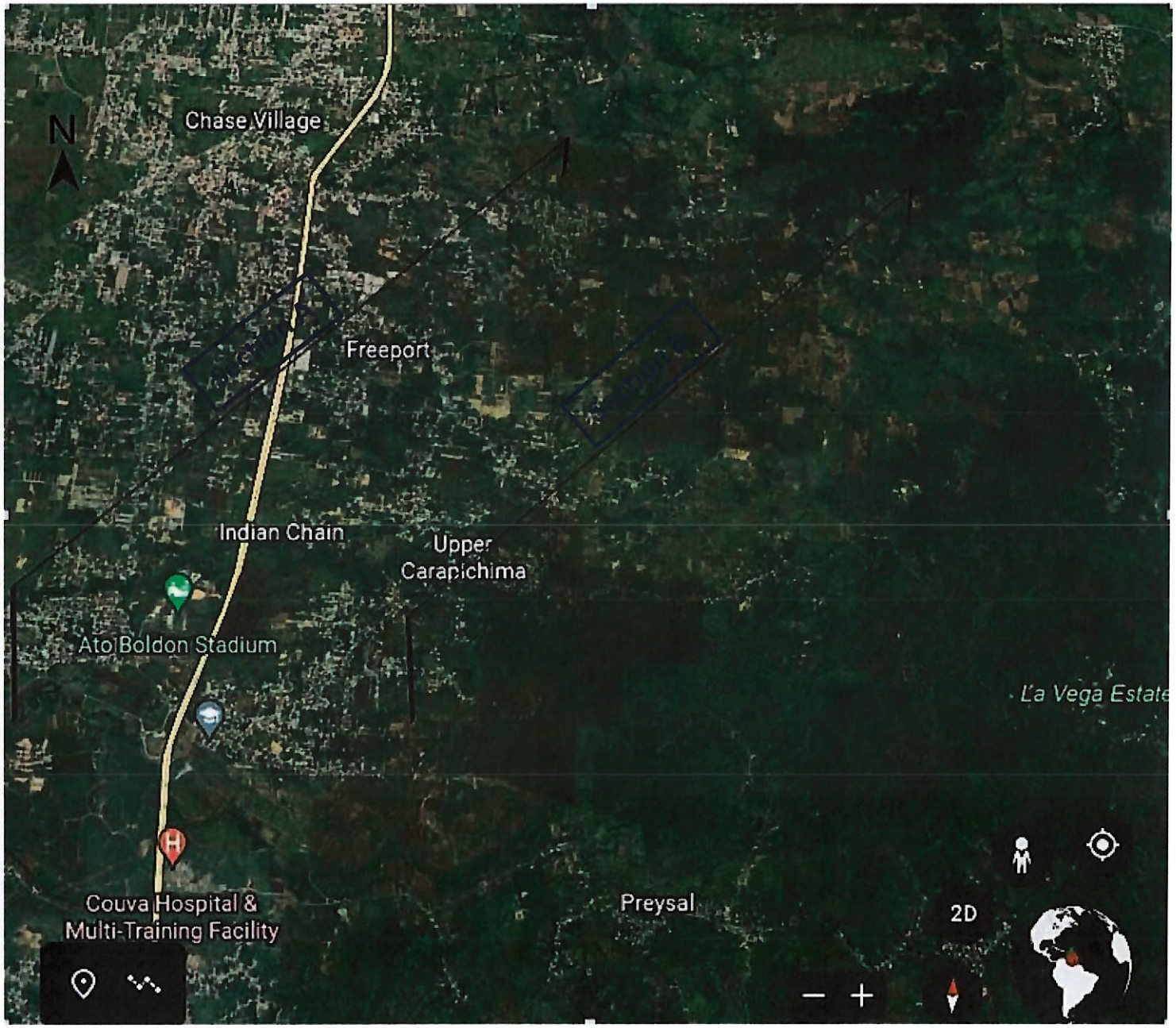
Transverse Section Map



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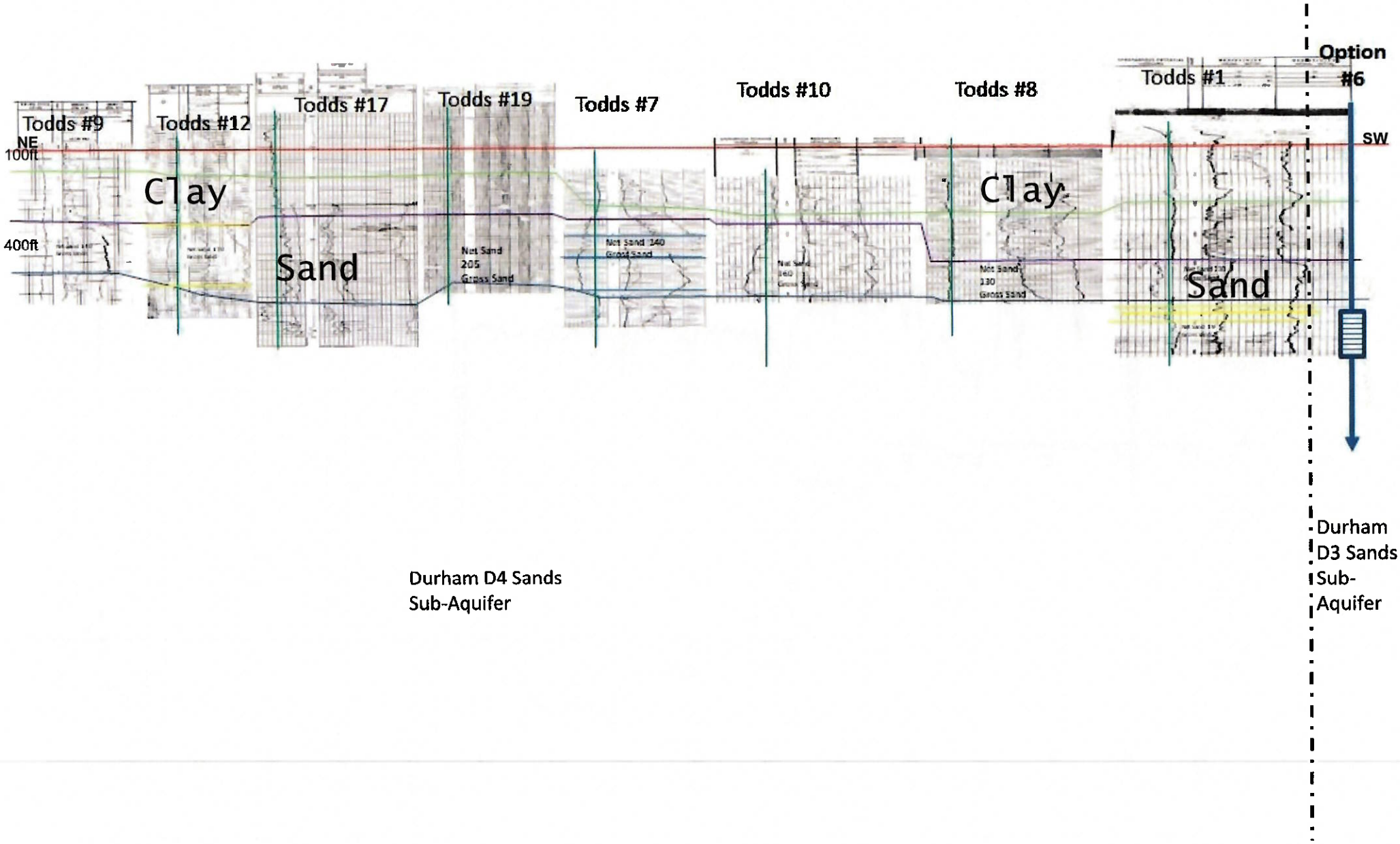
Freeport Cross Section B (Durham Sands)



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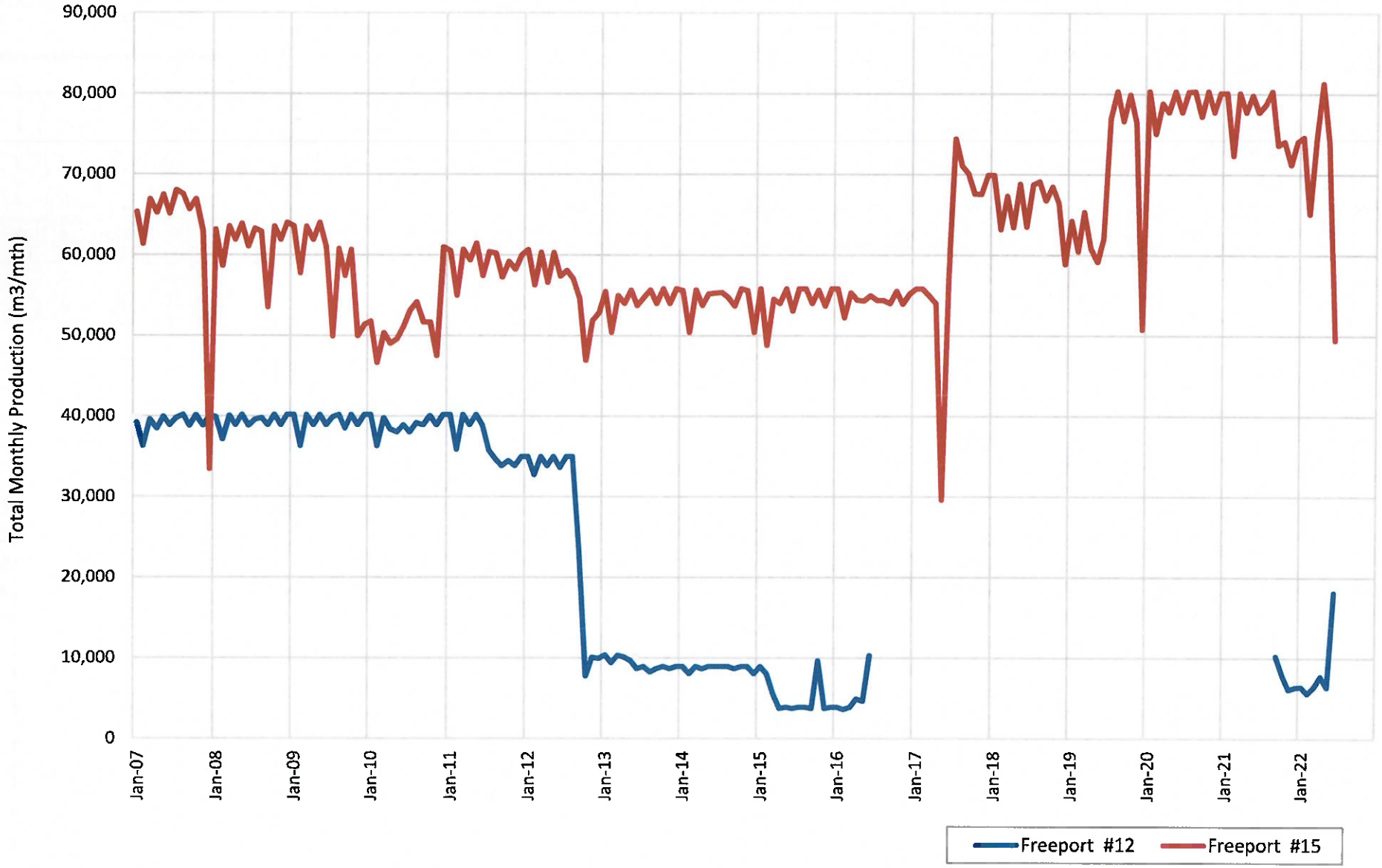
Production Profiles
Sub-Aquifer: Sum Sum S3 Sands



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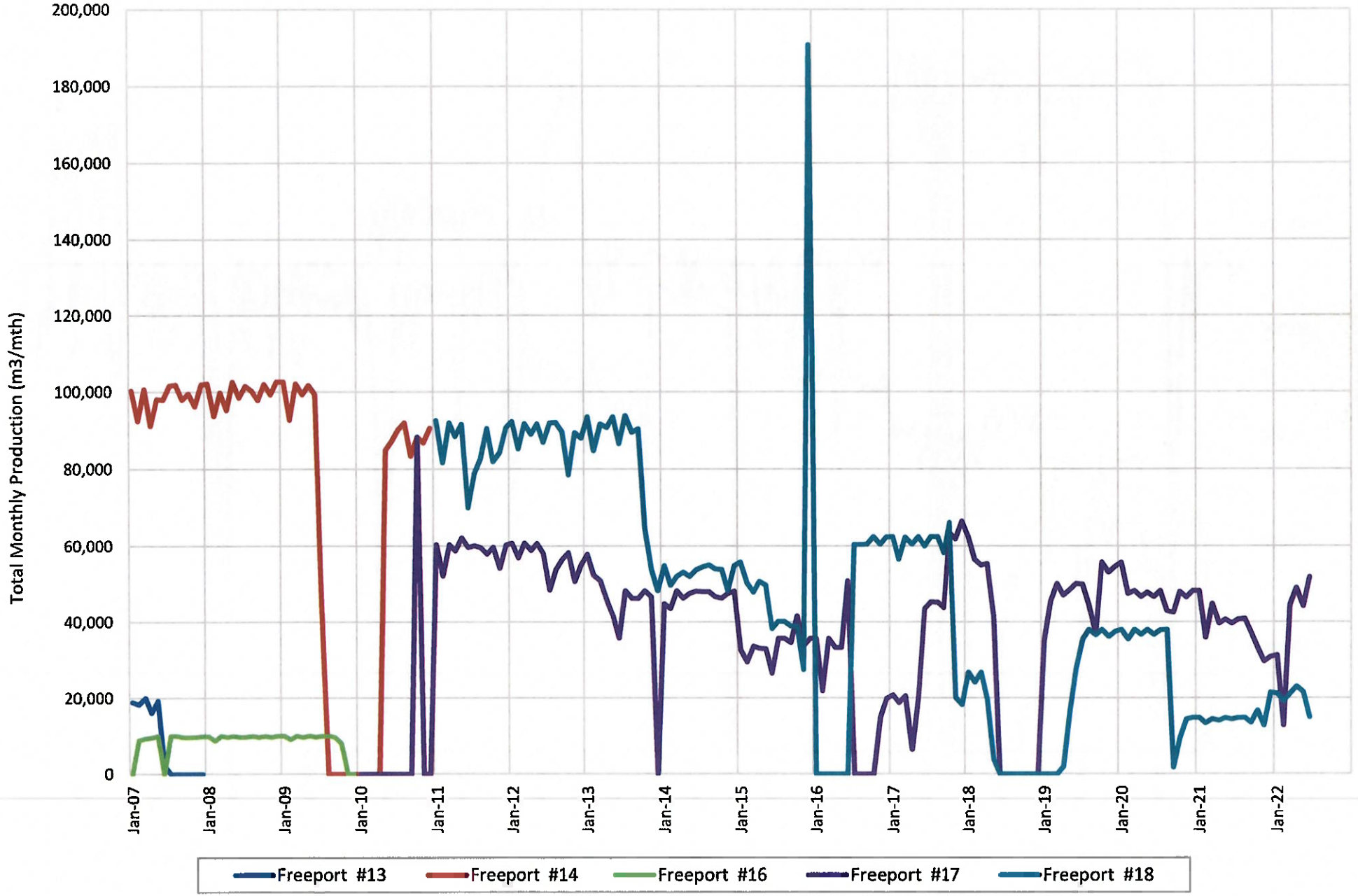
Production Profiles
Sub-Aquifer: Sum Sum S4 Sands



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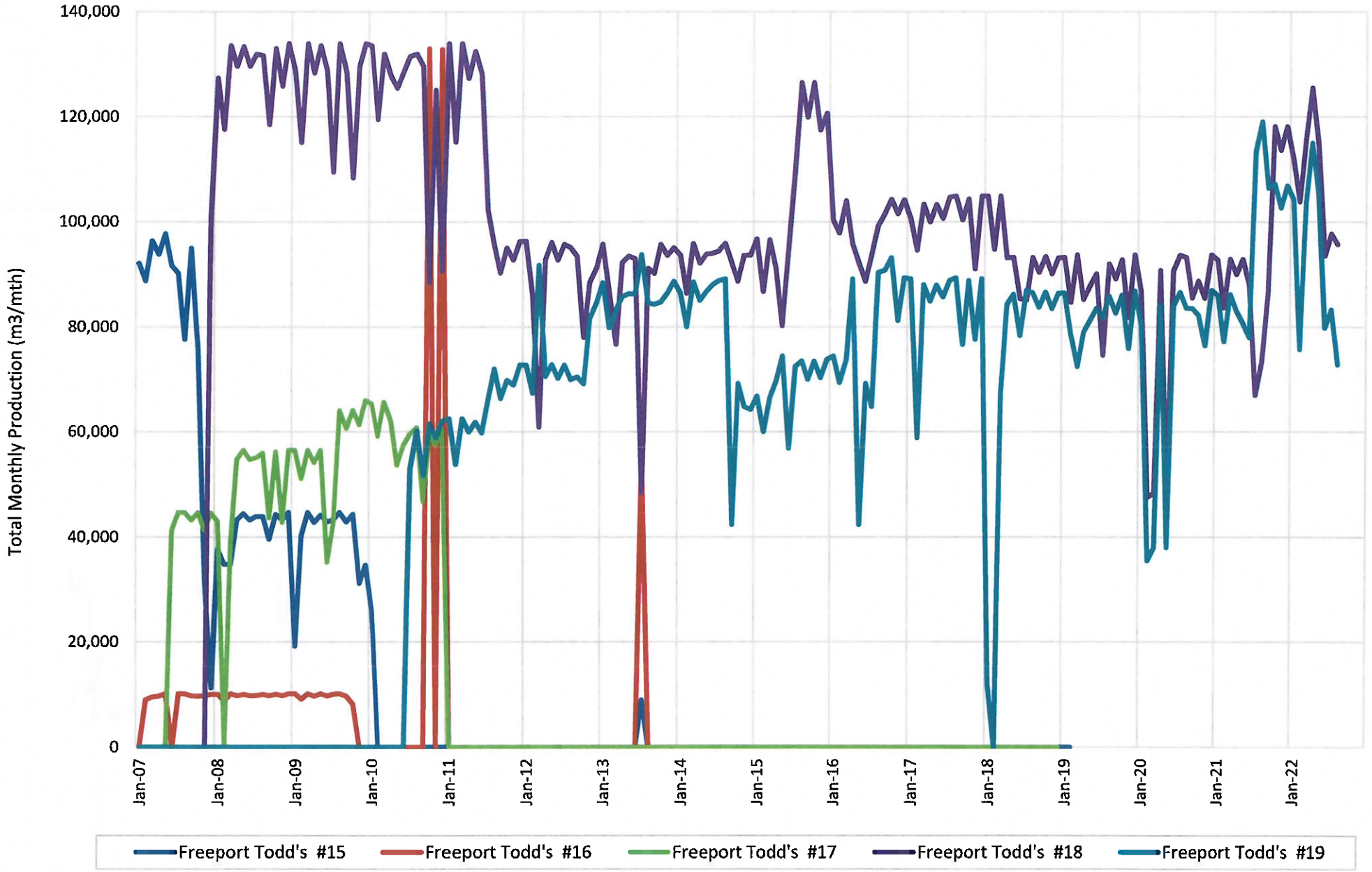
Production Profiles
Sub-Aquifer: Durham D4 Sands



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Preliminary Estimated Cost per Well

Works		Cost
Drilling Phase	Drilling	$2,140,800.00
	Development	$403,700.00
	Pump Testing	$128,050.00
	Total	**$2,672,550.00**
Equipping Phase	Mechanical	$423,050.00
	Electrical	$483,528.00
	Civil	$195,582.00
	Total	**$1,102,160.00**
Reporting Phase Total	Document submission with reports	$9,000.00
	Total	**$9,000.00**
Sub Total		**$3,783,710.00**
12.5% VAT		**$472,964.00**
Grand Total		**$4,256,674.00**

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APPENDICES

APPENDIX	DESCRIPTION
APPENDIX I	Optimum Well Spacing Methods
APPENDIX II	Results for Subaquifer S2 and S3 Well Spacing

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Appendix I Optimum Well Spacing Methods

Method	Formula	Key Parameters
Zhai et al (2021)	Empirical Relationship	K
UNDP (1982)	$R = 60\sqrt{(QtN/Rg)}$	Rg
Net Sands	R = 7758 x Area (acres) x H x S.W. x Porosity x RF x BW	Net Sands
Mojid (1991)	$R = 2.14\sqrt{(QtN/dS)}$	d & S

KEY FOR EACH VARIABLE USED IN OPTIMUM WELL SPACING FORMULAE

Q = average discharge rate from a well, l/s
t = average well operating hours in a day
N = number of well operating days in one recharge-depletion cycle
H = height in feet
R = diameter of a pocket area within the basin required for one tube well which is the optimum well spacing, m
d = allowable fluctuation of groundwater level within safe limit, m
S = specific yield of the subsurface to groundwater level fluctuation
Rg = usable annual recharge , mm/year
Sw = drawdown at the well outer perimeter
K = Hydraulic Conductivity of Material
h0 = saturated aquifer thickness
A = total area of groundwater basin (m2)
BW = Water Expansion Coefficient
RF = Recovery Factor
Porosity = Constant for how porous material is
SW = Water Saturation constant

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Appendix II: Optimum Well Spacing Methods

Method	Separation Distances (m)			
	Sum Sum S2	Sum Sum S3	Sum Sum S4	Durham D3
UNDP (1982)	815.4	815.4	1,034	1,034
Mojid (1984)	704.7	704.7	1,064	1,064

UNDP (1982) Method used for radii of influence in maps

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VARIATION

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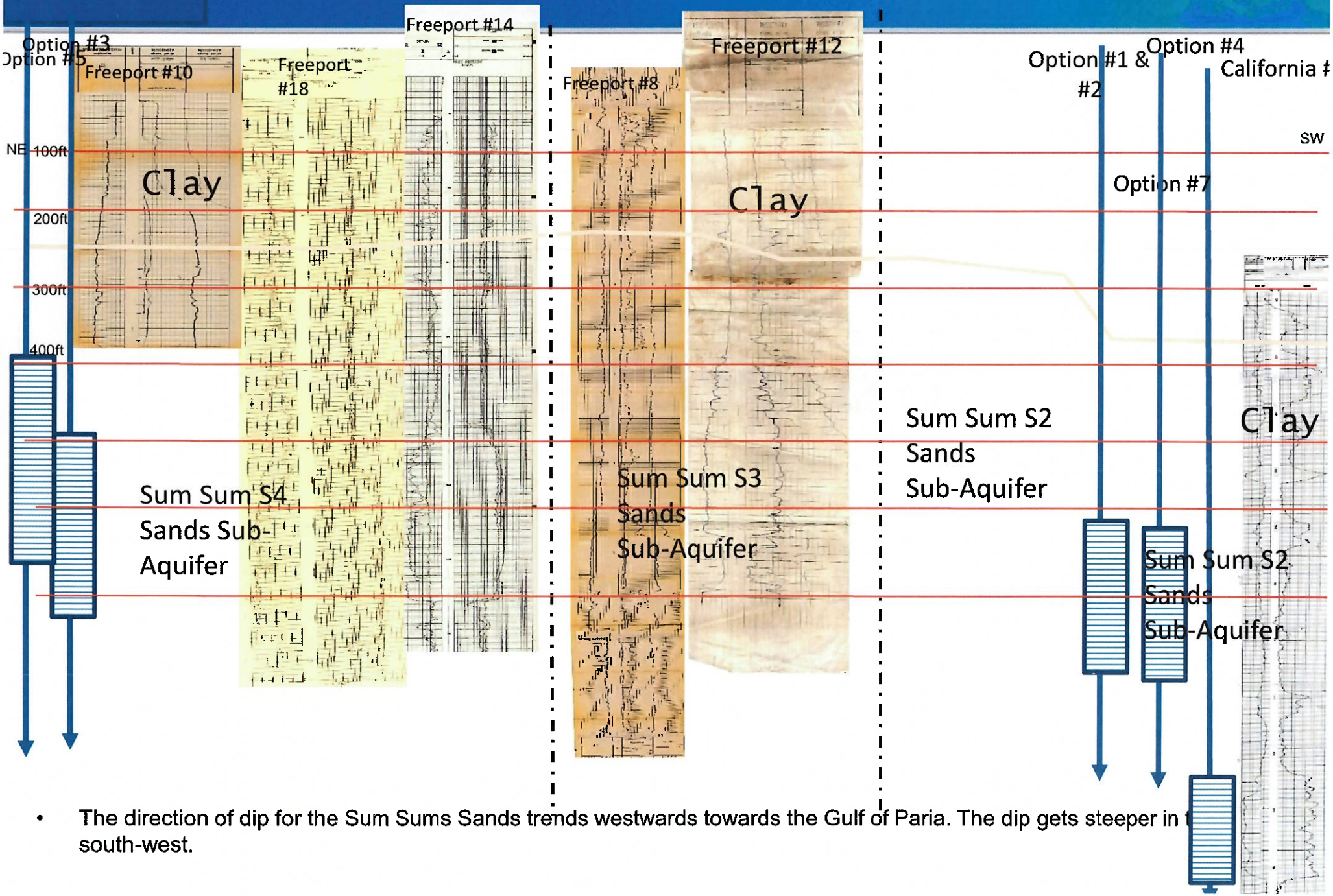
Freeport Cross Section A (Sum Sum Sub-aquifers)



- The direction of dip for the Sum Sums Sands trends westwards towards the Gulf of Paria. The dip gets steeper in t south-west.

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WATER RESOURCES AGENCY

Annex 3:

Erin Sands 9
Chatham New Wells Report
June 2021

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Erin Sands 9 Production Well Summary

Sub Aquifer	Well Name & No.	Original Maximum Well Yield		Current Abstraction		Sustainable Yield		Surplus		Drainage Radius (m)	Well Depth (ft)	Screen Interval (ft)	Total Screen (ft)
		m3/mth	imgd	m3/mth	imgd	m3/mth	imgd	m3/mth	imgd				
Erin Sands 9	-	-	-	-	-	**195,237**	**1.41**	**195,237**	**1.41**	886	1240	-	262

N.B.: No abstraction of water in Erin 9 sub-aquifer

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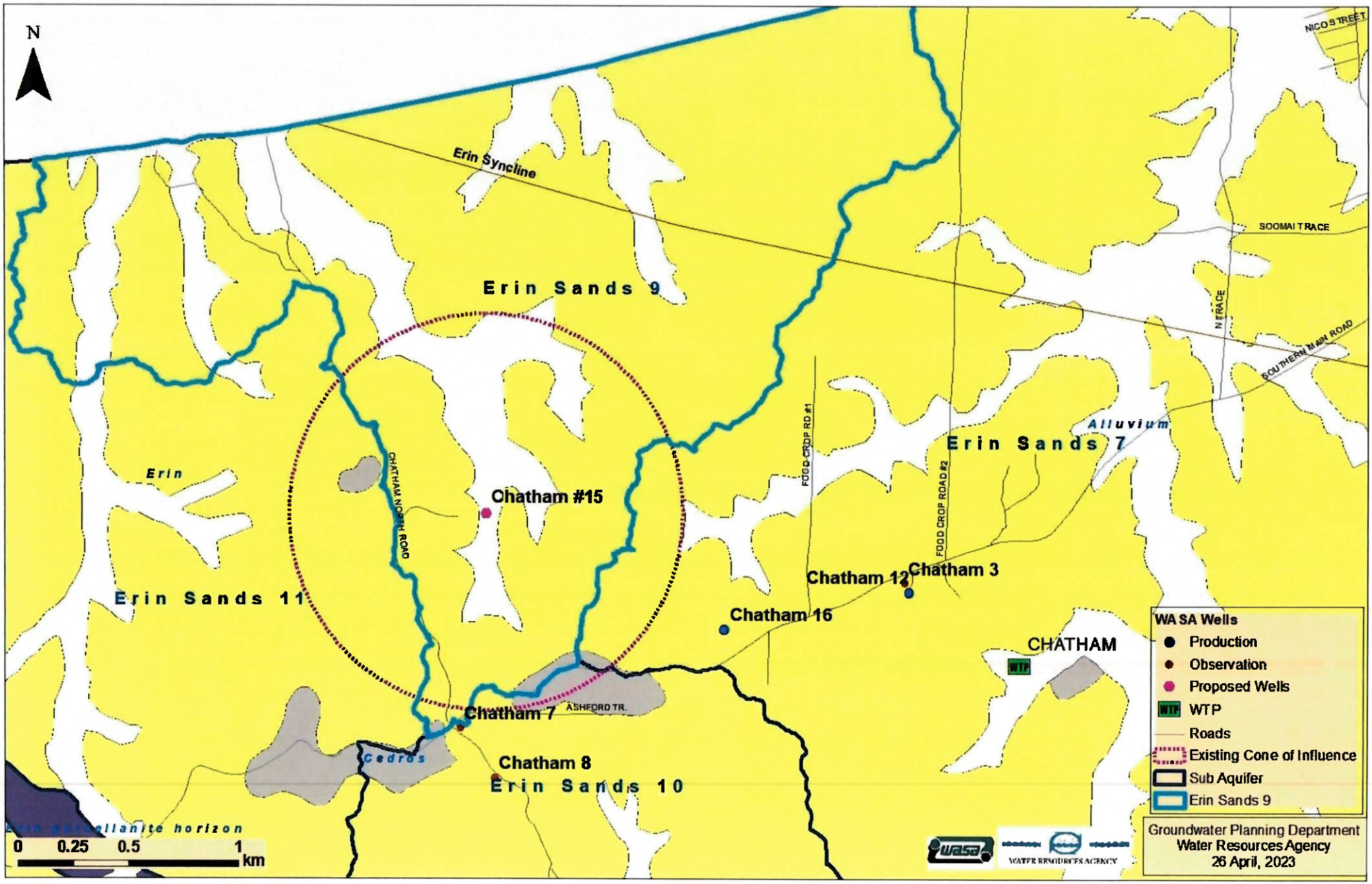
Location of Existing and Proposed Chatham Wells



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Erin Sands 9 Proposed Well Summary

Sub Aquifer	Well Options	Estimated Production		Location		Drainage Radius (m)	Location	Estimated Distance from WTP (m)	Estimated Pipeline Distance to Nearest Production well (m)	Recommendations (Estimated Depths and Screens) (ft)
		m^3/mth	imgd	Easting	Northing					
Erin Sands 9	Chatham #15	30,428	0.22	6377074.62	1120997.921	886	Bobby Trace, Chatham North Rd	2,418	1,125m from Chatham #16	1240 ft with 262 ft of screen

Production estimated from nearby well in the Erin Sands 7 subaquifer (see slide 5)

Recommendations for total depth and screens are only estimates. Hydrogeological and lithological subsurface characteristics at the proposed well sites, can only be confirmed by actual drilling. Distances between proposed well and WTP can be reduced by connecting wells in a chain.

Wells highlighted in red have been selected for high priority drilling.

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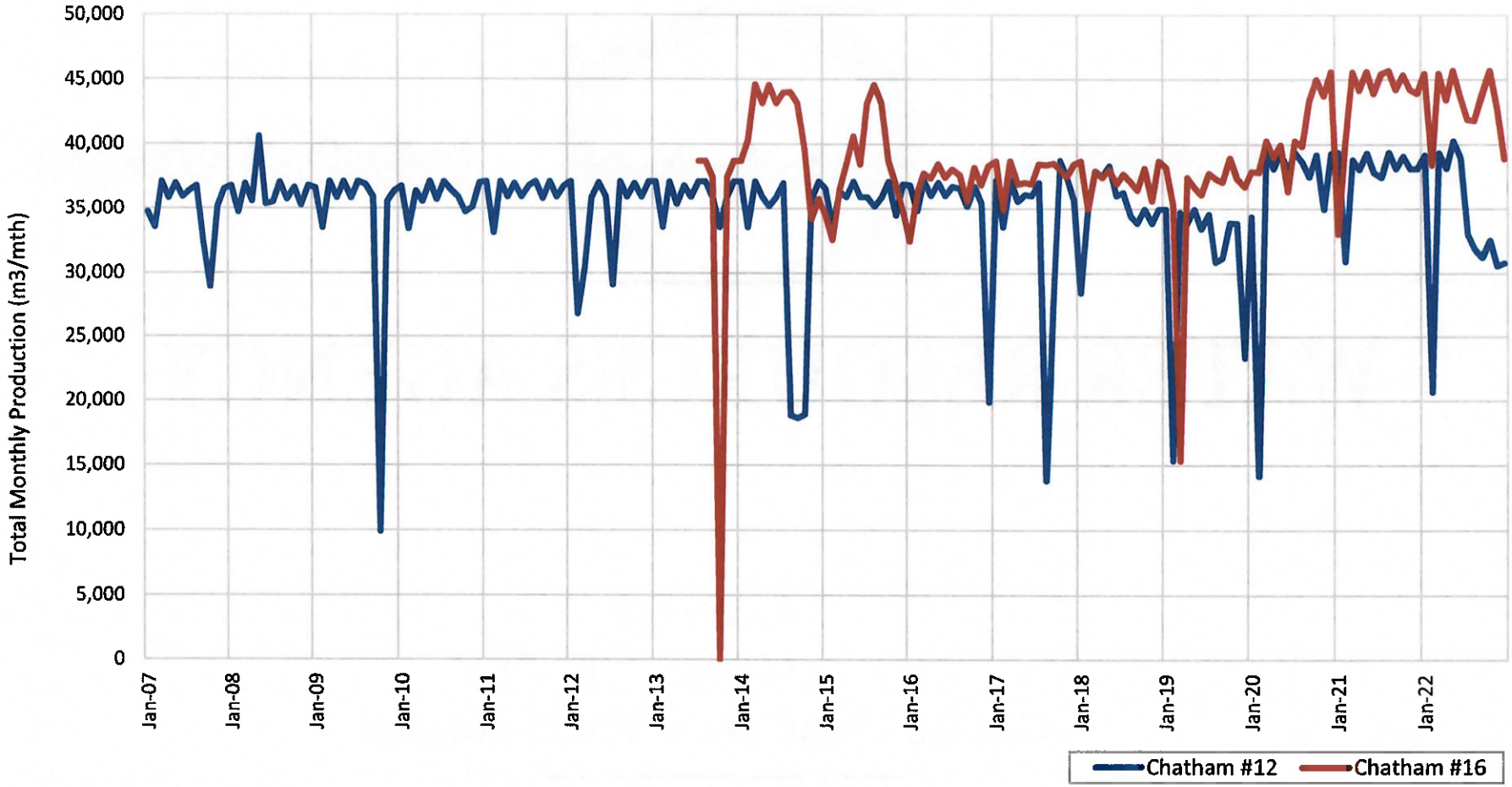
Production Profiles for Nearby Wells



Stabilized production for Chatham #12 – 0.27 IMGD
Stabilized production for Chatham #16 – 0.32 IMGD

Although the proposed Chatham #15 is in the same formation as Chatham #12 and Chatham #16, since Chatham #15 is in a different unexploited subaquifer, a more conservative estimate is used – the current production level of Chatham #12 (0.22 IMGD).

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WATER RESOURCES AGENCY

Annex 4:
Upper Morne L'Enfer I
Clarke Road New Wells Report
2022 November 18

DocuSign Envelope ID: 7CDA5D51-C436-41A1-99D6-A051901945D8

UMLE I Clarke Rd Existing Production Wells Summary

Sub Aquifer	Well Name & No.	Original Maximum Well Yield		Current Abstraction		Sustainable Yield		Surplus		Drainage Radius (m)	Well Depth (ft)	Screen Interval (ft)	Total Screen (ft)
		m3/mth	imgd	m3/mth	imgd	m3/mth	imgd	m3/mth	imgd				
UMLE I	Clarke Road #7	16,598	0.12	11,065	0.08	**78,453**	**0.57**	**60,001**	**0.44**	773	536	416 - 516	100
	Clarke Road #8	13,831	0.10	6,916	0.05					494	446	295 - 426	131
	TOTAL	**30,429**	**0.22**	**17,981**	**0.13**								

Note:

Clarke Road #7 drilled in 2007

Clarke Road #8 drilled in 2007

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UMLE I Clarke Road Proposed Wells

Sub Aquifer	Well Options	Estimated Production		Location		Land Tenure	Risk & Challenges	Estimated Pipeline Distance to Distribution Line (m)	Recommendations (Estimated Depths and Screens) (ft)
		m^3/mth	IMGD	Easting	Northing				
UMLE I	Option 1	19,808	0.14	672033.01	1122920.02	State [1]	Land availability High iron Hydrocarbons	738	110-140; 205-225; 325-395
	Option 2	19,808	0.14	672330.47	1122613.11	State	Land availability High iron Hydrocarbons	490	
	Option 3 (Clarke Rd #9)	19,808	0.14	672869.33	1122982.33	Private	Land availability High iron Hydrocarbons	36	

Notes:

1. The Cadastral 1991 shows this land to be owned by Trintoc
2. Only One Of the above three(3) options can be selected
3. Recommendations for total depth and screens are only estimates. Hydrogeological and lithological subsurface characteristics at the proposed well sites, can only be confirmed by actual drilling.

Wells highlighted in red have been selected for priority drilling.

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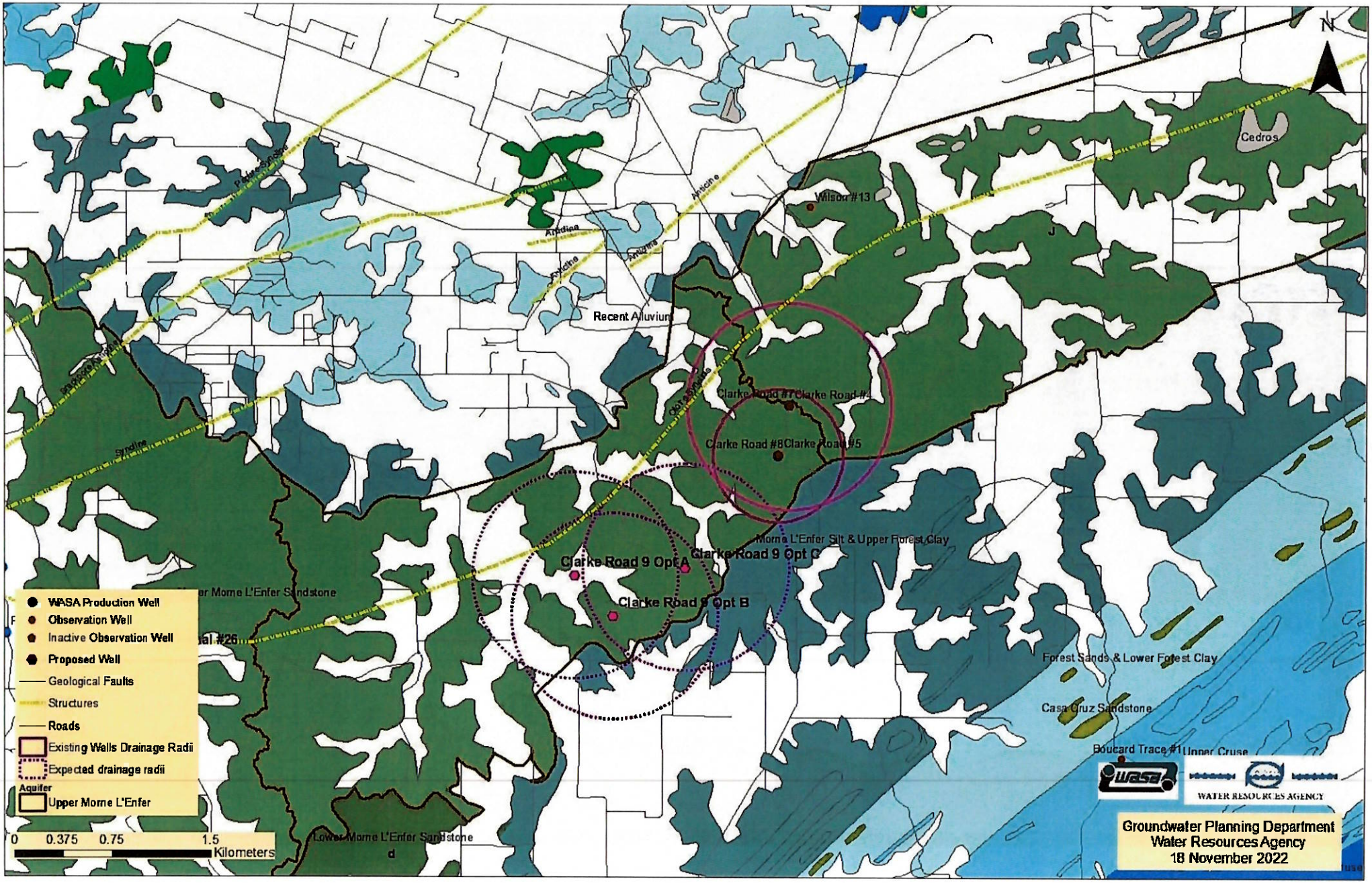
Location of Existing and Proposed Clarke Road Wells



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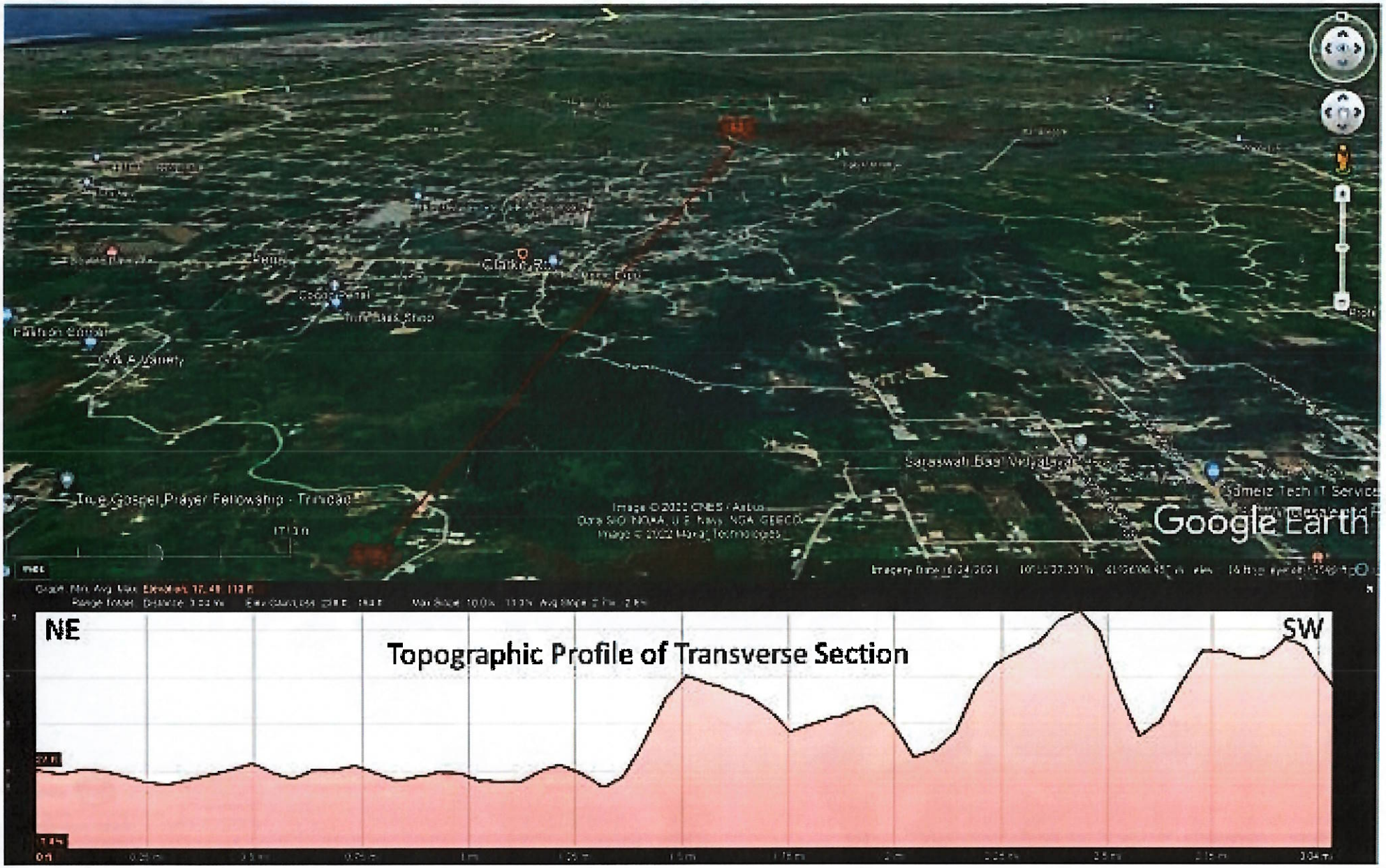
Clarke Road NE-SW Transverse (UMLE I Sub-Aquifer)



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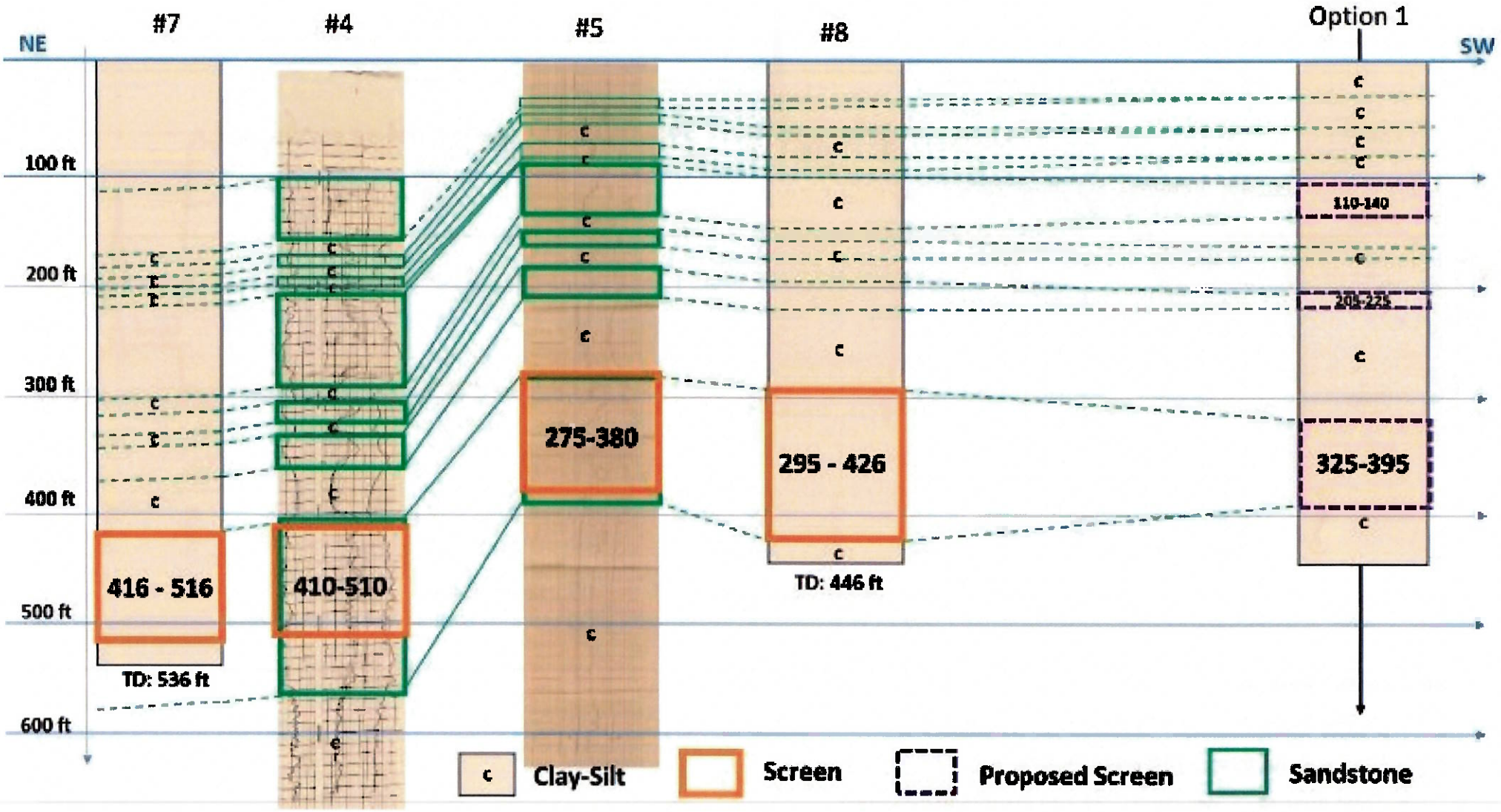
Clarke Road Cross Section (UMLE I Sub-Aquifer)



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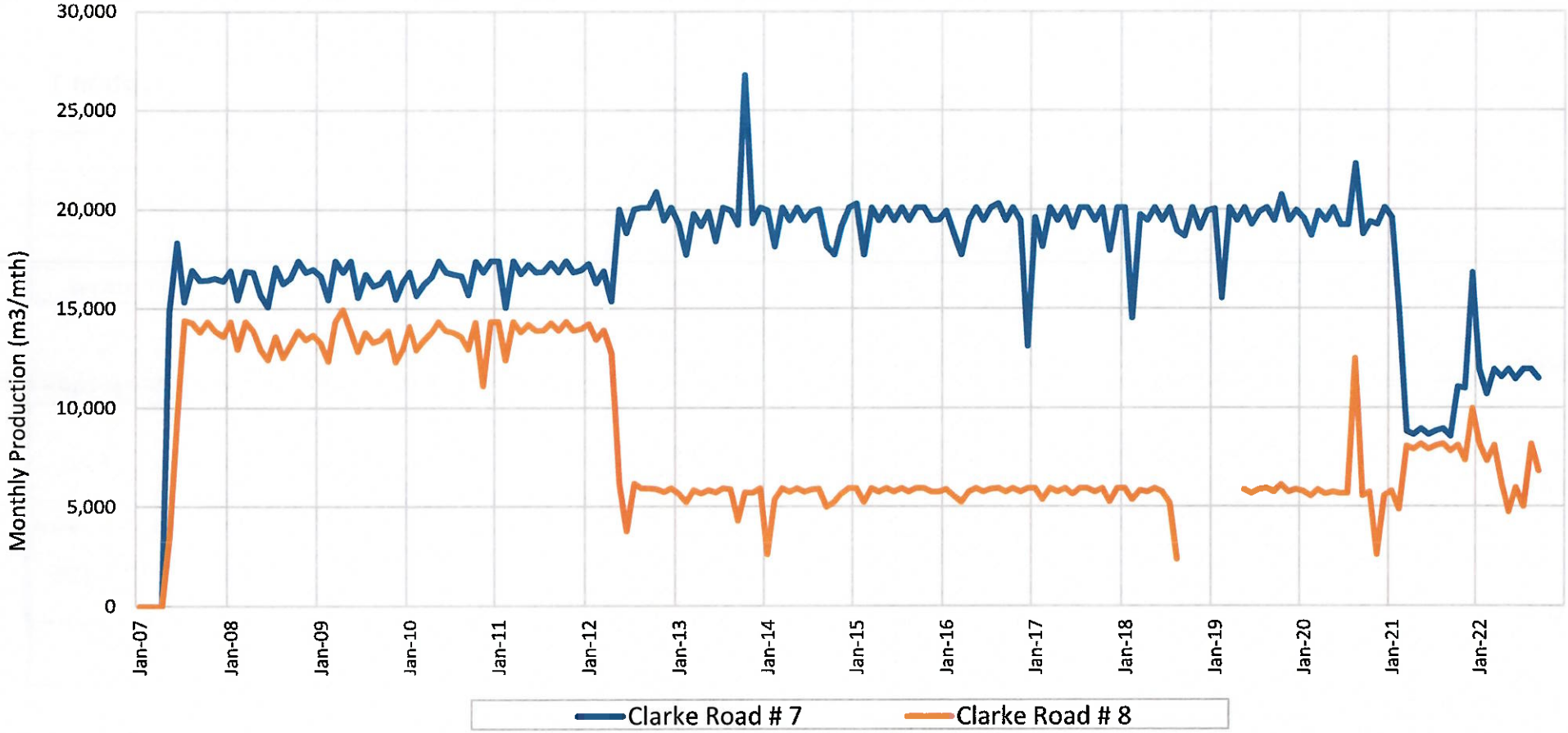
Production Profiles
Sub-Aquifer: UMLE I



Stabilized Production:

1. Clarke Road #7 – 19,473 m3/mth (0.14 imgd)
2. Clarke Road #8 - 5,712 m3/mth (0.04 imgd)
3. Total Average Production – 24,709 m3/mth (0.18 imgd)

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Appendix I: Optimum Well Spacing Methods

Method	Formula	Key Parameters
UNDP (1982)	R = 60 √(QtN/Rg)	Rg

KEY FOR EACH VARIABLE USED IN OPTIMUM WELL SPACING FORMULAE

Q = average discharge rate from a well, l/s
t = average well operating hours in a day
N = number of well operating days in one recharge-depletion cycle
H = height in feet
R = diameter of a pocket area within the basin required for one tube well which is the optimum well spacing, m
Rg = usable annual recharge , mm/year

Method	Radius of Influence (m)		
	Clarke Road #7 (0.14 IMGD)	Clarke Road #8 (0.04 IMGD)	Clarke Road Proposed Well (Estimated as 0.14 IMGD)
UNDP (1982)	773	494	779

Annex M– Security Plan

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Table of Contents

List of Acronyms

CCP	Contractor Control Plan
CIPP	Contractor Implementation Plan & Procedures
CPR	Cardio=pulmonary Resuscitation
EA	Executing Agency
ESMP	Environmental & Social Management
GPS	Global Positioning Satellite
HSE	Health, Safety & Environment
MPU	Ministry of Public Utilities
PEU	Project Executing Unit
PMO	Project Management Office
PPE	Personal Protective Equipment
RACI	Responsible, Accountable, Consulted, Informed
RAM	Responsibility Assignment Matrix
RED	Record of Emergency Data
SPC	Special Purpose Company
TTPS	Trinidad & Tobago Police Service
WASA	Water & Sewerage Authority

1.0 Introduction

This document provides guidelines for the Contractor for Security Management Plan for the Project – Construction Phase. It forms part of the Environmental and Social Management Plan ("ESMP") for the project. The Contractor will be required to develop their own site-specific Contractor Implementation Plan and Procedures ("CIPP") document for security as appropriate to meet the requirements of these guidelines.

1.1 Objectives

The broad objective of this document is to describe the approach and procedures to be followed by contractors for security measures during the Construction Phase. It also assists the Executing Agency in ensuring that the intended outcomes of the proposed security plan are achieved and assures compliance with legal and policy obligations and lender requirements.

1.2 Implementation Strategy

The Responsibility Assignment Matrix in Figure 1 below clarifies the roles and responsibilities by the various key Project resources in the design and implementation of the Security Plan for the construction phase of the Project.

	RESOURCES						
ACTIVITY	*MPU*	*Project Executing Unit (PEU)*	*Special Purpose Company (SPC)*	*Contractor*	*Contractor Project Manager*	*Site Supervisor*	*Head Security*
Policies & Procedures	I	I	A	R	C	I	C
Assessment Process	I	I	A	R	C	C	C
Worker Security	I	I	I	R	A	C	C
Site Security	I	I	I	R	A	C	C
Monitoring	I	I	I	R	A	C	C
Reporting	I	I	A	R	C	C	C

Figure 1: Responsibility Assignment Matrix for construction Security Plan for the proposed Project

Definition of Terms for a RACI Responsibility Assignment Matrix

R - Responsible : The person or role who is assigned to achieve the task. There is only one resource given this category type. Others may be required to assist in the work but they are either given another participation code, such as Assist, or are not included since this RAM only list the key people for the activities.

A - Accountable : This person or role must sign off on work that Responsible provides. They are ultimately accountable for the correct and thorough completion of the deliverable or task, and the one to whom Responsible is accountable. There must be only one Accountable specified for each task or deliverable.

C - Consulted : Those whose opinions are sought and with whom there is two-way communication.

I - Informed : Those who are kept up-to-date on progress, often only on completion of the task or deliverable, and with whom there is just one-way communication (informational only).

2.0 Safety & Security Procedures

Project Managers need to understand current threat levels and organizational vulnerabilities prior to establishing effective security procedures. Once assessment procedures are in place, standard security measures can be implemented and adjusted to ensure job sites operate with the lowest possible risk to staff and equipment. This section provides standard security procedures that can help prevent safety and security incidents from occurring and provides guidelines for emergency response when incidents do occur. It includes information on:

Communication
Incident Reporting
Medical Procedures
Personal Documentation
Personnel Issues
Safety and Security Planning
Security Briefing and Training
Site Selection and Management

2.1 Communication

All operational areas, especially within moderate or higher-risk locations, should be provided adequate communication equipment and have written communication procedures.

2.2 Incident reporting

Timely reporting of security incidents can aid in protecting construction staff. A well-maintained incident report system can help construction personnel identify, analyze and react to changes in the their security situation. Incidents should be reported to the appropriate senior staff through the most expedient means, such as telephone or radio, with a written report provided as soon as feasible. In cases of theft or minor injury, a submission of a written report at the earliest convenient time may suffice. An effective incident report system relies on a trained and committed staff that has confidence that the reports will be reviewed fairly and not used against them. Reports must be kept in a secure location with access restricted to the appropriate staff to ensure confidentiality, with a copy expeditiously forwarded to the relevant department.

2.3 Medical Procedures

In many areas where construction crews might work, the local medical support and emergency response infrastructure may not be well developed. Implementing basic medical training and procedures, such as

first-aid, cardiopulmonary resuscitation (CPR), and security in medical emergency response can increase the Contractor's medical capability and prevent minor medical problems from becoming significant security incidents.
To reduce the likelihood of a medical emergency, construction staff should receive a comprehensive medical examination prior to first assignment.

2.4 Personal Documentation

It is the responsibility of the Contractor to maintain records with security information for all employees, and ensure temporary project staff members are registered with the Project Management Office (PMO).

2.5 Personnel Issues

2.5.1 Leadership

Leadership, cohesion, and preparation can provide greater security than locks or reinforced fencing. Everyone should monitor their safety and security situation and should not hesitate to "take the lead" when a discrepancy is noted. The Contractor's and WASA staff in supervisory positions should encourage conscientious implementation of all safety and security policies and procedures. Any person may be put in a leadership role during times of crisis and should consider the following:

- *Develop adequate safety and security procedures and communicate them to all staff. Conduct regular safety and security updates.*
- *If necessary, designate a staff person to be responsible for evaluating the safety and security situation and ensuring staff training and enforcement of security standards.*
- *Remember the importance of confidentiality in information sharing.*

2.5.2 Background Checks

If reasonable to do so, background checks should be performed on all temporary project staff members (consistent with MPU policy and core values). This can mitigate or prevent potential safety and security incidents, such a gang member working in certain locations. The decision to conduct background checks rests with the Project Manager and depends on the specific situation at each site location. At a minimum, a photo should be taken and the information provided on the Record of Emergency Data (RED) should be verified. Often these measures will discourage those who may pose a security risk from seeking employment with the construction crew.

2.5.3 Training Records

It is important to record all safety and security training completed. An updated training record should be included in each staff member's personnel file. This allows identification of training priorities and can help determine suitability for advanced training. The training record provides a transportable, permanent documentation of training received and should be given to the member when they leave the construction crew, with a copy retained in the personnel file.

2.6 Safety & Security Planning

Experience has shown that, no matter what security strategy is adopted, certain fundamental safety and security preparations and procedures are appropriate in all locales and in all activities of Contractor's company.

Each Contractor should develop its own safety and security procedures, under the guidelines established by the HSE and PMO and provide staff training and equipment to ensure effective implementation. Safety and security plans, such as the Traffic Management Plan, are not contingency plans and do not replace the requirement for developing the Emergency Response Plan which will address disaster planning and evacuation plans. Contingency plans go into effect only when specific events occur, but safety and security plans are always in effect.

2.7 Security Briefing & Training

Safety and security briefings, orientation, and training should be provided for all Contractor personnel. The briefing and training should include safety and security procedures, and evacuation and disaster preparedness plans. The appropriate Project Manager is responsible for arranging a thorough security briefing prior to an employee's assignment. Likewise, they will debrief departing staff.

2.8 Site Selection & Management

Contractors during the construction exercise often will need to occupy several different types of structures (site offices, mobile offices, warehouses, etc…) to meet its operational requirements. These facilities should be selected and managed to reduce the risk of injury to personnel and/or loss or damage of material. The most effective site selection follows a thorough security assessment.

3.0 Personal Safety & Security

Contractors should conduct a comprehensive security assessment and develop and implement a security strategy and general safety and security policies and procedures. However, all construction personnel must view safety and security as an individual responsibility and not depend solely on the Contractor's, SPC, and WASA's procedures. A staff member will gain a greater sense of security and self-confidence by preparing ahead for a potential incident.

This section provides general safety and security guidelines that individual construction personnel can use. Most of them are common sense measures that are frequently forgotten when in an unfamiliar environment or during crisis. Successfully employing the safety and security measures in this section requires resourcefulness and vigilance. It is hoped that by applying these measures within a framework of the Contractor's security strategy, construction staff can prevent safety and security incidents from ever occurring. When they do occur, the well prepared staff member can take quick and decisive action to minimize the likelihood of injury or damage. This section provides information on:

Situational Awareness
General Security Guidelines

Criminal Activity
Sexual Harrassment
Vehicle Safety and Security
Additional Considerations for Women
Fire and Electrical Safety
Office Safety

3.1 Situational Awareness

Developing situational awareness by examining surroundings and potential threats is the first step in reducing the likelihood of a safety or security incident. Because each location poses its own unique threats, it is important to look at each location with openness and discernment. Situational awareness in its simplest form means paying attention to your surroundings and being sensitive to changes in them. It begins with an understanding of the culture and history of the area the Contractor can help incoming staff develop situational awareness by compiling safety guidelines into a single document for use during staff orientation. It should include information on the recent crime statistics including type and frequency and situations that may lead to tension and confrontations among different factions.

3.2 General Security Guidelines

1. Take time to plan activities.
2. Dress in Contractor issued uniform and use appropriate Personal Protective Equipment (PPE) provided and behave appropriately, giving consideration to Contractor's and WASA's image.
3. At a new assignment, potential threats or areas to avoid.
4. Know the local security arrangements, such as the nearest police station, emergency contact procedures, and health care centers.
5. Maintain a calm, mature approach to all situations.
6. Be non-provocative when confronted with hostility or potentially hostile situations.
7. Be alert to the possibility of confrontation with individuals or groups.

3.3 Criminal Activity

In recent years, criminal activity has become a significant threat to the safety of construction workers operating in certain areas. Criminal activity can take many forms, including armed assault, hijackings, or robbery. Be aware of the extent and activities of organized crime and take necessary precautions (for detailed information on dealing with specific incidents, see Section Five – Safety and Security Incidents). General precautions against criminal activity include:

- Do not display jewelry, cash, keys, or other valuables in public.
- Do not leave parked cars unlocked or leave valuable items in plain sight.

3.4 Vehicle Safety & Security

Traffic and vehicle-related accidents are a major cause of injuries among construction personnel.

If available and practical, all staff members should receive driver safety training.

3.5 Traffic Accidents

Traffic accidents involving Contractor staff can be minimized by implementing defensive driver training and other precautions, but they can never be avoided entirely. When an accident is mishandled, it can quickly change from an unfortunate occurrence into a security risk. In extreme situations, it can trigger violence or threats of retribution. The following procedures are useful when involved in an accident.

- *Quickly discern the attitudes and actions of people around the accident site to ensure that the staff member is not at risk by staying.*
- *Do not leave the site unless staff safety is jeopardized and then only to drive to the nearest police station.*
- *Provide care and assistance as appropriate. As appropriate, contact the police immediately and cooperate as required. Contact the Project Manager, Construction Supervisor, PMO and HSE Department as soon as practical.*
- *If feasible, take pictures of the scene and record the names and contact information of witnesses, responding authorities, and those involved.*
- *When approaching an accident involving other vehicles consider safety and security, taking care not to become involved in a second accident while responding.*

3.6 Additional Considerations for Women

Female construction personnel should never be pressured, or allowed to forgo common sense safety measures, to prove themselves in the field. General safety and security measures are the same for everyone. Both men and women should review all sections of this policy/ procedure. Additionally, women should consider the following:

- Do not hesitate to call attention when in danger. Scream, shout, run, or sound the vehicle horn.
- Immediately leave a location or person that feels uncomfortable.
- Communicate clearly. Be assertive and insist on being treated with respect.

3.6.1 Sexual Harassment

In any area, sexual harassment is incompatible with providing a safe and secure working environment and as such is unacceptable. Sexual harassment can be directed at men or women, but women are most often the targets. Staff members should be aware when someone is focusing unwanted attention on them or others with overt or subtle pressure or by other actions or comments. Each Contractor will clearly implement Sexual Harassment Policy which is consistent with the Executing Agency's guidelines and IDB policies. Each Contractor will ensure that all staff is familiar and comply with them. The appropriate personnel will investigate all sexual harassment complaints. The Sexual Harassment Policy must outline a clear process to receive complaints and resolve them.

3.7 Fire & Electrical Safety

Basic safety and security procedures are often overlooked on construction job-sites. Simple improvements in fire and electrical safety and first aid training and procedures can safeguard all staff and should be the first step in any security plan. Individual staff members, even when traveling, should make every attempt to adhere to commonsense precautions concerning fire and electrical safety. Staff members should take

advantage of the Contractor's fire and electrical safety training and share the knowledge with family members.

3.8 Sites Offices & Security

3.8.1 Locks & Keys

Having secure locks and proper key management is central to the concept of physical security. Cheap locks are easily overcome or bypassed and secure locks are worthless if their keys are not protected from unauthorized access. Some general guidelines for lock and key security include:

- Keep a minimum number of keys for each lock and strictly control who has access to them.
- Keep household keys separate from vehicle keys.
- Use caution when providing keys to maintenance staff.
- Do not allow duplicate keys to be made without permission, and record who has each duplicate.
- If a key is lost under suspicious circumstances have a new lock fitted.
- Never leave keys under the mat or in other obvious hiding places.

4.0 Construction Site Security Plan

This section lists the General Requirements for construction site security for the Contractor.

4.1 Perimeter Fencing

1. The number of access points onto the site shall be minimized and, where feasible, situated in locations that are highly visible from an adjacent street.
2. Fencing shall be installed around the site perimeter adjacent to streets.
    - Fencing shall be a minimum 6' high with green 94% minimum blackout heavy-duty plastic screening.
    - Vehicle and pedestrian gates shall not be covered.
    - Fencing shall not be covered for 20 feet on each side of gates.
3. Vehicle and pedestrian gates and openings shall have gates secured after hours of operation.
4. Padlocks used for securing gates shall be designed to prohibit cutting of shackle.
5. Locking gates shall be secured with minimum 3/8 inch thick, 30 grade coil chain, or minimum 5/16 inch cable.

Note: Perimeter fencing may be removed when there is no longer outside storage of building materials or building fixtures and when there are no remaining exterior construction activities requiring separation of non-construction related personnel and public from exterior construction activity

4.2 Signage

1. Address signs shall be posted at all vehicle entrances listing street name and number using letters and numbers at least 6 inches in height.
2. "No Trespassing" signs shall be installed at all perimeter access points.

3. Signs with a 24-hour emergency phone number for a person who can respond to site shall be posted at the main entrance gate and on the exterior of the on-site office trailer or building, if it is not a 24-hour manned security site.
4. All signs to be posted a minimum of 5 feet from ground level.

4.3 Site Lighting

1. The following locations shall be illuminated during hours of darkness:
    - Vehicle gate locations
    - All open centralized storage areas for building materials or fixtures
    - Trailers, temporary buildings, or containers used as an office or storage for building materials or fixtures.
2. Minimum light level at required locations is one foot-candle at the ground for a 15 foot radius. A Photometric plan is not required.
3. Light fixtures shall be installed a minimum 18 feet high, with tempered or polycarbonate lens approved for wet locations.
4. For Projects requiring a Security Plan, submit an informational sheet (cut sheet) for security light fixtures.
5. Where required lighting would affect occupied residential properties:
    - Motion sensors can be used to control light fixtures.
    - Elements may be modified or not required when first approved by the HSE Division or Security Department.

4.4 Storage Containers

(With at least 64 square feet of storage area)

1. Doors shall be secured using a hasp or slide bolt with a protective device to prohibit cutting of the padlock and attached with non-removable bolts from the exterior.
2. Padlocks shall have a minimum ½ inch thick shackle with heel and toe locking.
3. Exterior hinge pins shall be rendered non-removable by design or welding.

4.5 Motorized Equipment

1. Forklifts shall be rendered inoperable when the hours of operation are ceased, making them unable to start, operate or move. Removing forks and securing them satisfies this requirement.
2. An onsite record shall be maintained for all motorized equipment with a minimum 15 inch wheel diameter listing the equipment manufacturer, model, license plate number, vehicle identification number (VIN), and product identification number (PIN).

5.0 Mitigation Measures

As stated in the ESMP with framework approach, the Contractor and Executing Agency will be responsible for the following measures to ensure the safety and security of personnel and equipment during all phases of the project. The risk level and impact to the sites will have to be assessed and the appropriate mitigation measures devised. Some mitigation measures include: -

- Creation of site-specific security plan based on an assessment of the security risk.
- Liaise and communicate with the Trinidad and Tobago Police Service to assess the risk associated with each site for every stage of the project, The WASA Police should also be consulted and involved in this process.
- Contact the TTPS for the area to advise of areas where work will be conducted prior to commencement of work.
- Ensure that key assets and property are secured or removed to a secure location when not in use.
- Where possible ensure perimeter of areas has appropriate security fencing and areas are well illuminated.
- Control site access by ensuring limited access points and controlled entry.
- Engage with community members and encourage them to report suspicious activities to the TTPS or to the Executing Agency.
- Encourage security awareness among employees and ensure security supervisor is always at the site.
- Maintain a security risk register and periodically review the security risk plan to update the security mitigation measures.
- Contract licensed security services to guard and patrol sites where necessary. Security personnel should be unarmed and properly trained in de-escalation techniques.
- Consider the use of technology, such as tagging, GPS tracking and video surveillance to detect and alert for any security issues or treats.

6.0 Monitoring

The safety and security of the workers and equipment would be the responsibility of the Contractors and WASA (WASA Police particularly when operating on existing sites where both WASA employees and WASA resources are required).

The Contractor should coordinate with the Trinidad and Tobago Police Services (TTPS) when operating in areas with high risk to ensure the safety of equipment and all stakeholders.

Monitoring, such as checks of security measures implemented should be checked on a daily basis, at a minimum twice per day – at the start and end of the day's work and recorded in a Security Register which should at a minimum record the date, time, areas or mitigation measures checked, person(s) executing the daily check as well as include notes on any odd or suspicious observations.

If there are any security incidents, these must be reported to the SPC, MPU-PEU, WASA and the TTPS. Incident logs must also be maintained and should include corrective actions recommended, implemented and status. Reports/updates on the incident must be reported to the MPU on a weekly basis until incident has been closed.

Annex N – Soil Erosion & Stormwater Management Plan

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Table of Contents

List of Acronyms

ASTM	American Society for Testing & Materials
BMP	Best Management Practice
CCP	Contractor Control Plan
CEC	Certificate of Environmental Clearance
CIPP	Contractor Implementation Plan & procedures
ESA	Environmental & Social Assessment
ESMP	Environmental & Social Management Plan
MPU	Ministry of Public Utilities
PEU	Project Executing Unit
SPC	Special Purpose Company
TSS	Total Suspended Solids
WASA	Water & Sewerage Authority
WMP	Waste Management Plan

1.0 Introduction

This document is the Contractor Control Plan ("CCP") for soil erosion and storm water management for the proposed Project. It forms part of the Environmental and Social Management Plan ("ESMP") for the project. The Contractor will be required to develop their own site-specific Contractor Implementation Plan and Procedures ("CIPP") document for soil erosion and storm water management as appropriate to meet the requirements of this plan. The site-specific CIPP will need to be approved by the Ministry of Public Utilities (MPU) via the Project Executing Unit (PEU) and Water and Sewerage Authority (WASA) prior to implementation.

1.1 Purpose

The CCP is a management control document that fulfils the following purposes:

- Serves as an important part of the environmental management process to translate commitments made in the Project Source Documents (Certificates of Environmental Clearance, Strategic Environmental Social Assessment ("ESA") and Environmental & Social Management Plan (ESMP) and Inter-American Development Bank (IDB) Loan documents.
- Serves as a key tool by which MPU-PEU and WASA can check the CIPPs and specifically the procedures and method statements that specify how the activities described in their contracts will be carried out in compliance with project commitments.
- Provides transparency to the IDB that commitments for the Construction Phase are being met and are being translated through to the Contractor who is responsible for implementation.

1.2 Objectives

1.2.1 Objective of Contractor Control Plan

The broad objective of this CCP is to describe the approach and procedures to be followed by contractors for the management of soil erosion and storm water resulting from the Construction Phase. The CCP also assists MPU-PEU and WASA in ensuring that the intended outcomes of the proposed soil erosion and stormwater management strategies are achieved and assures compliance with legal and policy obligations and lender requirements.

1.2.2 Objectives of Contractor Implementation Plan & Procedures

At a minimum, the Contractor CIPP should meet the following specific objectives as it applies to the management of soil erosion and storm water resulting from the Construction Phase:

- Control the quantity and quality of runoff.
- Prevent soil erosion and sedimentation resulting from site construction and development.
- Prevent the pollution of runoff from construction sites.
- Protect natural resources including wildlife habitat.
- Protect other properties from damage that could be caused by erosion and sedimentation or the quantity or quality of runoff.
- Protect private and public property from storm water and groundwater related damage.
- Develop a storm water management plan that will not adversely affect wetlands, creeks, streams and rivers, while meeting the needs of the project.
- Develop a plan that uses natural features to retain and filter storm water on site, supported by traditional conveyance systems when necessary.

- Develop a storm water management plan that identifies specific required improvement and associated costs.
- Limit negative storm water related impacts to the community
- Implement a stormwater management program that satisfies current and future regulatory requirements.
- Protect or enhance the quality of life in the area, including aesthetics.

2.0 Supervision and Inspections

The Contractor will be required to designate a suitably qualified person(s) who will be assigned to the project construction site and who will be responsible for the implementation and monitoring of the soil erosion control and storm water management measures.

2.1 Environmental Inspections

2.1.1 Frequency of Inspections & Inspection Triggers

Weekly inspections of storm water management structures or techniques shall be conducted in compliance with the requirements of the CEC. Additional inspections are triggered by intense rainfall events i.e. in excess of 25mm of rainfall in a 30 minute period; these should be conducted within 24 hours, or as soon as practically possible after the period of intense rainfall.

It is also recommended that inspections be conducted at the site prior to the commencement of land clearing activities and at the completion of construction activities and the removal of any temporary Best Management Practices (BMPs).

2.1.2 Documentation of Inspections

All inspections shall be documented and written reports prepared that contain the following information (minimum):

- Date and location of the inspection.
- Date of last storm event
- Whether construction is following the approved management plan
- Variations from approved construction specifications
- Photographic documentation of each erosion and sediment control BMP and any other site level techniques employed pursuant to this regulation, such as but not limited to seeding with native non-invasive species of fill piles, marking of root zone areas of trees, disposal of construction debris, and implementation of any national or international level record-keeping or reporting procedures related to erosion and sediment control and storm water management.
- Recommended actions for replacement, repair, or substitution of BMPs, that are not functioning properly.
- Copies of reports and labelled photographs shall be provided to the MPU-PEU, SPC or WASA upon request.

2.1.3 Phases of Inspection

The schedule for inspections should include the following phases:

1. **Initial site inspection** prior to plan approval, which shall include a site walk by MPU-PEU, SPC and WASA personnel, Design Engineers, Contractor, Representatives from Drainage Division and/or relevant City/Borough/Regional Corporation and any other relevant persons.
2. **Erosion Control Inspection** to ensure erosion control techniques or structures have been properly installed and are in accord with the submitted plan. These must be conducted on a weekly basis.
3. **During and post-storm event inspection.** The Contractor shall inspect the site during and within 24 hours after the first storm event (intense rainfall in excess of 25mm in a 30-minute period) and subsequent storm events to ensure that erosion and sediment control techniques and drainage structures are functioning properly.
4. **Storm water management system inspection.** This inspection will include inspection of temporary measures to be employed only during construction, as well as semi-permanent and permanent measures designed to remain for some time period after construction is completed but which may be completed before all construction of the site is completed. The Contractor will also note whether construction debris is being disposed of properly and whether other erosion and sediment control measures in addition to those in the approved plan must be instituted by the Contractor to protect water resources.
5. **Final inspection and storm performance inspection**. This inspection shall also evaluate the effectiveness of the system during and after the first actual storm.

2.2 Responsibilities of Contractor

At a minimum, the Contractor shall be responsible for:

- Ensuring compliance with the requirements of this Plan, the mitigation measures proposed herein, and environmental requirements in landowner easement agreements;
- Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;
- Verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- Verifying the location of signs and highly visible flagging marking the boundaries of no-access areas, water bodies, wetlands, or other areas with special requirements along the construction work area(s);
- Identifying erosion/sediment control and soil stabilization needs;
- Ensuring that the location of dewatering structures and slope breakers will not direct water into sensitive areas;
- Verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or water body. If such deposition is occurring, the dewatering activity shall be stopped and the design of the discharge shall be changed to prevent reoccurrence;
- Ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;
- Advising the workforce when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;
- Ensuring restoration of contours and topsoil;
- Verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;

- Determining the need for and ensuring that erosion controls are properly installed, as necessary to prevent sediment flow into wetlands, water bodies, sensitive areas, and onto roads;
- Inspecting and ensuring the maintenance of temporary erosion control measures at least:
    - On a daily basis in areas of active construction or equipment operation;
    - On a weekly basis in areas with no construction or equipment operation; and
    - Within 24 hours or as soon as practically possible after periods of intense rainfall (25mm of rainfall in a 30 minute period).
- Ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification;
- Keeping records of compliance with environmental requirements during active construction and restoration; and
- Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.

3.0 Overview of Best Management Practices

Best Management Practices (BMPs) are controls (both structural and nonstructural) used to prevent erosion and control sedimentation, which could lead to storm water leaving the construction site and degrading the water quality of receiving water bodies. Appropriate BMPs will be selected and implemented prior to, during, and after construction, however the CEC(s) issued for the Project (**See Annex A of the ESMP**) provides a complete listing and details of the of the additional project specific requirements that must be met. The following guidelines will be used in the selection, design, and implementation of BMPs:

- The construction-phase erosion and sediment controls will be designed to prevent and minimize erosion and retain sediment onsite to the extent practical, and to ensure that no significant changes occur in the volume or characteristics of storm-water runoff to receiving waters;
- All erosion and sediment control measures will be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices;
- If sediment-laden storm water is conveyed beyond the construction site, controls will be used to minimize offsite impact, and additional BMPs will be implemented to prevent further migration offsite; and
- Litter, construction debris, temporary stockpiles, exposed soil, and construction chemicals exposed to storm water will be prevented from becoming pollutant sources for storm water discharges.

Generally, Contractors shall plan activities so that materials excavated from borrow pits and cuttings, in so far as possible, can be transported direct to and placed at the point where it is to be used. Should temporary stockpiling become necessary, the areas for the stockpiling of excavated and imported material shall be indicated and demarcated on the site plan submitted in writing for approval, together with the Contractor's proposed measures for prevention, containment, and rehabilitation against environmental damage. Stockpiles shall be positioned and sloped to create the least visual impact.

3.1 Design Standards

Strategies to Be Employed

To ensure that all sources or soil erosion and sediment on the construction site are adequately controlled, the following strategies should be considered:

1. **Minimize the areas of disturbed soil.** Limit site preparation activities such as grading and clearing to where they are absolutely necessary and consistent with the phasing plan and the daily schedule of construction activities.
2. **Maximize the protection and on-site use of native vegetation.** Protect all vegetation not intended for removal by adequately marking, fencing around the drip line of trees, protectively wrapping and temporarily transplanting as necessary.
3. **Reduce the time that soil is left disturbed.** Utilize construction management and by phasing; soil disturbed by construction activities shall be stabilized within 14 days of ceasing disturbance.
4. **Stabilize soil** with seeding with native non-invasive species and mulch as soon as possible after disturbance. Minimize soil disturbance in the rainy season.
5. **Control water at upslope site perimeters.** Prevent storm water from entering areas of disturbed soil from outside the site and from other parts of the site. Utilize diversion swales and vegetated strips to reduce the amount of water entering a construction site.
6. **Control water on-site.** On the site water must be controlled and kept to low velocities so that erosion is minimal. This can be achieved through immediate seeding with native non-invasive species and mulching or the application of sod, as well as the use of structural measures including silt fences, check dams, mulch filter socks, and mechanical tracking of hillsides (where necessary).
7. **Control sediment on site.** Reduce the amount of sediment produced from areas of disturbed soils, and control the sediment produced on site through seeding with native non-invasive species and mulching and structural measures.
8. **Control sediment at the down slope site perimeters.** Prevent the offsite transport of all sediment produced on the construction site using vegetated strips, diversion dikes, and swales, sediment traps and basins, stabilized construction entrances, and silt fences or mulch filter socks.
9. **Utilize biological or recyclable materials.** To the extent possible, Contractor should utilize natural biological materials or recyclable materials as temporary measures that can remain on-site after the completion of construction such as mulch berms or other methods as opposed to silt fences, which must be removed and disposed after the completion of construction activities in order to reduce waste and reduce costs of removal.

3.2 Erosion Prevention and Sediment Control

3.2.1 Erosion Control

Erosion control is any source control practice that protects the soil surface and prevents soil particles from being detached by rainfall, flowing water, or wind. Erosion control is also referred to as soil stabilization. Erosion control consists of preparing the soil surface and implementing one or more of the BMPs to disturbed soil areas.

Some erosion control BMPs can be used effectively to temporarily prevent erosion by concentrated flows. These BMPs, used alone or in combination, prevent erosion by intercepting, diverting, conveying, and discharging concentrated flows in a manner that prevents soil detachment and transport. Temporary concentrated flow conveyance controls may be required to direct run-on around or through the project in a non-erodible fashion. Temporary concentrated flow **conveyance controls** include the following BMPs:

- Earth Dikes and Drainage Swales
- Velocity Dissipation Devices
- Slope Drains

Specific BMPs typically required in the CEC(s) include:

- Temporary and permanent drainage systems should be designed and maintained to ensure that there is no net increase in surface run-off from the pre-development to the post development stage. All such drainage system designs should ensure that the drainage network is adequately sized and located to retain the maximum expected run-off from the site and minimize run-off of silted material into the surrounding environment
- Temporary and permanent drainage systems should be approved by the Drainage Division and/or the relevant City/Borough/Regional Corporation prior to the commencement of site activities.
- Construction works should be scheduled to take place in a phased manner and during periods of minimal rainfall
- Installation of suitable filtering devices during site preparation and construction works to minimize pollutants such as sediments from entering existing drains;
- Maintenance of any temporary on-site roadway ditches/drains to ensure that they are kept clear to allow an unobstructed flow of water at all times;
- Silt fences should not be constructed in any areas where the flow of water may impede the ability of the silt fence to function efficiently. The silt fence should be installed in accordance with American Society for Testing Materials, ASTM D6462-03: Standard Practice for Silt Fence Installation, or similar codes.

Additional Erosion prevention and sediment controls that should be implemented as BMPs include the following:

Runoff Controls

- Diversion of run-on;
- Minimizing total suspended solids (TSS) during any in-stream construction;
- In-stream diversion techniques; and,
- In-stream isolation techniques.

Erosion Prevention

- Scheduling;
- Preserving of existing vegetation;
- Top soiling;
- Temporary and permanent seeding with native non-invasive species and planting; and
- Mulching.

Sediment Control

- Sediment fence.
- Compost berms and socks.
- Fiber rolls or wattles.
- Temporary sediment basin.
- Entrance/ exit tracking controls.
- Entrance/exit tyre wash.

- Minimizing total suspended solids (TSS) during in-stream construction.
- In-stream diversion techniques; and
- In-stream isolation techniques.

Non-Stormwater Pollution Control

- Dewatering and ponded water management.
- Vehicle and equipment cleaning.
- Vehicle and equipment fueling, maintenance, and storage.
- Material delivery and storage controls.
- Material use.
- Stockpile management.
- Spill prevention and control procedures.
- Solid waste management.
- Hazardous materials and waste management.
- Sanitary waste management.
- Liquid waste management; and
- Training and signage.

The BMPs identified in this Plan represent the minimum requirements that will be documented and implemented during construction activities. As construction progresses, additional BMPs may be identified and implemented, if necessary. The Contractor will detail the specific measures in the CIPP that will be used. Additionally, the CIPP shall detail the criteria used in the selection of the specific BMP/control measure at the specific site, identify where the selected BMPs will be installed as well as address the modifications, updating of the BMPs as sit conditions change.

All BMPs will be installed per manufacturer's recommendations and good engineering practices and will be maintained in effective operating condition. Routine inspections will be performed to confirm that the erosion and sediment control BMPs are effective, to identify problems with existing BMPs, and to identify the need for changes in BMPs. Maintenance activities will be performed as needed.

Properly operating BMPs will be maintained to ensure continued effectiveness. When BMPs are not operating properly, maintenance will be performed within 24 hours (if practical) or at least before the next storm event, as necessary to maintain the continued effectiveness of storm-water controls. If maintenance prior to the next anticipated storm event is impractical, maintenance will be accomplished as soon as practical. If implementation before the next storm event is impractical, the situation will be documented in the inspection report and alternative BMPs will be implemented as soon as practical.

3.3 Stream bank Crossing

The Contractor CIPP is expected to detail where stream bank crossings will be necessary as well as how these stream bank crossings will be executed. At a minimum the following BMPs should be used:

- Minimize the number and use of crossings.
- Minimize the amount of bare soil exposure.
- Cross at right angles to the stream and as far as possible, cross at straight, narrow section of the channel.
- Remove crossings as soon as possible if not needed.
- Limit clearing of vegetation to the temporary and permanent easements.

- Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 15 m away from water's edge, if possible. Limit the size of extra work areas to the minimum needed to construct the waterbody crossing.
- Limit use of equipment operating in the water body to that needed to construct the crossing.
- All spoil from minor and intermediate water-body crossings, and upland spoil from major water-body crossings, must be placed at least 5 m from the water's edge or in additional extra work areas.
- Use sediment barriers to prevent the flow of spoil or heavily silt-laden water into any water body. Install sediment barriers immediately after initial disturbance of the water body or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or until restoration of adjacent upland areas is complete.
- Install sediment barriers across the entire construction easement at all water-body crossings, where necessary, to prevent the flow of sediments into the water body. In the travel lane, these may consist of removable sediment barriers or drivable berms. Removable sediment barriers can be removed during the construction day but must be re-installed after construction has stopped for the day or when heavy precipitation is imminent.
- Where water bodies are adjacent to the construction easement, install sediment barriers along the edge of the construction easement as necessary to contain spoil and sediment within the construction easement.
- Use trench plugs at all water-body crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the water body; and
- At dam and pump and flume crossings, prevent streambed scour at pump discharge.

3.4 Stream Bank Stabilization

Stream bank stabilization involves a combination of erosion and sediment control practices to protect streams, banks, and in-stream habitat from accelerated erosion. BMPs associated with stream bank stabilization may include protection of existing vegetation, check dams/grade control, temporary and permanent seeding, outlet protection, rolled erosion control products, temporary diversions, dewatering operations and bioengineering practices such as brush layering, live staking and fascines.

- The following stream bank stabilization BMPs shall be used after construction at all stream crossings, whether perennial or not-flowing at the time of construction:
- Use clean gravel or native cobbles for the upper 0.3 m of trench backfill in all water bodies that contain coldwater fisheries.
- For open-cut crossings, stabilize water-body banks and install temporary sediment barriers within 24 hours of completing in-stream construction activities. For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the water-body channel.
- Within 24 hours of initiating clearing, grading, stripping, excavation, or fill activities, install functioning erosion-protection measures.
- Stabilize slopes greater than 12 percent with mulch, sod, mat, or blanket in combination with seeding with native non-invasive species, or equivalent.
- Return all water-body banks to pre-construction contours or to a stable angle of repose, as approved by the relevant authorities.

- Employ primarily bio-engineering techniques for bank armoring and protection.
- Riprap shall not be used for bank stabilization unless a geotechnical or environmental engineer determines that alternative soft armoring methods will be inadequate. If riprap is used, it shall be limited to the minimum required stream length.
- Re-vegetate disturbed riparian areas with conservation grasses and legumes or native plant species, preferably woody species.
- Install a permanent slope breaker across the construction easement at the base of slopes greater than five (5) percent that are less than 15 m from the water-body, or as needed to prevent sediment transport into the water body.
- At dam and pump and flume crossings, repair unavoidable streambed scour at pump discharges with clean gravel; and
- Remove all non-native materials from the crossing after construction and stabilization are complete.

3.5 Soil Stabilization

Appropriate BMPs will be implemented and maintained at the construction site from the initiation of construction through final stabilization. "Final stabilization" refers to the time when all soil-disturbing activities at the site have been completed and one of the following criteria has been met:

- The area has been compacted, surfaced, or built upon for final use;
- Permanent planting and seeding with native non-invasive species have been established;
- Equivalent permanent stabilization measures (such as the use of riprap, gabions, or geo-textiles) have been used;
- In land used for agricultural purposes (such as crop or range land), the disturbed land is returned to its pre-construction grade for potential agricultural use; and
- Dispose of all temporary erosion and sediment control measures/materials within 30 days after final site stabilization is achieved with permanent soil stabilization measures.

3.6 Stockpile Management

Numerous BMPs will be implemented and maintained at the construction site to adequately manage stockpiles created during construction. To facilitate installation of the proposed pipeline and various components, excavations will be created. The soil from these excavations will be temporarily stockpiled and used as backfill over the pipeline and associated components. Stockpile management will consist of the following:

- While the material is stockpiled, silt fencing or straw wattles will be used as perimeter control;
- Stockpiled material (any piles containing more than 8 cubic meters of material) will be covered with a thick layer of mulch. Inactive stockpiles will be covered immediately. Active stockpiles will be covered at the end of each work week, or if inclement weather is forecast;
- Stockpiles from trenching must be kept a minimum of 5 m from streams; and
- Stockpiles will also be constructed to have stable slopes to prevent the potential for erosion.

4.0 Pre-Construction Planning

The Contractor will be required to conduct the following procedures identified prior to initiating construction activities.

4.1 Construction Work Areas

The Contractor must identify all construction work areas (*e.g.*, construction right-of-way, extra work space areas, pipe storage and contractor yards, borrow and disposal areas, access roads) that would be needed for safe construction. The Contractor must ensure that appropriate cultural resources and biological surveys have been conducted prior to the identification and designation of the construction work areas. Where the Contractor anticipates the need for activities outside of the designated areas, it is recommended that cultural resources and endangered species surveys be conducted in these new areas before work commences.

4.2 Road Crossings & Access Points

Evaluations and planning must be conducted at all roadway crossings and access/egress points during construction to ensure safe and accessible conditions are maintained at all times inclusive of during restoration phases.

4.3 Disposal Planning

Methods and locations for the disposal of construction debris (*e.g.*, timber, slash, mats, garbage, drilling fluids, and excess rock) will be identified and managed in accordance with the Waste Management Plan (WMP). Off-site disposal in other than commercially operated disposal locations is subject to compliance with all applicable survey, landowner permission, and mitigation requirements as specified in the WMP.

4.4 Agency Co-ordination

The Contractor must coordinate with the MPU, SPC, WASA and appropriate government agencies as follows:

- Obtain written recommendations from local management agencies regarding permanent erosion control and re-vegetation specifications; and
- Develop specific procedures in coordination with the appropriate agency to prevent the introduction or spread of noxious weeds and soil pests resulting from construction and restoration activities.

5.0 CONSTRUCTION

The Contractor will be required to follow the procedures identified during the course of implementation of Construction activities.

5.1 Approved Areas of Disturbance

Project-related ground disturbance shall be limited to the construction right-of-way, extra work space areas, pipe storage yards, borrow and disposal areas, access roads, and other areas. Any project-related ground disturbing activities outside these areas, except those needed to comply with this Plan (*e.g.*, slope breakers, energy-dissipating devices, dewatering structures) will require prior approval. All construction

or restoration activities outside of the identified areas are subject to all applicable survey and mitigation requirements.

The construction right-of-way width shall not exceed 25 m unless a demonstration is provided for the necessity of expanding the width of the right-of-way. However, in limited, non-wetland areas, this construction right-of-way width may be expanded by up to 8 m without prior approval to accommodate full construction right-of-way topsoil segregation and to ensure safe construction where topographic conditions (such as side-slopes) or soil limitations require it. Eight (8) m of extra construction right-of-way width may also be used in limited, non-wetland or non-forested areas for truck turnarounds where no reasonable alternative access exists.

Project use of these additional limited areas is subject to landowner approval and compliance with all applicable survey and mitigation requirements. When such additional areas are used, each one should be identified and the need explained in the weekly or bi-weekly construction reports, if required. The following information should be provided included in these reports:

- The location of each additional area by station number and reference to a previously filed alignment sheet, or updated alignment sheets showing the additional areas;
- Identification of where the records contain evidence that the additional areas were previously surveyed; and
- A statement that landowner approval has been obtained and is available in project files.

Prior written approval from MPU-PEU and WASA is required when the construction right-of-way width would be expanded by more than 8 m.

5.2 Topsoil Segregation

Unless MPU-PEU or WASA, and landowner or land management agency (e.g. State Lands, Ministry of Agriculture, Regional Corporation) specifically approves otherwise, the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area (ditch plus spoil side method) will be prevented in:

- Actively cultivated or rotated croplands and pastures;
- Residential areas;
- Grassy fields; and
- Other areas at the landowner's or land managing agency's request.

In residential areas, the importation of topsoil is an acceptable alternative to topsoil segregation. In deep soils (more than 0.3 m of topsoil), at least 0.3 m of topsoil should be segregated. In soils with less than 0.3 m of topsoil, every effort should be made to segregate the entire topsoil layer. Where topsoil segregation is required, maintain separation of salvaged topsoil and subsoil throughout all construction activities.

5.3 Road Crossings and Access Points

Safe and accessible conditions will be maintained at all road crossings and access points during construction. If crushed stone access pads are used in residential or active agricultural areas, place the stone on synthetic fabric to facilitate removal. The Contractor is also required to implement suitable measures to ensure all approach roads are kept clear of mud, debris, gravel, sediments or other materials generated from construction activities at all points of vehicular ingress and egress from the site. These measures include but are not limited to:

- The installation of a stone-stabilized pad or temporary gravel entrance/exit which shall include an aggregate layer at the ingress and egress area(s) of sufficient dimensions to accommodate vehicles (light & heavy) utilizing the site. This entrance shall widen at the point of connection to the public roadway(s) to accommodate the turning radius of large vehicles. This arrangement as described, shall ensure a high efficiency of silt removal via complete contact of the vehicles tyres or tracks for (at least) one (1) revolution with the stone-stabilized pad or temporary gravel entrance;
- The installation of a wash bay area in close proximity to the temporary gravel entrance, to facilitate the washing of the wheels of the vehicles before exit to the public roadway(s). this area shall have a gravel base, which shall be installed in such a manner as to allow removal of sediments by directing water from the area to a temporary holding basin or to any temporary on-site drains.

5.4 Temporary Erosion Control

Temporary erosion controls will be installed immediately after initial disturbance of the soil. Temporary erosion controls must be properly maintained throughout construction (on a daily basis) and reinstalled as necessary (such as after backfilling) until replaced by permanent erosion controls or restoration is complete.

5.4.1 Temporary Slope Breakers

Temporary slope breakers are intended to reduce runoff velocity and divert water off the construction right-of-way. Temporary slope breakers may be constructed of materials such as soil, silt fence, staked hay or dried grass, or sand bags.

Temporary slope breakers will be installed on all disturbed areas, as necessary to avoid excessive erosion. Temporary slope breakers must be installed on slopes greater than five (5) percent where the base of the slope is less than 15m from water body, wetland, and road crossings at the following spacing (closer spacing should be used if necessary):

Slope (%)	Spacing (metres)
5 - 15	90
> 15 - 30	60
> 30	30

The outfall of each temporary slope breaker should be directed to a stable, well-vegetated area or construct an energy-dissipating device at the end of the slope breaker and off the construction right-of-way. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetlands, water bodies, or other sensitive resources.

5.4.2 Sediment Barriers

Sediment barriers are intended to stop the flow of sediments and to prevent the deposition of sediments into sensitive resources. They may be constructed of materials such as silt fence, staked hay or straw bales, compacted earth (*e.g.*, drivable berms across travel ways), sand bags, or other appropriate materials.

At a minimum, install and maintain temporary sediment barriers across the entire construction right-of-way at the base of slopes greater than five (5) percent where the base of the slope is less than 15 m from a water body, wetland, or road crossing until re-vegetation is successful as defined in this Plan. Leave

adequate room between the base of the slope and the sediment barrier to accommodate ponding of water and sediment deposition.

Where wetlands or water bodies are adjacent to and downslope of construction work areas, install sediment barriers along the edge of these areas, as necessary to prevent sediment flow into the wetland or water body.

5.4.3 Mulch

Apply mulch on all slopes (except in actively cultivated cropland) concurrent with or immediately after seeding with native non-invasive species, where necessary to stabilize the soil surface and to reduce wind and water erosion. Spread mulch uniformly over the area to cover at least 75 percent of the ground surface at a rate of two (2) tons/acre of straw or its equivalent, unless the local soil conservation authority, landowner, or land managing agency approves otherwise in writing.

Mulch can consist of weed-free straw or hay, wood fiber hydro-mulch, erosion control fabric, or some functional equivalent. Mulch before seeding with native non-invasive species if:

- Final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the area is backfilled (10 days in residential areas); or
- Construction or restoration activity is interrupted for extended periods, such as when seeding with native non-invasive species cannot be completed due to seeding period restrictions.

If mulching before seeding with native non-invasive species, increase mulch application on all slopes within 30 m of water bodies and wetlands to a rate of three (3) metric tons/acre of straw or equivalent. If wood chips are used as mulch, do not use more than one (1) metric ton/acre and add the equivalent of 5kg/acre available nitrogen (at least 50 percent of which is slow release). Ensure that mulch is adequately anchored to minimize loss due to wind and water. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 30 m of wetlands or water bodies. Install erosion control fabric on water body banks at the time of final bank re-contouring. Anchor the erosion control fabric with staples or other appropriate devices.

5.5 Stormwater and Sedimentation Control

The Contractor is required take all reasonable measures to prevent soil erosion and the discharge of sediments and pollutants from the site during construction of the project. The Contractor shall, as an ongoing exercise, implement erosion and sedimentation control measures to the satisfaction of the MPU-PEU and/or WASA. During construction, the Contractor shall protect all areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking any other measures necessary to prevent storm water from concentrating in streams and scouring slopes, banks, etc. Any runnels or erosion channels developed during the construction or maintenance period shall be backfilled and compacted and the areas restored to a proper condition.

5.5.1 Stabilization of Cleared Areas

Stabilization to prevent and control erosion and/or sedimentation shall be actively managed. The contractor CIPP will detail the method of stabilization to be utilized following consultation with the MPU-PEU via the SPC. At a minimum the following methods (or combination thereof) should be considered:

- brush-cut packing,
- mulch or chip cover,
- straw stabilizing,
- watering,
- planting/sodding,
- soil binders and anti-erosion compounds,
- mechanical cover or packing structures (including the use of geofabric, log/pole fencing, etc.).

The Contractor shall be required to undertake actions to correct and stabilize any existing areas of erosion along access roads, within or outside the road reserve. Temporary erosion and sediment controls (*e.g.*, silt fences and sediment control structures) will be installed prior to the commencement of construction activities. Silt curtains will be used during construction that may create excessive material disturbance.

Traffic and movement over stabilized areas shall be restricted and controlled, and damage to stabilized areas shall be repaired and maintained to the satisfaction of the MPU-PEU. In areas where construction activities have been completed and where no further disturbance would take place, rehabilitation and re-vegetation should commence as soon as possible.

5.5.2 Drainage

In general, drains should be spread over a larger area with many smaller culverts rather than a few large ones. Storm-water culverts should reflect the positions of natural drainage lines. Where drainage lines constitute streams or wetlands, culvert numbers should be increased. Culverts should be placed, sized and designed so that they do not drain upstream wetland areas, but facilitate surface and subsurface flow linkages with downstream systems.

The site drainage network will be established at the commencement of construction activities to capture site runoff. Runoff captured from the site during construction will be evaluated for water quality prior to discharge in adjacent water bodies. These requirements assume only stormwater will be discharged from construction. Water that does not meet the relevant water quality criteria will be stored on-site and treated prior to release and/or re-used on-site. If discharges contain other pollutants, the additional requirements stipulated in the Water Pollution Rules, 2001 (as amended) shall apply. As applicable, limits will be met through sampling and analysis for discharges associated with the terminal construction, and for the pipeline route compliance will be assessed visually. Based on the visual inspections consideration will be given to performing sampling and analysis of the discharge from the pipeline construction.
The Contractor will provide a site map detailing the drainage plans for the site inclusive of the location of culverts and the final intended discharge point of site run-off. The CIPP is also expected to identify the water quality sampling points, in addition to providing the criteria for selection of the proposed locations.

5.5.3 Storm water Management

Storm-water runoff can be a significant source of water pollution at a construction site. Emphasis on reducing storm-water pollution will include (but not be limited to) the following:

- Maintain a clean and orderly work environment;
- Timely inspection and maintenance of facility equipment and system that could contribute to storm-water runoff pollutants;
- Spill prevention and response procedures; and
- Using drip pans during material transfer activities.

The Contractor is required to install storm-water drains, storm-water ponds, settlement ponds, and/or storage ponds and other erosion, sediment, and pollution controls as may be appropriate to manage storm water on the site. Contractors shall maintain all erosion, sediment, and pollution control infrastructure at or above design capacity for the duration of construction of the project and until such time as all ground disturbed by the works has been stabilized and rehabilitated so that it no longer acts as a source of sediment. Minimum criteria for the design capacity of sediment control infrastructure (sediment ponds/basins) include:

- To entirely contain sediment laden run-off from small and moderate sized (≤25mm of rainfall in a 30 minute period) storm events so that it can settle out before the next storm event;
- To provide a minimum of 2 – 6 hours of detention during larger storms (≥ 25mm of rainfall in a 30 minute period) when settling rates are the greatest;
- To provide half the storage as a permanent pool to protect against re-suspension and to promote better settling conditions.

All stockpiled construction materials shall be stabilized and covered where practicable to prevent erosion or dispersal of the materials into storm water runoff. Contractors shall manage any fill/ preload material brought to the site in manner that prevents erosion and dispersal of those materials into storm-water runoff.

5.5.4 Management of Run-off from Concrete Construction Activities

Concrete mixing directly on the ground shall not be allowed and shall take place only on impermeable surfaces to the satisfaction of the MPU-PEU. The concrete batching activities shall be located in an area of low environmental sensitivity to be identified and approved by the MPU-PEU.

All runoff from batching areas shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of at a site approved by the MPU-PEU. Contaminated water storage facilities shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.

Used (empty) cement bags shall be collected and stored in weatherproof containers to prevent wind-blown cement dust and storm-water contamination. All excess concrete shall be removed from the site on completion of concrete works and disposed of appropriately. Washing of excess concrete into the ground (where it could be dispersed into storm water) is not allowed. The Contractor shall submit a method statement detailing cement storage, concrete batching areas and methods, method of transport of cement and concrete, storage and disposal of used cement bags, etc. for each concrete batching operation.

5.5.5 Temporary De-watering of Excavations

Any water that accumulates in excavations created during construction activities will be tested to determine its quality. Depending on the quality of this water, it will be pumped to dedicated detention ponds or (if the water quality is suitable) pumped to on-site settling ponds for storage and re-use. Water that is considered to be of unsuitable quality for re-use will be temporarily stored within dedicated detention ponds with low-permeability liners (*e.g.*, compacted clay or geo-membrane) before being treated for re-use and/or removed from the site and disposed of appropriately.

6.0 Site Restoration

The Contractor will be required to detail in the CIPP the plans for restoration of the job-site inclusive of site cleanup activities, permanent erosion control measures installed, mitigation of areas of soil compactions and plans for re-vegetation of disturbed areas.

The following procedures are recommended for site restoration following the implementation of construction activities. The Contractor is expected to utilize the most appropriate site restoration measures stated herein or utilize any other appropriate industry best practice with a proven record of effectiveness.

6.1 Clean-up

Clean-up operations will commence immediately following backfill operations. Final grading, topsoil replacement, and installation of permanent erosion control structures will be completed within 20 days after backfilling (10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary slope breakers and sediment barriers) until conditions allow completion of clean-up.

A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed, inspected, and maintained (as specified in this Plan). When access is no longer required, the travel lane must be removed, and the right-of-way restored.

Excavated rock may be used for backfilling only to the top of the existing bedrock profile. Rock that is not used for backfill will be considered construction debris, unless approved for use as mulch or for some other use on the construction work areas by the landowner or land managing agency. Excess rock should be removed from at least the top 0.3 m of soil in all actively cultivated or rotated cropland and pastures, hayfields, and residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. The landowner may approve other provisions in writing.

The construction right-of-way will be graded to restore pre-construction contours and leave the soil in the proper condition for planting. Construction debris will be removed from all construction work areas unless the landowner or land managing agency approves otherwise.

Temporary sediment barriers will be removed when replaced by permanent erosion control measures or when re-vegetation is successful.

6.2 Permanent Erosion Control Devices

6.2.1 Trench Breakers

Trench breakers are intended to slow the flow of subsurface water along any excavated trenches. Trench breakers may be constructed of materials such as sand bags or polyurethane foam. Do not use topsoil in trench breakers. An engineer or similarly qualified professional shall determine the need for and spacing of trench breakers. Otherwise, trench breakers shall be installed at the same spacing as and upslope of permanent slope breakers.

In agricultural fields and residential areas where slope breakers are not typically required, install trench breakers at the same spacing as if permanent slope breakers were required. At a minimum, install a trench breaker at the base of slopes greater than five (5) percent where the base of the slope is less than 15 m from a water body or wetland and where needed to avoid draining a water body or wetland.

6.2.2 Permanent Slope Breakers

Permanent slope breakers are intended to reduce runoff velocity, divert water off the construction right-of-way, and prevent sediment deposition into sensitive resources. Permanent slope breakers may be constructed of materials such as soil, sand bags, or some functional equivalent.

Permanent slope breakers will be constructed and maintained in all areas, except cultivated areas and lawns, using spacing recommendations obtained from the local soil conservation authority or land managing agency. In the absence of written recommendations, use the following spacing unless closer spacing is necessary to avoid excessive erosion on the construction right-of-way:

Slope (%)	Spacing (metres)
5 - 15	90
> 15 - 30	60
> 30	30

Slope breakers should be constructed to divert surface flow to a stable area without causing water to pool or erode behind the breaker. In the absence of a stable area, construct appropriate energy-dissipating devices at the end of the breaker. Slope breakers may extend slightly (about 2 m) beyond the edge of the construction right-of-way to effectively drain water off the disturbed area. Where slope breakers extend beyond the edge of the construction right-of-way, they are subject to compliance with all applicable survey requirements.

6.3 Soil Compaction Mitigation

Topsoil and subsoil should be tested for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to approximate pre-construction conditions. Use penetrometers or other appropriate devices to conduct tests.

Severely compacted agricultural areas should be plowed with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil.

Alternatively, make arrangements with the landowner to plant and plow under a suitable crop to decrease soil bulk density and improve soil structure. If subsequent construction and cleanup activities result in further compaction, conduct additional tilling. Perform appropriate soil compaction mitigation in severely compacted residential areas.

6.4 Re-vegetation

The Contractor is responsible for ensuring successful re-vegetation of soils disturbed by project-related activities. All turf, ornamental shrubs, and specialized landscaping will be restored in accordance with the landowner's (Regional Corporation or other private owner) request or the landowner will be compensated. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices.

6.4.1 Soil Additives

Fertilize and add soil pH modifiers in accordance with written recommendations obtained from the local soil conservation authority, land management agencies, or landowner. Incorporate recommended soil pH modifier and fertilizer into the top 50 mm of soil as soon as possible after application.

6.4.2 Seeding Requirements

The following procedures should be followed in order to provide adequate reseeding of areas disturbed during construction:

- Prepare a seedbed in disturbed areas to a depth of 8 to 10 cm using appropriate equipment to provide a firm seedbed. When hydro-seeding, scarify the seedbed to facilitate lodging and germination of seed;
- Seed disturbed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or as requested by the landowner or land management agency. Seeding is not required in actively cultivated croplands unless requested by the landowner;
- Perform seeding with native non-invasive species of permanent vegetation within the recommended seeding dates. If seeding with native non-invasive species cannot be done within those dates, use appropriate temporary erosion control measures and perform seeding of permanent vegetation at the beginning of the next recommended seeding season. Lawns may be seeded on a schedule established with the landowner;
- In the absence of written recommendations from the local soil conservation authorities, seed all disturbed soils within six (6) working days of final grading, weather and soil conditions;
- Base seeding rates on pure live seed and use seed within 12 months of seed testing;
- Treat legume seed with an inoculants specific to the species using the manufacturer's recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydro);
- In the absence of written recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary, a seed drill equipped with a culti-packer is preferred for seed application; and
- Broadcast or hydro-seeding can be used in lieu of drilling at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a culti-packer or imprinter after seeding with native non-invasive species. In rocky soils or where site conditions may limit the effectiveness

of this equipment, other alternatives may be appropriate (*e.g.*, use of a chain drag) to lightly cover seed after application, as approved by the MPU-PEU.

7.0 Off Road Vehicle Control

To each owner or manager of forested lands, the contractors will offer to install and maintain measures to control unauthorized vehicle access to the right-of-way. These measures may include:

- Signs;
- Fences with locking gates;
- Slash and timber barriers, pipe barriers, or a line of boulders across the right-of-way; and
- Appropriate trees or shrubs across the right-of-way.

8.0 Post Construction Activities

The procedures identified herein will be followed subsequent to completion of construction and restoration activities.

8.1 Monitoring and Maintenance

The Contractor will be required to conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of re-vegetation. Re-vegetation in non-agricultural areas shall be considered successful if, upon visual survey, the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agricultural areas, re-vegetation shall be considered successful if crop yields are similar to adjacent undisturbed portions of the same field. The Contractor will continue re-vegetation efforts until re-vegetation is successful.

The Contractor is also required to monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is successful. Restoration shall be considered successful if the right-of-way surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the land owner or land managing agency), re-vegetation is successful, and proper drainage has been restored.

Routine vegetation maintenance shall be conducted as frequently as required. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 3 m in width centered on the pipeline may be maintained annually in an herbaceous state. Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, shall continue throughout the life of the project. Maintain signs, gates, and vehicle trails as necessary.

8.2 Reporting

The Contractor shall maintain records that identify by milepost the following:

- Method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;
- Acreage treated;
- Dates of backfilling and seeding with native non-invasive species;
- Names of landowners requesting special seeding treatment and a description of the follow-up actions; and

- Any problem areas and how they were addressed.

The Contractor shall develop quarterly activity reports documenting problems, including those identified by the landowner, and corrective actions taken.

ANNEX O - PUBLIC CONSULTATION PLAN

CHATHAM CLUSTER OF PROJECTS

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Table of Contents

List of Tables

1.0 Introduction

The objective of the Chatham Cluster of Projects is to improve the water supply and enhance the lives of approximately **23,333** persons within the project catchment. Residents in this supply zone experience varying levels of service, from a one in nine day supply (1/9), to a twenty-four hour supply (24/7). The execution of these projects, which will directly affect approximately 134 households and 13 businesses within the zone, presents a potential for some temporary disruptions within this community in different ways. The stakeholder consultation process identified in this plan is aimed at enhancing project acceptance, minimizing disruption and misinformation, thereby contributing to the project's overall successful development and implementation. This Stakeholder Consultation Plan identifies the stakeholders associated with the project and the manner in which they will be engaged, to mitigate the risks aligned to each stakeholder group.

The Chatham Cluster of projects is comprised of the following:

- Drilling and development of Chatham Well #15
- Rehabilitation of the Chatham Water Treatment Plant

2.0 Objectives of Consultation Plan

The stakeholder consultation process is an inclusive process conducted throughout the project's life cycle. The objectives of this Consultation Plan are:

a) To capture the views and perceptions of people who may be affected or have an interest in the project, which can be used as inputs to improve the project design and implementation;
b) To assist in validating and verifying the data obtained elsewhere for use in the ESA/ESMP;
c) To enable people to understand their rights and responsibilities in relation to a project, by providing appropriate information on environmental and social risks and impacts of the project in a timely, understandable, accessible manner and format;
d) To provide greater transparency and involvement of stakeholders, in order to build trust and project acceptance;
e) To provide stakeholder with accessible and inclusive means to raise grievances and allow for their appropriate response and management.

3.0 Stakeholder Identification & Analysis

Stakeholder identification and analysis is an essential component of effective, targeted and meaningful stakeholder engagement. The objective of this step is to provide a general overview of all stakeholders associated with the Chatham Cluster of projects.

3.1 Stakeholder Identification

The project stakeholders are persons who have a role in the project, could be affected by the project, or who are interested in the project. The stakeholders for the Chatham Cluster of projects can be divided into the following categories:

a) Project Affected Parties (PAP)

These are the primary stakeholders who are likely to be impacted directly or indirectly, positively or adversely by the project and who are most likely to be susceptible to change associated with the project. The project's directly impacted stakeholders include residents, women and small business owners. While stakeholders will be positively impacted by the projects, they will also experience some degree of temporary nuisance and risks. The project's beneficiaries are all customers **(approximately 23,333 persons)** within the Chatham Water Treatment Plant supply zone who will experience an improved level of service. Although all customers within the zone will experience an improved level of service, **only 134 households and 13 businesses** are expected to experience some form of short-term disruption and inconveniences. Given that Chatham is a rural community with limited economic activity, the most vulnerable group within the Chatham area are the women who are primarily homemakers who spend the majority of time within the home. The data reflects that these women are of predominantly low-mid socio-economic status. As such, particular emphasis will be placed on ensuring that women are included in the consultation process.

There is little to no risk identified for residents and businesses due to the project works associated with development of the new Chatham Well #15, as these works will take place in a remote area away from the populated areas. The rehabilitation of the Chatham Water Treatment Plant will be of low risk to stakeholders as the active project works will be confined to within the facility. The low risk to be encountered will be due to the increased movement of equipment along the Southern Main Road to the Plant. However, this route is a main thoroughfare that already caters for relatively high traffic volume with vehicles of varying sizes and types. However, there will be moderate risk to residents and business along the pipeline route which will connect the new well to the existing pipeline network along Chatham North Trace. This will be due to the inconveniences of traffic, access, noise and dust/runoff associated with pipeline installation works.

b) Interested Parties or Influencers

These are stakeholders whose interest may be affected by the project and who have the potential to influence the project outcomes in any way, but who may not experience the direct impacts of the project. As it relates to the Chatham Cluster of projects this may include unemployed persons in the community, who may wish to be employed by the project, as well as the Parliamentary Representative and Local Government Representatives at the Point

Fortin Regional Corporation, along with community groups such as Chatham Village Council, and Chatham Youth Development & Apprentice Centre.

3.2 Stakeholder Mapping

A Stakeholder Mapping exercise was undertaken in the Chatham Cluster project area to identify the categories stakeholders who would be impacted and with whom the executing agency would need to consult for project design, development and implementation.

The following **Table 1** identifies the stakeholder categories and subcategories of the Chatham community with the Chatham WTP Rehabilitation and the Chatham Well #15 and associated pipeline installation, represented separately. The table highlights the aspects of the projects for which stakeholders will experience varying levels of risk from low – moderate. The Table also outlines the expected project impacts/interests against the level of risk and Influence of various stakeholders.

***Table 1** – Stakeholder Categories*

Project	Stakeholder Category	STAKEHOLDER DETAILS	Expected or Potential Project Impact/Interest	Level of Risk(Low, Moderate, High)	Level of Influence (Low, Moderate, High)
PROJECT AFFECTED PARTIES					
Chatham Cluster *(Chatham WTP Refurbishment* **and** *Chatham Well 15)*	**Women**	**Women –** 134 Approximately one per household	▪ Will experience improved water service. ▪ Possible impact by dust/runoff, noise emissions, increased traffic. ▪ Possible damage to road infrastructure within community	Low	low
Chatham Water Treatment Plant Rehabilitation	**Residents**	**Residents** – 94 Along Southern Main Road to the Plant)	▪ Possible noise emissions and increased traffic.	Low to no risk	low
Chatham Well #15 Chatham		**Residents** – 40 Along Chatham North Trace in vicinity of Pipeline Installation	▪ Possible impacted by dust/runoff, noise emissions, increased traffic. ▪ Possible damage to road infrastructure within community.	Moderate	Moderate
Chatham Water Treatment Plant Rehabilitation	**Businesses**	**Businesses** – 13 Located along Southern Main Road to the Plant (1 Food Shop, 6 Mini Marts, 1 Barber Shop, 1 Car Care Shop, 1 Plant Shop, 1 Bar) **Roadside Vendors** - 2 Vegetable stalls	▪ Will experience improved water service. ▪ Possible impacted noise emissions.	Low	Low
Chatham Well #15 Chatham		**Business** – 1 Bar (Gopeesingh's Bar) Along Chatham North Trace	▪ Will experience improved water service. ▪ Possible impacted by dust/runoff, noise emissions, increased traffic. ▪ Possible damage to road infrastructure within community.	Moderate	Low

INTERESTED PARTIES					
Chatham Cluster	**Unemployed members**	Unemployed members of the community	▪ May obtain temporary employment during pipeline construction works in particular.	Moderate	Low
	Local Contractors	Contractors interested or living in the community	▪ Will benefit from improved water service. ▪ Will be interested in pursuing work on project sites.	Low	Moderate
	Political Representatives	1 - Member of Parliament, Kennedy Richards;	▪ Will benefit from improved water service to residents within their jurisdiction. ▪ Can provide input on key components of the project, including recommendations on the implementation. ▪ Monitor the presence and activities of the contractors.	Low	High
	Local Government	Point Fortin Regional Corporation; Councillor Arlene Ramdeo	▪ Will benefit from improved water service to residents within their jurisdiction. ▪ Can provide input on key components of the project, including recommendations on the implementation. ▪ Monitor the presence and activities of the contractors.	Low	High
	Community Based Organizations;	▪ Chatham Village Council; ▪ Chatham Youth Development & Apprentice Centre	▪ Will experience improved water service. ▪ Can be impacted by dust/runoff and noise emissions. ▪ Can be affected by an increase in traffic. ▪ May represent citizens and monitor project activities in area.	Low	Low

Key: **Low** – little to no risk to stakeholder and/or exercises no material influence over the project
Moderate – has potential risk to the stakeholder that warrants clear mitigation measures; can temporarily delay project execution. Mitigation methods reside in the consultation process by ensuring representation by these stakeholders.
High – major risk to the stakeholder and has the capacity to halt the project. This stakeholder must be kept informed regularly.

4.0 Prior Information

It is important to note that information regarding all aspects of the project be shared in a timely manner with all stakeholders. As such, the MPU PIU and WASA PEU will collaborate to ensure that all stakeholders have adequate time to discuss the information among themselves and develop informed opinions prior to the consultation events including the Community meetings and the Key Informant, House to House Awareness Exercise. Prior to the hosting of Community Meetings and other interactive sessions, stakeholders will be informed in a timely manner of at least 14 days of details such as date, time, location and agenda. Further, stakeholders will be provided with the project information a minimum of 14 days before, which includes a summary of the project scope, objectives, expected benefits, potential environmental & social impacts as well as mitigation strategies. The following methods will be utilized to provide this prior information:

- MPU & WASA websites & social media platforms at least 14 days prior to the Community Meeting
- Key Informant House to House engagement to begin 14 days prior to the Community Meeting
- Loud speaker public announcements in the project affected area five (5) days prior to the meeting.

5.0 The Consultation Event for the ESA/ESMP

The Consultation Process for the Chatham Cluster will involve multi-dimensional stakeholder consultation aimed at providing in-depth information to a wide range of stakeholders while ensuring adequate mechanisms for receiving feedback which can be used to amend, update and enhance project design and delivery.

The consultation process will begin prior to meeting community persons face to face at the community meetings. These consultation process will begin immediately after IDB approval and will disclose the Draft ESA/ESMP, inclusive of details on the project scope, stages, potential issues, risks, impacts and mitigation methods associated with its implementation. This process will familiarize community stakeholders with the project details and provide adequate opportunity to prepare for the planned community meeting engagement to be held at the centrally located Chatham Community Centre, along Chatham South Trace. The public consultation event has been planned for July 12th, 2023 at 5pm. Given the proposed meeting time of 5:00 p.m., it is anticipated that the meeting will be attended by representatives from all stakeholder groups including stay-at-home mothers, working men and women, business people, political and civil representatives and unemployed persons.

Visual and verbal presentations will be delivered at the stakeholder meeting that will further clarify and enhance the written information previously disseminated to community persons. The facilitators will be members of the MPU/WASA project teams, who are experienced in community consultations and who have a demonstrated ability to employ appropriate communication skills such as active listening, clear and empathetic explanations and encourage open feedback on matters raised. These personnel inclusive of a Communications Specialist, who will chair the meeting, will conduct the meeting using the proposed agenda:

- Objectives and Structure of event – Meeting Chairman
- Identification of Key Project Personnel – Meeting Chairman

- Outline of ESA/ ESMP including project details, and possible impact on community stakeholders – Project Leader (PowerPoint presentation)
- Details of Grievance and Redress Mechanism (GRM) – Project Leader
- Questions/Queries/Recommendations from Community Stakeholders on Project – Project Team Lead
- Project Contact and Communication Channels – Meeting Chairman
- Closing Remarks

Printed handouts which summarize the critical project information will be provided to stakeholders in attendance. The consultation meetings will have an attendance register to record attendees and note takers to ensure that critical details are recorded and can be addressed subsequent to the sessions.

In addition to the community meetings, the project consultation process will also employ a secondary two-way direct consultation method by using key informants to conduct a house-to-house sensitization exercise. This exercise will be undertaken at least 30 days before the start of the Chatham Well #15 pipeline works. Given that the pipeline route for Chatham Well #15, runs along Chatham North Trace to the corner of the Southern Main Road and may adversely affect the 40 residents on Chatham North Trace, these key informants from the MPU/WASA project teams (Communications Specialists and Project Leads) will go house-to-house, to further sensitize residence about the project and gather feedback on stakeholder concerns or inputs. The teams will also provide project details, impacts and address perceptions and expectations, information on GRM and how to contact and engage the project in the future. This information will be provided verbally and through printed information packages that will be left with stakeholders. It is believed that this method will ensure none of this specific stakeholder group and in particular stay-at-home persons such as women, the elderly and people with disabilities are not left out of the consultation process. This method will provide an additional opportunity to effectively engage residents who on their specific concerns.

The other methods of information sharing such as Internet/ Digital/ Social Media (MPU & WASA websites & social media pages); Direct Mail Delivery; and Loud Speaker Public Announcements will be utilized throughout the consultation process to provide information on project updates, community relations, employment and procurement, environmental and social aspects of project.

6.0 Stakeholder Feedback, Documentation and Public Disclosure

It is important that stakeholders receive timely and relevant feedback on how issues/concerns raised during the consultation process are being addressed. To ensure that this is achieved a record of the following will be taken during the consultation process and a final report will be prepared:

- Location, time, and participants (Recorded by sector and gender)
- Agenda
- Key issues discussed or asked by participants
- Any agreements reached due to consultation
- Recommendations made for amending project design and/or implementation
- Environmental/Social concerns/impacts and how they were addressed
- Decisions made based on stakeholder inputs to improve project design and implementation

- Areas of disagreement or diverging views and reasons why some recommendations cannot be accommodated
- Agreements on preferred methods and selected persons through which community stakeholders may wish to be notified.
- Videos/Photos of event in progress.

Where applicable, immediate feedback will be provided during the consultation process, or via the Disclosure and Consultation Report, which will be subsequently available on MPU and WASA websites. The Project Team Lead in consultation with the Communications Specialist, will determine any other required engagement method.

7.0 Community Engagement Approaches/Methodologies

7.1 Engagement Methods

Based on the above Stakeholder Identification and Analysis for the Chatham Cluster of projects, the nature and scope of the projects, as well as the socio-cultural characteristics of the project impact area, the following methods will be utilized to engage stakeholders throughout the life of the project. These includes two-way direct consultation methods – Community Meeting and Key Informants House to House Awareness Exercise, along with information sharing methods – internet/digital/social media, direct mail delivery and loud speaker public announcements.

The details of these methods are as follows:

- **Public Notice** – The placement of a Public Notice in the Print Media will place the location and nature of the project in the national dialogue. This will allow all citizens to envision these projects within the wider context of transforming the water utility into a reliable and sustainable entity.

- **Direct Mail Delivery** – This information sharing method will be used to invite community persons to meetings and to provide project details prior to the first community meeting and throughout the life of the project. This method will involve printed information with summarized project details and an invitation to community meeting. This will be delivered to each house, at least five (5) days before the first scheduled meeting to give residents adequate time to read and discuss the information. Similarly, information concerning the commencement of project works, will be delivered through the project affected area, five (5) days before the project start. This is expected to effectively target residents, businesses and women as a vulnerable group within the project area, since information will be directly delivered to residences, community organizations and businesses. This method will be especially important to the 104 residents and 14 businesses, bars and vendors along the Southern Main Road and Chatham North Trace.

- **Internet/ Digital/ Social Media** – The use of digital media is one information sharing method that will be used to disclose project updates, community relations, community updates, employment and procurement, environmental and social aspects of project.

  Despite the Chatham project area being considered rural and remote, the country's broad high level of internet connectivity, will assist many persons in accessing project information relevant to their

area. As such, WASA and MPU will utilize popular social media to provide information to community stakeholders at least 5 days prior to the first community meeting. Additionally, detailed and relevant project information will be accessible on the websites to allow stakeholders to conduct a more thorough review. These digital platforms will be regularly updated and refreshed to aid information sharing.

- **Community Meeting** – Community meetings will be used as a critical engagement method with stakeholders. The first meeting will be held after receiving IDB approval to disclose the Draft ESA/ESMP. This community meeting will be targeted at all community persons and will provide details to all community stakeholders on the project's design, plans and activities. It will also address stakeholder perceptions and expectations, impact mitigation/management measures to be implemented and receive inputs and inform persons of how to provide additional feedback on the project going forward. The community meetings will be conducted using presentations and Q&A sessions by personnel who are knowledgeable about the project and area as well as being skilled facilitators.

  Given, the rural and remote location of the Chatham Cluster of projects, stakeholder accessibility will be a key consideration when hosting this consultation meeting. As such, the meeting venue will be centrally located at the Chatham Community Centre and will be held at 5:00 p.m. on a week day. The venue and time will allow for attendance by residents after normal work hours, which is 4:00 p.m. It also accommodates vulnerable groups such as women, who can attend after children arrive home from school. This meeting will also be used as the forum to identify any community representatives through which the community may wish to filter concerns or receive direct project updates.

- **Key Informants House to House Awareness Exercise** – will be used as an additional two-way direct consultation method, to provide details on the Chatham Well #15 project design, plans and activities, address perceptions and expectations, share impact mitigation/management measures, receive inputs and outline how stakeholders can engage with project representatives. This method will involve key informants (MPU PIU/WASA PEU Communications Specialist and Project Leaders) visiting each house in the Chatham North Trace project impact area to provide project details and solicit feedback/inputs.

  Given that the pipeline route to connect the Chatham Well #15 to the existing pipeline network, will run along Chatham North Trace, this may directly impact, for a short time, approximately 40 residents and 1 business in the area. As such, in order to engage these stakeholders who may be inconvenienced by the works along the pipeline route, a two-way dialogue consultation will be conducted through a key informant house to house awareness exercise. This will be carried out at least 30 days prior to the start of the actual pipeline works and will provide these residences and business with a further update on the project, such as the start date and schedule for completion, and obtain any further feedback and inputs. This will allow community persons to adequate time to raise specific concerns regarding the project works. In addition to providing an update to the community, this exercise will provide one-on-one engagement with persons who were unable to attend the community meetings.

- **Loud Speaker Public Announcements** –This culturally and geographically appropriate information sharing method will be used to share details on project updates, community relations, community updates and to generate public interest.
  Considering the remote and relatively small area and number of adversely impacted stakeholders, these loud speaker public announcements will be an effective method to notify community persons on upcoming stakeholders' engagement meetings, planned house to house sensitization exercise and the commencement of project works. This method is particularly impactful on vulnerable groups such as women within the home, small businesses and unemployed persons.

- **Community Liaison Team** – This strategy will utilize the WhatsApp platform to create a platform for timely feedback from the community as well as to share pertinent project information. A minimum of five (5) residents along the project area will be solicited for participation and will be engaged as virtual community eyes along the life-span of the project. These will be volunteers who are prepared to place project concerns/questions in the WhatsApp group chat created for that specific project. The Project Team lead will be the Admin of this facility.

- **Strategic Community Partners** – Businesses within the project area will be engaged to display project notices (Updates, changes, etc.) throughout the life-span of the project. Government and government agencies will also provide support by way of information sharing across their digital platforms.

- **WhatsApp Messaging** – This has proven to be a useful tool to share information at the community level and provides an avenue for immediate feedback.

***Table 2** – Communications Consultation Matrix*

	CHATHAM WELL #15 & PIPELINE WORKS						
CATEGORY	**STAKEHOLDER**	**ENGAGEMENT METHOD**	**OBJECTIVE**	**WHEN**	**WHERE**	**WHO'S RESPONSIBLE**	**FEEDBACK MECHANISM**
National Community	National	Public Notice	Create Awareness of Project to National Community	Immediately after approval by the Bank to disclose the Draft ESA/ESMP (Min. 21 days)	Print Media One (1) Publication on One (1) day	Graphic Artist – Artwork Communications Team Lead - Placement	Contact info printed on Public Notice
Project Affected Parties	Residents – 40 Women 40 – Approximately one per household Businesses – 1 (Gopeesingh's Bar)	Key Informant House to House Sensitization Exercise and Community Meeting Invite	Initial engagement. Further identification of undocumented vulnerable individuals/groups	Immediately after publication of Public Notice and minimum 14days before Community Meeting	Throughout project affected area	Customer Response Unit	Contact for Team Lead on the project
		Digital/Social Media	Place basic project info in the public domain. Create project awareness. Targeted social media activity to groups within project area.	This activity to begin 14 days before Community Meetings and continuing – Two (2) digital media posts weekly	MPU & WASA websites and social media platforms	Communications Officer – Posting & Monitoring content	Office contact on all printed material (email address/land and mobile numbers)
		Direct Mail	Community Awareness and generate project interest	3-5 days before Community Meeting	Chatham North Trace, houses and Gopeesingh's Bar.	Consultation Team in collaboration with Customer Response Unit	Contact for Team Lead on the project
		Community Meeting	Provide project details. Identify potential disruptions and mitigation strategies. Create Community Liaison Team (5 persons spanning project	Minimum 14 days after publication of draft ESMP/ESA	Chatham Community Centre	Environmental Specialist – Draft ESMP/ESA Project Team – Coordinated by	Contact info on all disseminated material (email address, land and mobile numbers) Establishment of WhatsApp group for

	CHATHAM WELL #15 & PIPELINE WORKS						
CATEGORY	**STAKEHOLDER**	**ENGAGEMENT METHOD**	**OBJECTIVE**	**WHEN**	**WHERE**	**WHO'S RESPONSIBLE**	**FEEDBACK MECHANISM**
			area). Identify strategic community partners.			Communications Team Lead	Community Liaison Team.
		Follow-up Community Meeting/Direct Mail/ Key Informants House to House Awareness Exercise ***Method to be confirmed based on changes made.**	Update community on changes made to ESA/ESMP and inclusion of strategies to address issues raised.	Seven (7) days **after** Community Meeting	To be determined based on engagement method used.	Project Team Lead	Established feedback mechanisms
Project Affected Areas	Residents – 94 Women 94 – Approximately one per household Businesses – 11 (1Food Shop, 6 Mini Marts, 1 Barber Shop, 1 Plant Shop, 1 Bar)	Direct Mail	Initial engagement	14 days prior to Community Meeting	Throughout project affected area	Customer Response Unit	Contact for Communications Lead on the project
		Digital/Social Media	Place basic project info in the public domain. Create project awareness	This activity to begin 14 days before Community Meetings and continuing – Two (2) digital media posts weekly	MPU & WASA websites and social media platforms	Communications Officer – Posting & Monitoring content	Office contact on all printed material (email address/land and mobile numbers)
		Loud Speaker Announcement	Community based invitation to Community Meeting	3-5 days before Community Meeting	Throughout project affected area	Independent Vendors on the Authority's approved listing – Booked by Communications Team Lead	n/a

ANNEX O – CHATHAM PROJECT CLUSTER PUBLIC CONSULTATION PLAN

	CHATHAM WELL #15 & PIPELINE WORKS						
CATEGORY	**STAKEHOLDER**	**ENGAGEMENT METHOD**	**OBJECTIVE**	**WHEN**	**WHERE**	**WHO'S RESPONSIBLE**	**FEEDBACK MECHANISM**
		Community Meeting	Provide project details. Identify potential disruptions and mitigation strategies. Create Community Liaison Team (5 persons spanning project area). Identify strategic community partners.	Minimum 14 days after publication of draft ESMP/ESA	Chatham Community Centre	Project Team – Coordinated by Project Team Lead	Contact info on all disseminated material (email address, land and mobile numbers) Establishment of WhatsApp group for Community Liaison Team.
Interested Parties	Unemployed members of the community Local Contractors	Digital/Social Media	Place basic project info in the public domain. Create project awareness	This activity to begin 14 days before Community Meetings and continuing – Two (2) digital media posts weekly	MPU & WASA websites and social media platforms	Communications Officer – Posting & Monitoring content	Office contact on all printed material (email address/land and mobile numbers)
		Loud Speaker Announcement	Community based invitation to Community Meeting	3-5 days before Community Meeting	Throughout project affected area	Independent Vendors on the Authority's approved listing – Booked by Communications Team Lead	n/a
		Community Meeting	Provide project details. Identify potential disruptions and mitigation strategies. Create Community Liaison Team (5 persons spanning project area). Identify strategic community partners.	Minimum 14 days after publication of draft ESMP/ESA	Chatham Community Centre	Project Team – Coordinated by Project Team Lead	Contact info on all disseminated material (email address, land and mobile numbers) Establishment of WhatsApp group for Community Liaison Team. Creation of database of Vulnerable,

ANNEX O – CHATHAM PROJECT CLUSTER PUBLIC CONSULTATION PLAN

	CHATHAM WELL #15 & PIPELINE WORKS						
CATEGORY	**STAKEHOLDER**	**ENGAGEMENT METHOD**	**OBJECTIVE**	**WHEN**	**WHERE**	**WHO'S RESPONSIBLE**	**FEEDBACK MECHANISM**
							Unemployed persons and Local Contractors
	Elected Representative - Members of Parliament; **Local Government:** Point Fortin Regional Corporation; **Community Based Organizations**: Chatham Village Council; Chatham Youth Development & Apprentice Centre	Direct Mail Delivery	Provide project details. Identify potential disruptions and mitigation strategies.	14 days prior to Community Meeting	In-person delivery to identified offices	Customer Response Unit representatives to deliver curated content to these officials	Identification of Team Leads and provision of contact information
		Digital/Social Media	Place basic project info in the public domain. Create project awareness	This activity to begin 14 days before Community Meetings and continuing – Two (2) digital media posts weekly	MPU & WASA websites and social media platforms	Communications Officer – Posting & Monitoring content	Office contact on all posted material (email address/land and mobile numbers)
		Community Meeting	Provide project details. Identify potential disruptions and mitigation strategies. Creation of database of CBO contact persons.	Minimum 14 days after publication of draft ESMP/ESA	Chatham Community Centre	Project Team – Coordinated by Project Team Lead	Contact info on all disseminated material (email address, land and mobile numbers) Establishment of WhatsApp group for Community Liaison Team.

8.0 Grievance and Redress Mechanism

The Grievance Mechanism (GRM) is aimed at providing an open and transparent system for complaints and grievances to be resolved regarding any project related matter. The process must be timely, effective and efficient with clearly outlined steps that are shared with all stakeholders. The GRM is a critical tool in building trust and collaboration with the community and as a means of enabling remedial actions. The GRM is detailed in **Annex G**. During the consultation event of the ESA/ESMP, the GRM will be disclosed to the public and subsequently, all public grievances will be documented.

9.0 Institutional Responsibility for Implementation of Stakeholder Engagement Plan

The MPU PIU will have overarching responsibility for the implementation of this Consultation Plan with the support of the WASA PEU.

***Table 3** - Consultation Team and areas of expertise*

Name	Position	Area of Expertise
Giselle Barnett	Team Lead	Environmental Specialist
Raul Edwards	Team Member	Project Supervisor
Shenelle Yearwood	Team Member	Project Engineer
Ruth Osman	Team Member	Communications Support
Chelsea Sanchez	Team Member	Administrative Support

10.0 Auxiliary Support

The following will lend support on an as/when required basis:

1. **Ministry of Communications** – Logistical support in the dissemination of information across all government agencies.
2. **The Adopt A River Programme** – Community based programme to assist with House to House engagement.
3. **WASA Corporate Communications** – Videography/Photography services.

11.0 Monitoring and Evaluation

The implementation of the Project Consultation Plan will be rigorously monitored to ensure compliance to timelines and responsivity to concerns raised. The following, **Table 4**, provides the monitoring tool:

Table 4 *- Monitoring Framework, Well#15 and Pipeline Works*

Stakeholder	Activity	Date Proposed	Date Executed	No. of Persons In Attendance	No. of persons/houses engaged	Concerns Raised	Date Concerns Addressed & Medium Used	Comments
National Community	Public Notice							
Residents – 40 Women 40 – Approximately one per household Businesses – 1 (Gopeesingh's Bar)	Key Informants House to House Awareness Exercise and Community Meeting Invite							
	Digital/Social Media							
	Direct Mail							
	Community Meeting							
	Follow-up Community Meeting/Direct Mail/House to House Engagement ***Method to be confirmed based on changes made.**							

Table 5 *- Monitoring Framework, Chatham WTP Rehabilitation*

Stakeholder	Activity	Date Proposed	Date Executed	No. of Persons In Attendance	No. of persons/houses engaged	Concerns Raised	Date Concerns Addressed & Medium Used	Comments
Households – 94 Women 94 – Approximately one per household Businesses – 11 (1Food Shop, 6 Mini Marts, 1 Barber Shop, 1 Plant Shop, 1 Bar)	Direct Mail							
	Digital/Social Media							
	Loud Speaker Announcement							
	Community Meeting							
	Direct Mail							
	Follow-up Community Meeting/Direct Mail/House to House Engagement ***Method to be confirmed based on changes made.**							

***Table 6** - Monitoring Framework, Chatham Cluster*

Stakeholder	Activity	Date Proposed	Date Executed	No. of Persons In Attendance	No. of persons/houses engaged	Concerns Raised	Date Concerns Addressed & Medium Used	Comments
Unemployed members of the community Local Contractors	Digital/Social Media							
	Loud Speaker Announcement							
	Community Meeting							
Political Representative - Members of Parliament; **Local Government:** Point Fortin Regional Corporation; **Community Based Organizations**: Chatham Village Council; Chatham Youth Development & Apprentice Centre	Digital/Social Media							
	Direct Mail Delivery							
	Community Meeting							

11.4 **Evaluation Framework**

Table 7 *- Evaluation Framework*

Stakeholder	Activities	% Completion Achieved	Lessons Learned	Comments
• Residents • Businesses • Unemployed • Local Contractors • Member of Parliament • Local Government Representative • Community Based Organizations	Key Informants House to House Awareness Exercise and Community Meeting Invite			
	Digital/Social Media			
	Direct Mail			
	Loud Speaker/Community PA			
	Community Meeting			
	Satisfaction Survey			

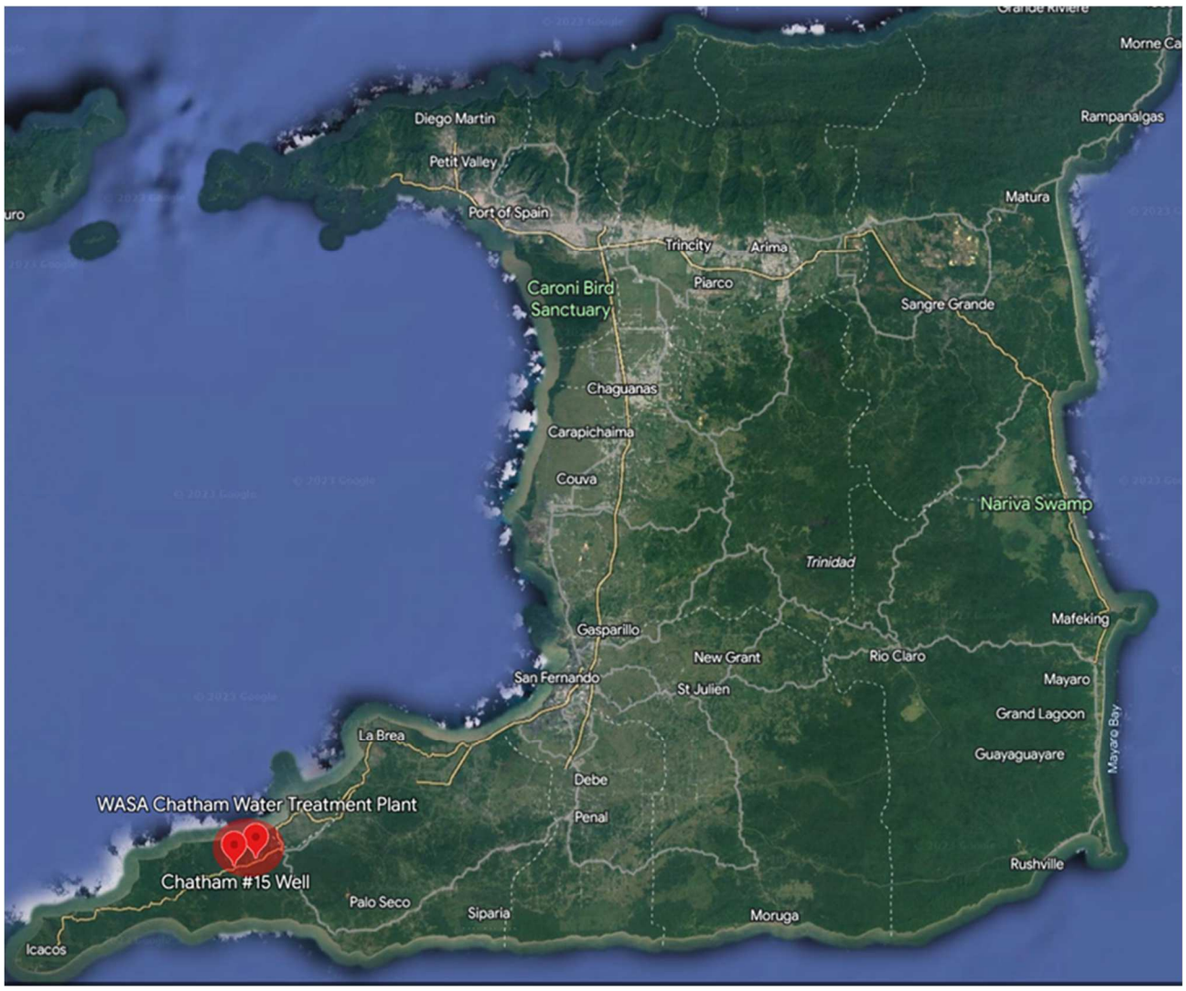
Appendix I – Community Meeting Checklist

LOGISTICS – Chatham Community Centre						
Location	Date of Site Visit:	Date of Booking:	Housekeeping Required Y/N	Air-condition Available Y/N	Parking Y/N	Contact for Site Manager:
Transportation	No. of Persons:	Date Transport Booked:	Pickup Point:	MPU Transport: Y/N	-	Contact for Dispatcher:
Equipment	Date PA System Booked:	Projector & Screen: Y/N	Photography/Videography Y/N	Audio Recording Requested Y/N	-	Contact for Vendor:
Infrastructure	No. of Chairs:	No. of Tables:	Hand Sanitizer Station: Y/N	Drinking Water/Coffee/Tea: Y/N	-	Contact for Vendor:
PROTOCOL						
No. of Guests:	Seating Plan Prepared: Y/N	Ushers Required: Y/N	Registration List: Y/N	Agenda Printed: Y/N	Meeting Scribe Secured: Y/N	Contact for Coordinator:
PRESENTATION						
PowerPoint	Format Stored:	No. of Slides:	Date Submitted:	Date Tested:	Clicker Requested: Y/N	Contact for Operator:
Flyers	No. of Flyers Printed:	Date Printed:	Date Distributed:	Areas Delivered:	FAQ Flyer Available: Y/N	Team Member Responsible:
SECURITY						
Date of Site Visit:	Persons in Attendance:	Strength of WASA Police Required:	TTPS Required: Y/N	Strength of TTPS Required:	Cost of TTPS Personnel:	Contact for Security Personnel:

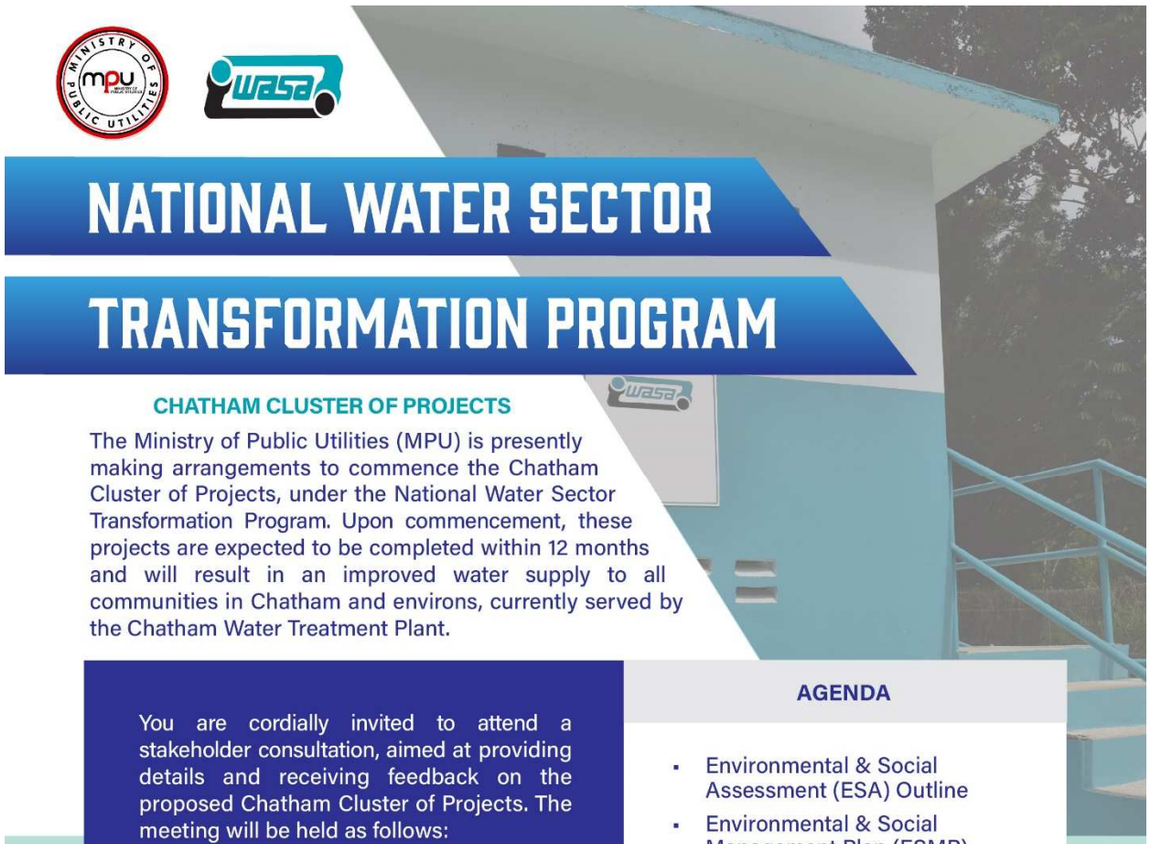
Auxiliary Notes:

1. Team Leads will co-ordinate checklist activity.
2. Logistics should be confirmed no later than Seven (7) days before Community Meeting.
3. Protocol, Security and Presentation should be confirmed no later than three (3) days before Community Meeting.
4. Completed checklists are to be submitted to the Communications Consultant no later than 3 days prior to Community Meeting.

Appendix II - Map Showing Chatham Cluster Highlighted as Part of Trinidad (Source Google Earth)



Appendix III – Flyer



NATIONAL WATER SECTOR TRANSFORMATION PROGRAM

CHATHAM CLUSTER OF PROJECTS

The Ministry of Public Utilities (MPU) is presently making arrangements to commence the Chatham Cluster of Projects, under the National Water Sector Transformation Program. Upon commencement, these projects are expected to be completed within 12 months and will result in an improved water supply to all communities in Chatham and environs, currently served by the Chatham Water Treatment Plant.

You are cordially invited to attend a stakeholder consultation, aimed at providing details and receiving feedback on the proposed Chatham Cluster of Projects. The meeting will be held as follows:

Date:

Time:

Venue:

AGENDA

- Environmental & Social Assessment (ESA) Outline
- Environmental & Social Management Plan (ESMP)
- Project Outline (Details & Impact)
- Grievance Redress Mechanism
- Questions/Inputs
- How to engage the project

THE PROJECTS, WHICH WILL BE EXECUTED IN COLLABORATION WITH THE WATER AND SEWERAGE AUTHORITY (WASA) INCLUDE:

Refurbishment and upgrade of the Chatham Water Treatment Plant
Drilling and equipping of ChathamWell #15 located off Chatham North Trace

PROJECT ACTIVITIES INCLUDE:

- Grading of the site to prepare for drilling operations
- Installation of equipment and drilling tools, along with drilling and equipping of wells
- Removal of solid wastes from the site
- Installation of mechanical, electrical and control components and pumps
- Civil works including the erection of a structures, paving, installation fencing and gates
- Marking of the roads/carriageways
- Excavation of road/trench and installation of pipeline
- Backfilling of the trench and restoration of road

POTENTIAL IMPACTS DURING IMPLEMENTATION INCLUDE:

- Disruption in traffic from the movement of equipment and laying of pipeline
- Noise during well drilling, pipeline installation and other associated works
- Dust and runoff from site

For further information and to confirm your attendance please call any of the following numbers:
662-2302 / 628-9500
Project documents are available for viewing at: www.mpu.gov.tt / www.wasa.gov.tt

Appendix IV – Public Notice

PUBLIC NOTICE

CHATHAM CLUSTER OF PROJECTS

The Ministry of Public Utilities is presently making arrangements to commence the Chatham Cluster of Projects, under the National Water Sector Transformation Program. Upon commencement, these projects are expected to be completed within 12 months and will result in an improved water supply to all communities in Chatham and environs, currently served by the Chatham Water Treatment Plant.

The projects, which will be executed in collaboration with the Water and Sewerage Authority (WASA) include:

- **Refurbishment and upgrade of the Chatham Water Treatment Plant.**
- **Drilling and equipping of Chatham Well #15, located off Chatham North Trace.**

The public is cordially invited to attend a stakeholder consultation, aimed at providing feedback on the Chatham Cluster of Projects. The meeting will be held as follows:

Date:

Time:

Location:

For further information and to confirm your attendance, please call any of the following numbers:
662-2302 / 628-9500.

Project documents are available for viewing at:
www.mpu.gov.tt / www.wasa.gov.tt