ROAD MAP OF THE

MULTIPHASE WASTEWATER

REHABILITATION PROGRAMME

PHASE 1 – LO 2890/OC-TT

Date: October 27th 2016

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Introduction

- Current Scenario
- Environment-Water Quality
- Road Map of Wastewater Projects
- Project Execution Plan

Current Scenario

Wastewater Services in Trinidad and Tobago

Wastewater Services in Trinidad and Tobago

Current Scenario

- Coverage- approximately 30% of the population has access to centralized sewerage services

- WWTPs service:
  - Population equivalent > 390,000
  - Average flow of 56,600m3/d (12.45imgpd)

- No. of Facilities:
  - Over 150 WWTPs
  - WASA operate and maintains 36 WWTPs and 24 lift stations

- Length of sewers: 460kms

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Wastewater Services

- Wastewater Treatment Plants are designed to meet the Water Pollution Rules 2001 (amended in 2006)
- At present a number of WWTPs are operating inefficiently.
- 35% of WWTPs are located along the east-west corridor. The watersheds drain into the Caroni Basin.
- The Caroni River supplies about 34% of potable water produced in Trinidad.
- The Caroni River is the largest river in Trinidad. It feeds the Caroni Swamp which is an environmentally sensitive area.

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Components of the Vision

Objectives: Improve Coverage & Quality of Service

- Increased coverage of sanitation services

- Ensure quality of wastewater effluent meets environmental standards.

Environment - Water Quality

Nationally

- There are concerns regarding the inefficient operation of the increased number of private wastewater treatment plants throughout the country.
- Many Property Developers are not able to maintain the packaged wastewater treatment plants, since WASA is the sole Authority entitled to collect sewerage rates.

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Environment - Water Quality

- WASA is in the process of adopting many of the Housing Development Corporation Wastewater Treatment Plants
- Wastewater Treatment Plants are monitored by the EMA's WPR.
  - WPR primarily focuses on point source pollution (e.g. a factory, waste water treatment plant) which usually enter the environment through a discrete location or outfall such as a pipe or drain.

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Wastewater Feasibility Studies

- Several Studies conducted to determine the sewer catchments in Trinidad and Tobago
  - Expansion and Integration of the existing wastewater systems along the East West Corridor & Environs- Safege Consulting Engineers and ADeB Consultants, 2005
  - Master Plan - 2008

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Environmental Assessment

- Rivers monitored:
  - Cipero, Vistabella, Marabella, Arouca, Oropune, Mausica, Arima, Guanapo, Caroni
- River water quality
  - Elevated nutrients (phosphates, nitrates, nitrites, ammonia)
  - High biochemical oxygen demand (BOD)
  - Very high levels of total and faecal coliforms
- Hazardous to human and other animal life
  - Nitrates are of concern in drinking water and marine environment
  - Ammonia and BOD consume oxygen in streams -> fish kills
  - Faecal coliform, bacteria and other pathogens,

Benefits of the Wastewater Treatment

- Reduce public health risks, decrease water borne diseases associated with untreated wastewater discharges into drains, rivers and other water courses
- Improve standard of living,
- Protect ground water and surface water sources,
- Sustain human life as well as life in the rivers and streams
- Protect RAMSAR sites, Caroni Swamp, Buccoo Reef
- Promote the sustenance of the tourism sector
- Potential for reuse of treated wastewater for industrial, commercial, agriculture purposes
- Employment opportunities
- Compliant to the WPR of TnT , International Treatise such as Cartagena Convention-Land Based Source Protocol

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Wastewater Action Plan

- Trinidad and Tobago broken into 30 Wastewater Catchments (25 in Trinidad and 5 in Tobago)

- Assess wastewater treatment system in each catchment
  - Construct Centralized Systems with regional wastewater treatment plants, decommission small package WWTPs, provide sewer service connections to all feasible properties.
  - Construct On-lot systems

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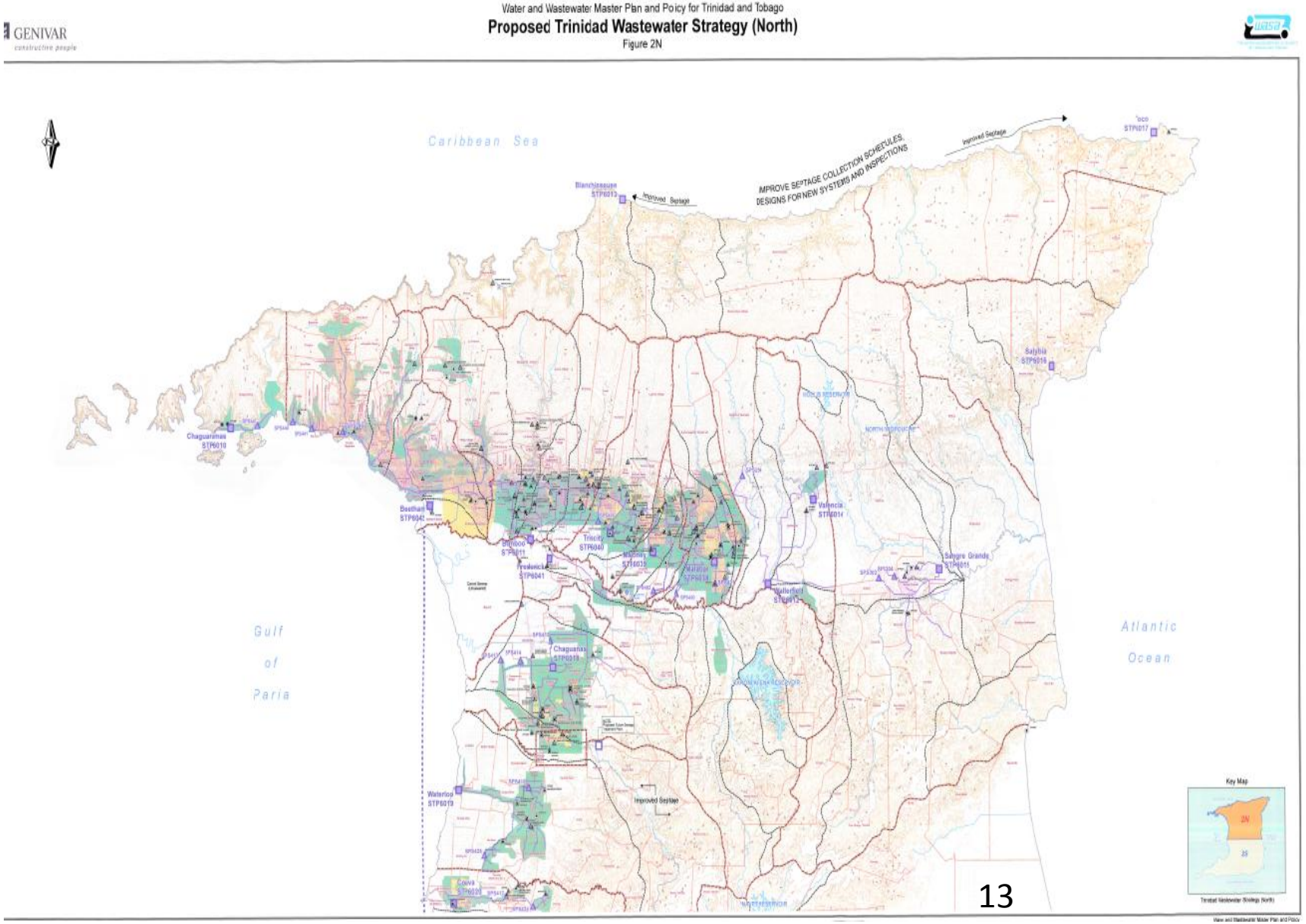
Trinidad North Catchments



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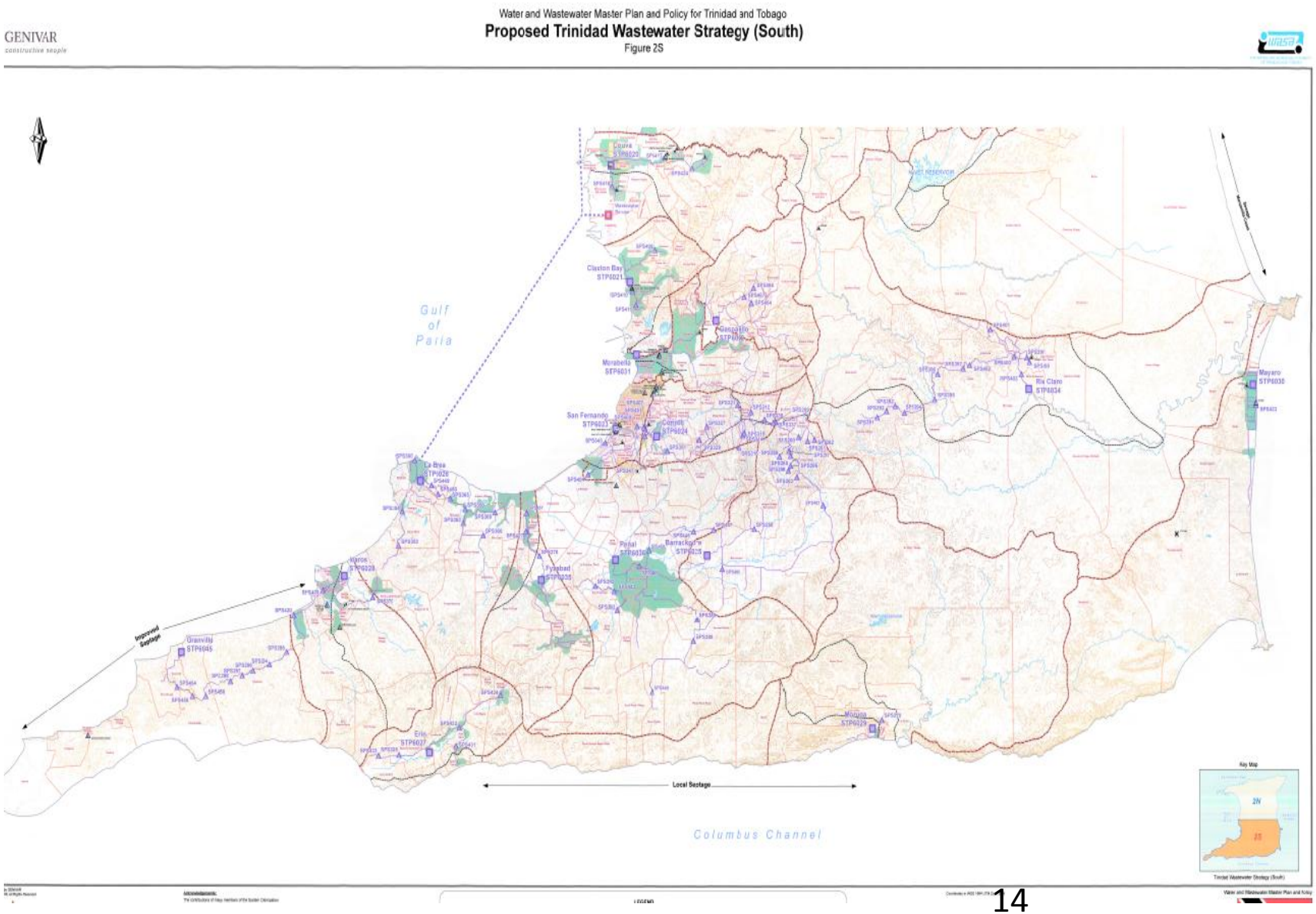
Trinidad South Catchments



Prioritization

Project areas were prioritized based on a Multi Criteria Analysis

Considered:

- topography,
- population density,
- population growth,
- proximity to water sources (groundwater, surface water)
- geotechnical and environmental considerations,
- proximity to beaches,
- social acceptance
- sustainability and economic considerations
- potential for reuse of effluent , treated sludge
- Potential to integrate stand alone WWTPs

Strategies- Catchments

- Six (6) catchments to achieve 60% sewerage coverage:

Wastewater Catchment	Population 2035
Port of Spain	295,106
San Fernando	104,673
East-West Corridor(Bamboo, Trincity, Maloney, Malabar, Wallerfield/Valencia	291,922
Chaguanas	104,200
Scarborough	24,806
SW Tobago	21,794
TOTAL	842,501

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Strategies –Long term

- Provide sewer service to 60% of the country's population
- Current sewered population : 30%
- Projects:
  - San Fernando: adds 8%
  - Malabar: adds 7.5%
  - -Chaguanas: adds 8%
  - -Southwest Tobago: adds 2%
  - -Maloney: adds 3%
  - -Trincity: adds 1%

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IDB LOAN 2890/OC-TT

INTRODUCTION

i. Loan 2890 OC-TT , Multiphase Program, Phase 1, Loan signed January 19th 2013.
ii. Provision of improved Wastewater Services in Malabar and San Fernando catchments.
iii. Works entail construction of two (2) regional WWTPs, integration and expansion of the Wastewater Network and Property Connections in the Malabar and San Fernando Catchments

OBJECTIVES

1. Improve environmental conditions of Trinidad and Tobago by decreasing the uncontrolled discharge of untreated wastewater into the environment.
2. Institutional strengthening of the Water and Sewerage Authority:
   a. Training activities on contract management for outsourced operations, operation and maintenance, environmental management
   b. Implementation of key action to improve commercial management services
   c. Implementation of key actions to improve corporate governance

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IMPACT OF WORKS

- These works together with the works in the Maloney Catchment is expected to increase wastewater coverage in Trinidad and Tobago by **18%**.
- Phase 1 Works in the Malabar is estimated to benefit a population of **108,630 persons** with 12km of new sanitary sewer pipes.
- While, works in San Fernando works is estimated to benefit **111,600 persons** with 21km of new sanitary sewer pipe.

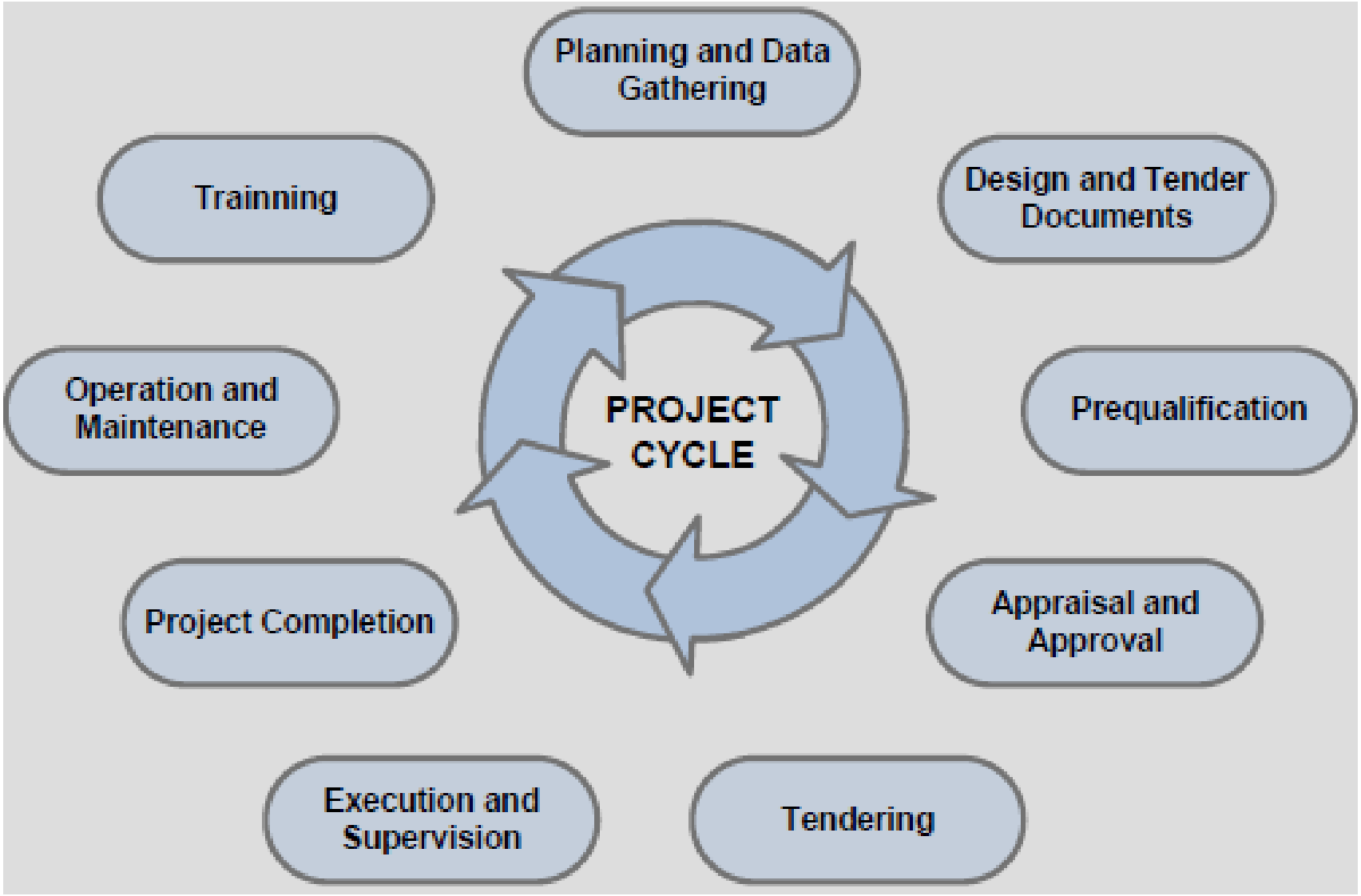
Project Areas in Malabar include:

- Calvary Hill,
- Mausica/Olton Road,
- Cleaver Road/Andrews Lane,
- Lower O'Meara Road,
- Arima Proper,
- Mt. Pleasant/Maturita,
- Upper Pinto Road/Gills View,
- Upper Malabar/Tumpuna Road,
- Upper O'Meara Road,
- Santa Rosa East/West,
- Malabar,
- Peytonville/Caparo and
- La Horquetta/Greenvale.

Project Areas in San Fernando include:

- Marabella, Vistabella-Gulf,
- Tarouba-Cocoyea,
- Cocoyea South,
- San Fernando South,
- Pleasantville-Corinth,
- Ste Madeleine,
- Bel Air-Gulf View,
- Duncan Village,
- Green Acres,
- Union Hall,
- Retrench-Golconda,
- Palmiste South,
- La Romain North, Central and South.

Project Cycle



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Project Execution Plan

1. Project Organizational Structure
   - Matrix Structure (Procurement, Legal, Environmental, Financial, Operations, Corporate Communications)
   - Reporting relationships
   - Roles and responsibilities
   - Authorizing signatories

2. Develop Project Plan for Implementation
   - Identify Activities
   - Develop schedule

3. Procurement Plan
   - Utilized IDB's Standard Procurement Documents (Goods and services)
   - International/National Competitive Bidding, Shopping
   - Evaluation: Quality and Cost Based Selection, Quality Cost Selection

Project Execution Plan

4. Financial Administration
   - Develop cash flow projections
   - Annual Audit at end of each fiscal year
   - Disbursements
   - Payments
   - Financial Controls

5. Reporting
   - Annual Operating Plan
   - Semi-Annual Reports
   - Environmental and Social Compliance Report

6. Communication Plan
   - Internal and external stakeholders
   - Communication Strategies

Project Execution Plan

7. Develop Risk Matrix
    - Identify risk
    - Severity of risk
    - Probability of event occurring
    - Avoid, transfer, mitigate, accept
    - Update risk register

Key Result Indicators

Key Results	Baseline	Target
Households with new connection to a sewerage network in pilot area (household)	0	400
Households connected to an improved sewerage network in Malabar and San Fernando (household)	0	16,626
Malabar: percentage of population in the catchment covered by the WWTP (percentage)	0	100%
San Fernando: percentage of population in the catchment covered by the WWTP (percentage)	0	100%
Malabar: percentage of wastewater treated by the WTTP meeting the Water Pollution Rules (percentage) and having a zero or positive net impact on downstream water quality (in relation to upstream water quality)	0	90%
San Fernando: percentage of wastewater treated by the WTTP meeting the Water Pollution Rules (percentage) and having a zero or positive net impact on downstream water quality (in relation to upstream water quality)	0	90%
Women trained in water quality monitoring (percentage)	0	50%
Hours of preventative maintenance in the Malabar and San Fernando systems (hours/month)	200	720
New systems operated and maintained according to design specifications (system)	0	2
New systems designed, implemented, operating and maintained according to social and environmental specifications (system)	0	2
WASA with new set of corporate governance policies (approved by the Board)	0	1
Corporate governance policies and compliance report disclosure of WASA's web page	0	1
WASA's audited financial statements available to the public	0	4
Percentage of WASA costumers served with new billing system (percentage)	0	100

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Lessons Learnt

State of readiness: Detailed Designs, CEC, Economic Analysis- Completed	Review & Optimize the procurement process (detailed designs)	Acquire sewer routes - easements and land acquisition	Early engagement of stakeholders (NGC, TSTT, T&TEC, HDC, FLOW, MOWTT, MPU, Drainage Division, Highways Division, EMA, Residents
Support received from the Board, Executive Management, internal stakeholders, Union, Ministries	Mechanisms for obtaining foreign exchange for the payments during the project	Allow sufficient time for tendering process Master Programme	Project matrix- Allocation of resources to focus on the IDB Project (legal, finance, environment, corporate communication, operations, new services,
Maintain communication with Ministries & IDB		Conform to Health and Safety requirements, as well as Environmental requirements.	Payment Process

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MALABAR PICTURES

Bioreactor #2 at Malabar WWTP

La Horquetta Pipeline Works

Arima Lift Station

Clarifier #2 at Malabar WWTP

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SAN FERNANDO PICTURES

Photo #03 (24-06-2016)
PA 30_Bioreactor - Aerial View

Photo #06 (24-06-16)
PA 40_Clarifier - Aerial View

Photo #11 (16-06-2016)
Shaft DSRS60991010 - Final level excavation

Aerial Video of the New Malabar Wastewater Plant

Thank You for your Attention