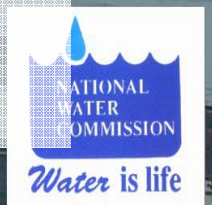


The background of the slide is a photograph of a coastal scene. In the foreground, there is a concrete pier or walkway with a metal railing. Several birds, possibly pelicans, are perched on the railing and flying in the air. In the background, there is a body of water and a large, dark mountain under a cloudy sky.

WATER SUPPLY and SEWERAGE PLANS

**Presentation to the
Caribbean Infrastructure
Conference**

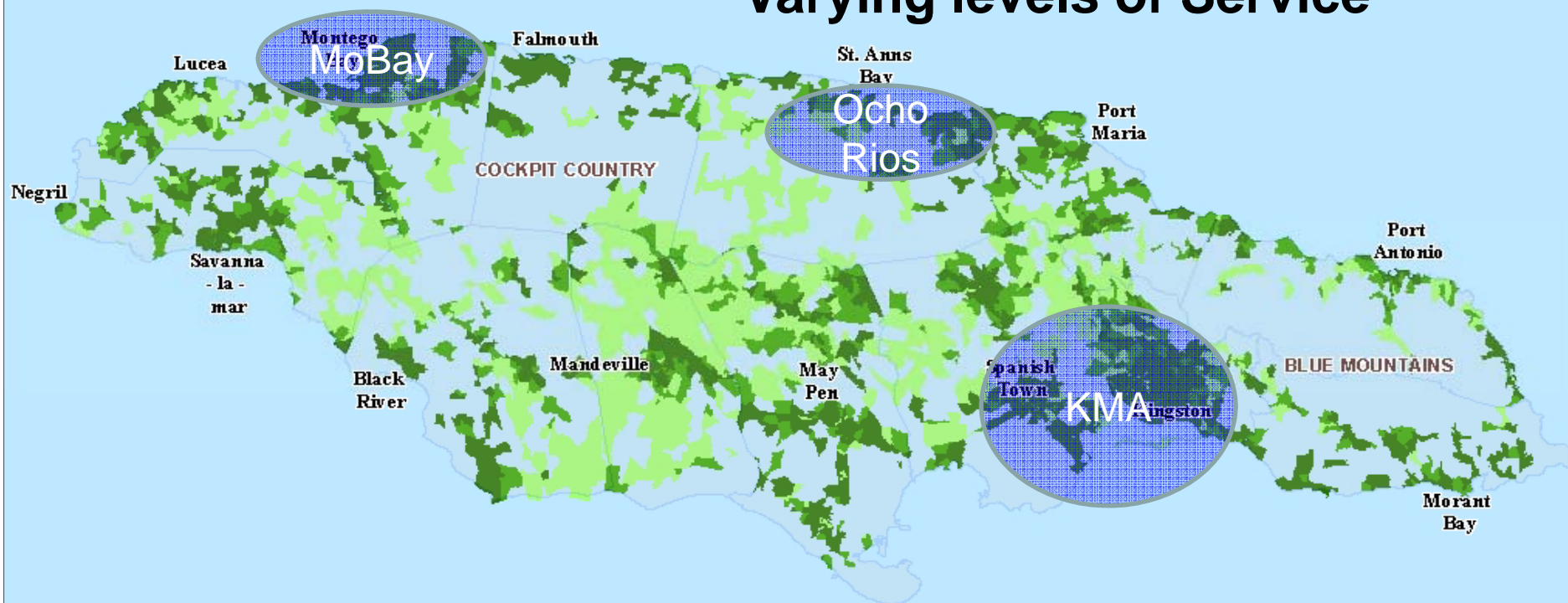
**September 21, 2011
Vernon Barrett**



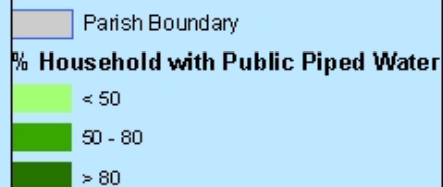
WATER SUPPLY COVERAGE

73% of Population supplied with potable

Varying levels of Service



LEGEND

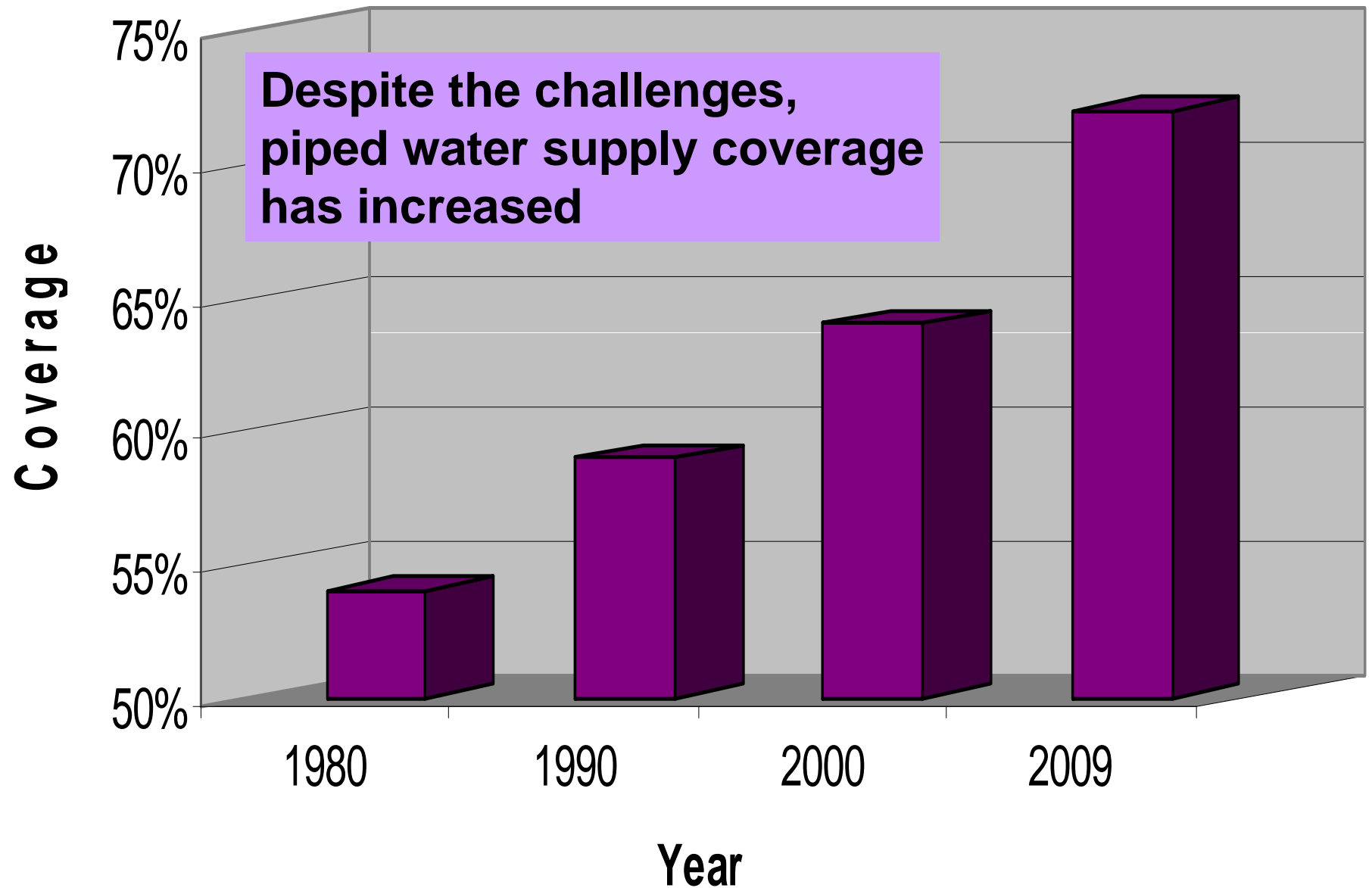


KMA CARIBBEAN SEA

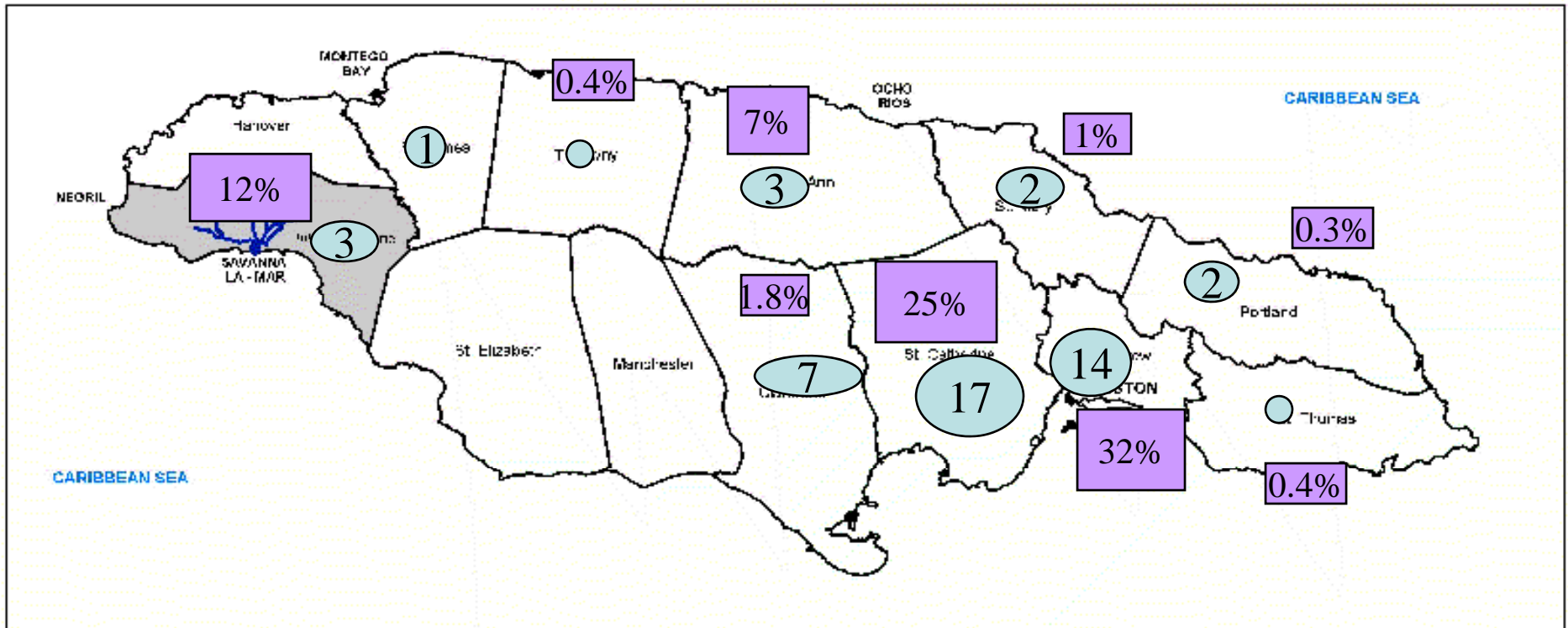
Prepared By: GIS Unit
National Water Commission
28 - 48 Barbados Avenue
Kingston 5



Piped Water Supply - Jamaica



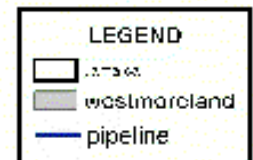
ISLAND OF JAMAICA



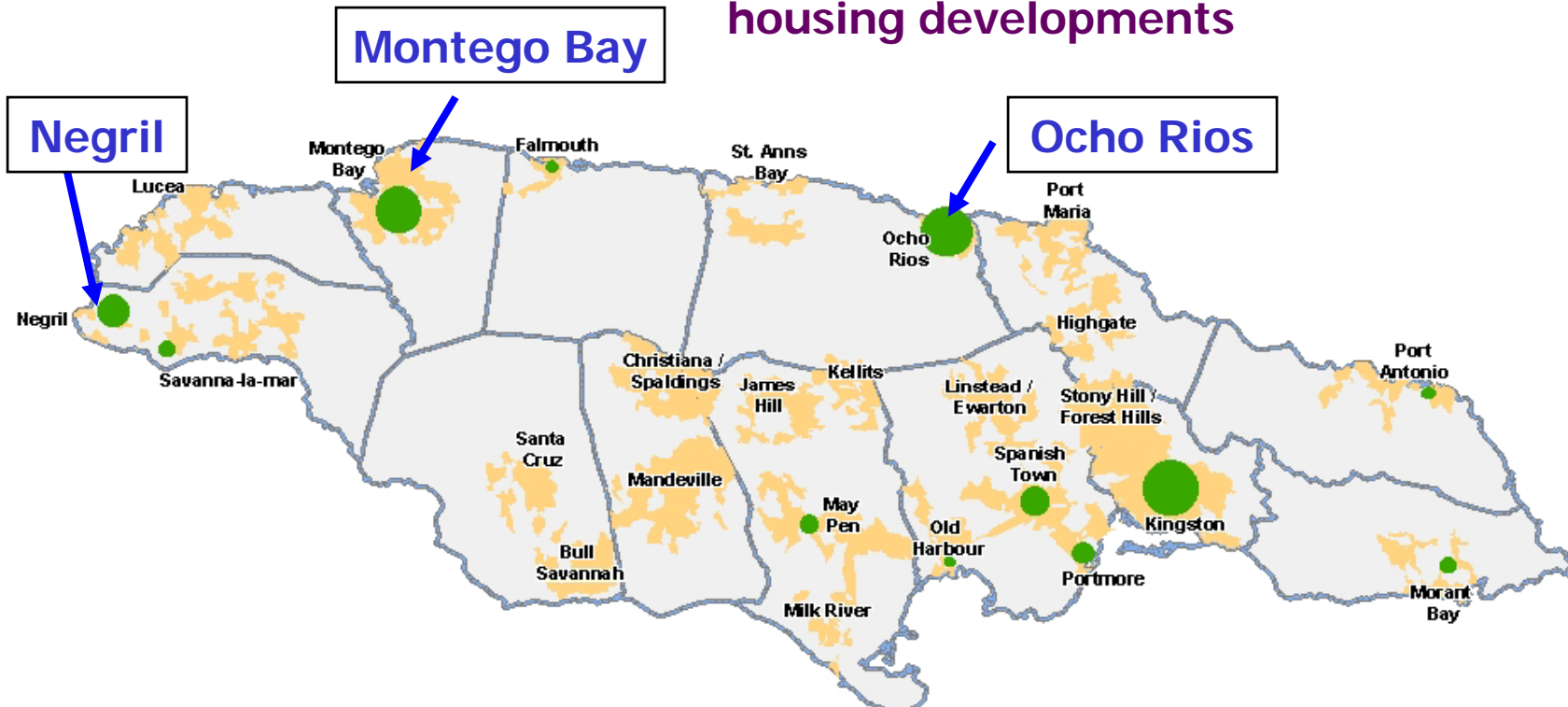
Number of plants

% Installed capacity as % of island total

0 16,500 33,000 66,000 99,000 132,000 Meters



NWC Inherited sewerage facilities associated with various housing developments



NWC constructed WWTP plants during the latter half of 1990s

- Ocho Rios (Oxidation Ditch),
- Montego Bay (WSP) &
- Negril (WSP)

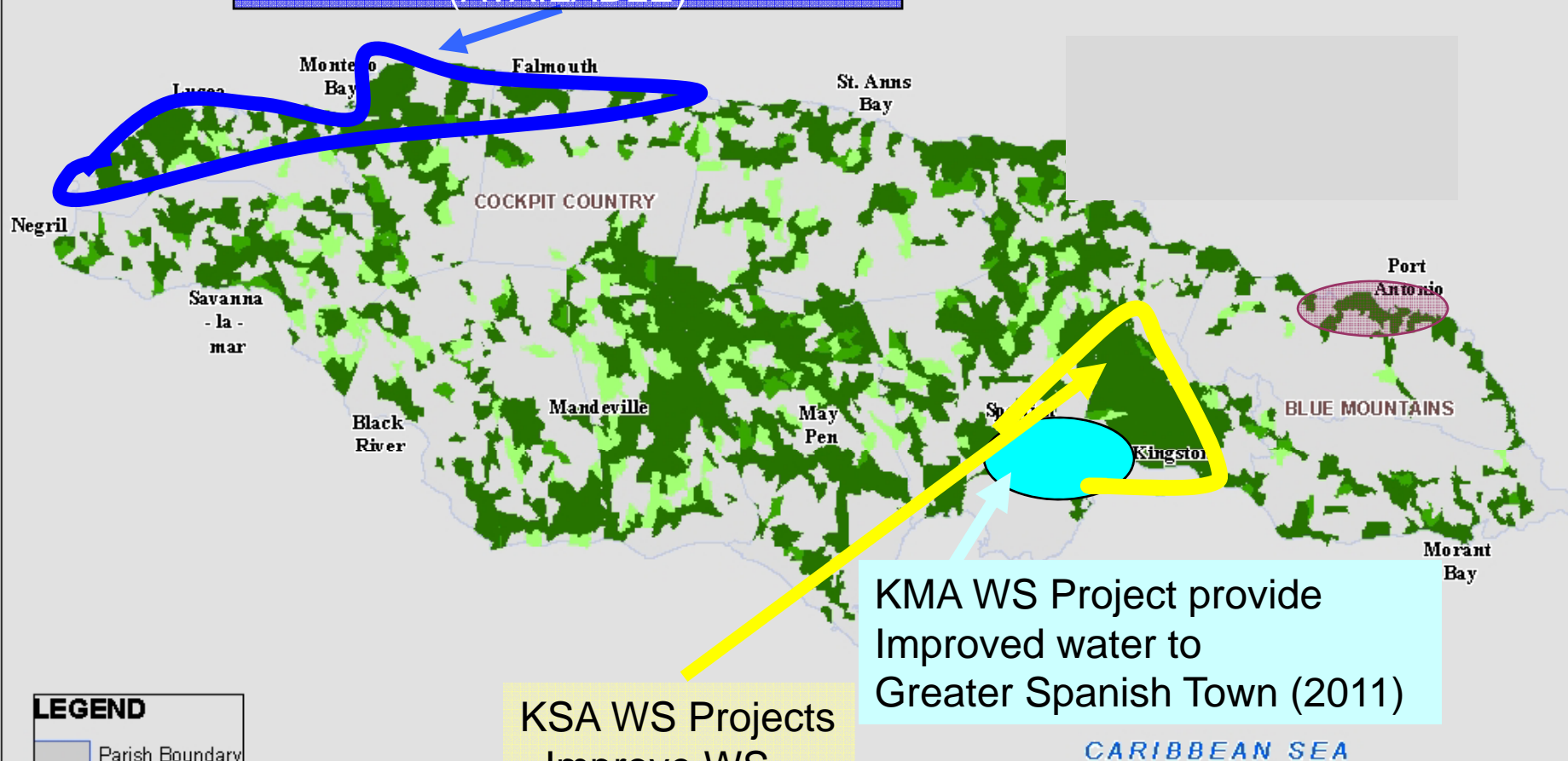
NWC involved in CWTC to construct Soapberry (2007)



Prepared By: GIS Unit
National Water Commission
28 - 48 Barbados Avenue
Kingston 5

SUPPLY COVERAGE

NWC has provided water supply infrastructure along sections Of the North West Coast (AVAILABLE)



KSA WS Projects - Improve WS

KMA WS Project provide Improved water to Greater Spanish Town (2011)

73% of population now has access to piped water

Kingston 5



Modalities

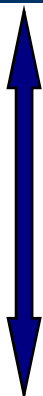
Other



Piped Water



100 %



Rural Water Supply Master Plan,
Wayside Tanks, household tanks,



85 % Level With Additional Projects



73% Existing Level

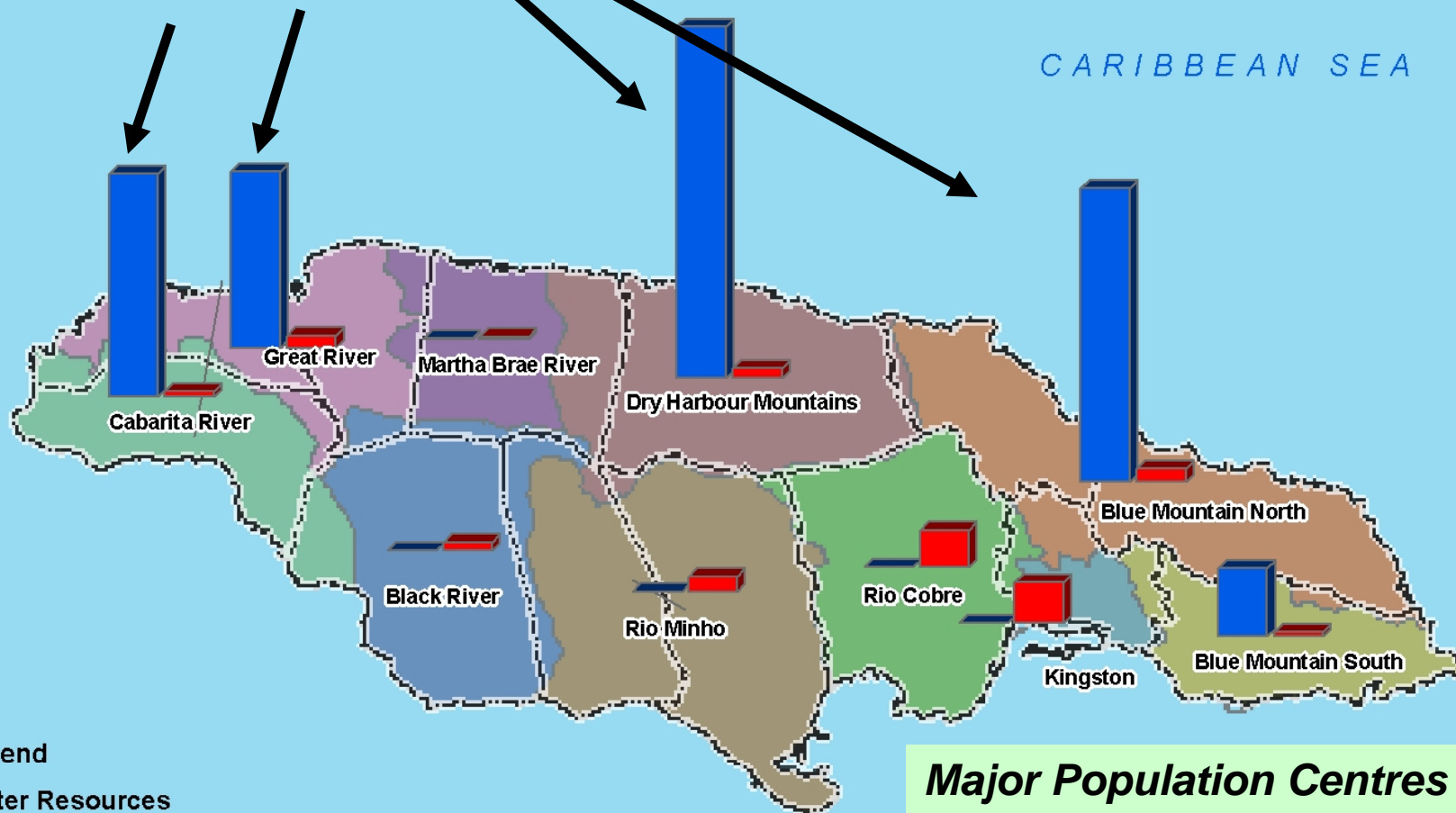
**PROGRAMME TO INCREASE ACCESS
TO WATER SUPPLY**

WATER SUPPLY PLANS

**Significant Water Resource
On Northern Side**

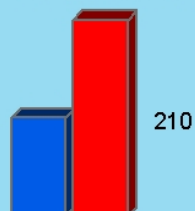
SUPPLY CHALLENGE

CARIBBEAN SEA



Legend

Water Resources



Available Supply
Water Demand

Parish Boundary

**Major Population Centres
on Southern Side
Limited water resource
availability**

Available Water Resources and Demand for 2010 (MIGD)



Prepared By GIS Unit
National Water Commission
28-48 Barbados Ave.
Kingston 5

PREPARATION PROCESS

Preparation of Draft Parish Plans

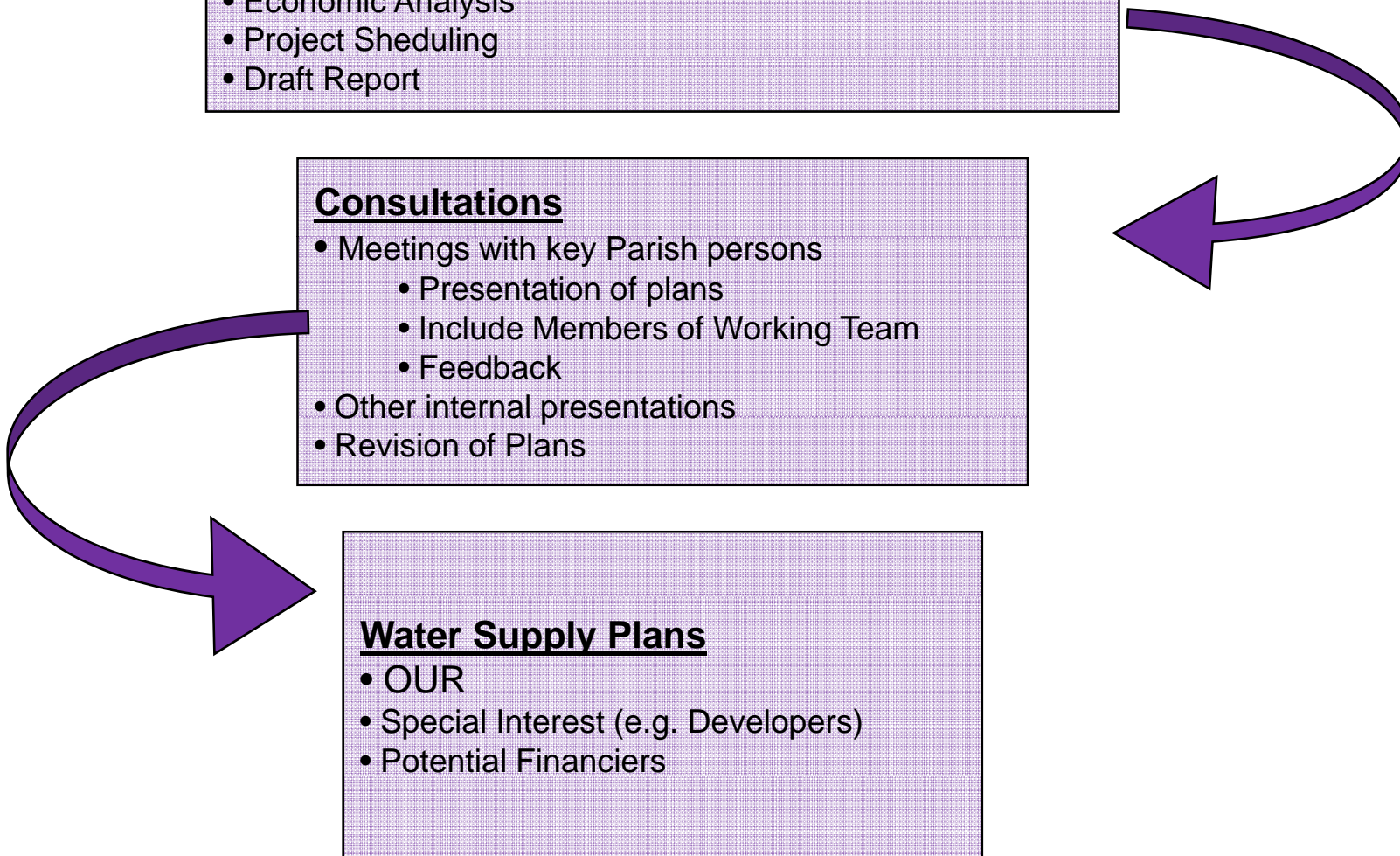
- Assignment of Working Teams to Parishes
 - Lead Person assigned full time
 - Input from local operations persons (part time)
- Project Identification and Costing
- Economic Analysis
- Project Sheduling
- Draft Report

Consultations

- Meetings with key Parish persons
 - Presentation of plans
 - Include Members of Working Team
 - Feedback
- Other internal presentations
- Revision of Plans

Water Supply Plans

- OUR
- Special Interest (e.g. Developers)
- Potential Financiers



Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://misgis-svr1/distributionsystem_assessment/

Getting Started Customize Links Windows Customize Links Ja Radio Stations Windows Media Windows Yahoo! Downloads Yahoo! New Folder

BOB MARLEY and the WAILERS
ROOTS, ROCK, REMIXED

DISTRIBUTION SYSTEM ASSESSMENT

ESRI | ESRI Support Center | Help

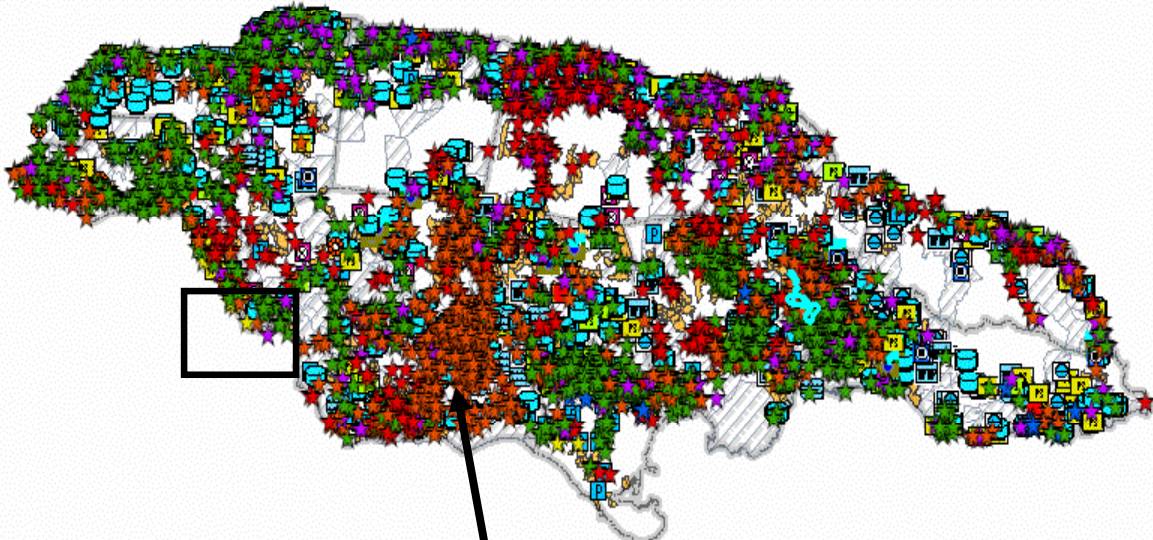
SEARCH NETWORK | SEARCH CUSTOMER | PRINT

Results

Map Contents

- ☒ DistributionSystem_Assessment
 - ☒ Customer Location
 - ☒ Subdivision Application
 - ☒ Potable Facilities
 - ☒ Pipe Network
 - ☒ Street Centreline
 - ☒ EDs Population Density > 150
 - ☒ Distribution System
 - ☒ Enumeration District (Census)
 - ☒ Parish Boundary

The Use of GIS Technology to support the effort



0 5 10 20 30 40 Km

- Water supply network (> 95% mapped)
- Production facilities
- Census data
- Subdivision data

start

5 Micro... 5 Micro... Distribution... Dalintober ... 4 Micro... Microsoft P... Mozilla Firefox

2:34 PM

PROJECT IDENTIFICATION

Projects were developed to address identified water supply deficiencies at a broad level

- What needs to be done to address
 - *Supply Shortfall* (Additional production capacity, reduction in technical losses)
 - *Service Reliability* (rehab of facilities – intakes, WTPs, pumping equipment, use of technology to improve monitoring & control)
 - *Operational Efficiency* (electricity, maintenance, operations)
- Estimated Project Costs
- Project Benefits and Impact
- Broad economic analyses

KEY ISSUES CONSIDERED

Options to Address Inadequacies ?

State of Supply Infrastructure?

Supply Surplus Deficit ?

Water Requirement ?

Technical Losses ?

Commercial and Other Water Requirement ?

Domestic Water Requirement ?

Existing Production:

Water Supply System

Population (Agglomeration of EDs)

Options to Address Inadequacies ?

State of Supply Infrastructure?

Supply Surplus Deficit ?

Water Requirement ?

Technical Losses ?

Commercial and Other Water Requirement ?

Domestic Water Requirement ?

Existing Production:

Water Supply System

Population (Agglomeration of EDs

WATER SUPPLY PLANS For ST. ELIZABETH

St. Elizabeth WS

- Average Monthly Production - 380 million gallons of water
 - through twenty (21) wells and
 - six (6) surface sources.
- Average billed volume is only 54 million gallons per month
 - Revenue water of 15%

DEMAND CENTRES BLACK RIVER WS

Priority given to water demand centres
-Are the DC in parish fully served?
-If not , what are the options

Benlomond

Union/Siloah

Maggotty

Extent of service area
of System

YS

Luana

Dalintober

Burnt Savanah

Black River Water
Supply System

SHEET6

ST. ELIZABETH

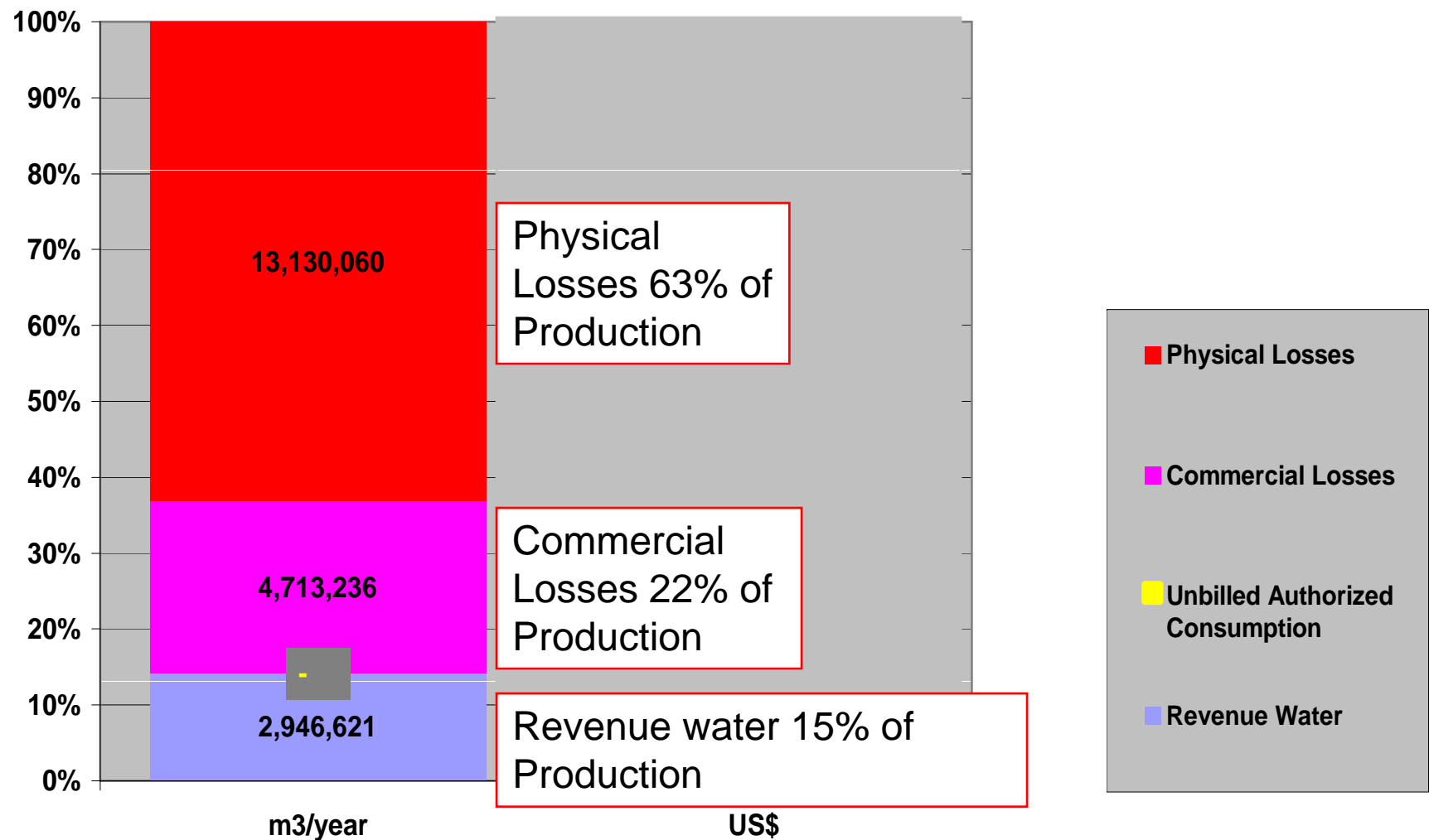
Water Balance in m3/year

<div>Home</div> <div>System Input Volume</div> <div>20,789,917 m3/year</div> <div>Error Margin [+/-]: 5.0%</div>	<div>Authorized Consumption</div> <div>2,946,621 m3/year</div> <div>Error Margin [+/-]: 0.0%</div>	<div>Billed Authorized Consumption</div> <div>2,946,621 m3/year</div>	<div>Billed Metered Consumption</div> <div>2,710,890 m3/year</div>	<div>Revenue Water</div> <div>2,946,621 m3/year</div>	
			<div>Billed Unmetered Consumption</div> <div>235,731 m3/year</div>		
		<div>Unbilled Authorized Consumption</div> <div>0 m3/year</div> <div>Error Margin [+/-]: 0.0%</div>	<div>Unbilled Metered Consumption</div> <div>0 m3/year</div>	<div>Non-Revenue Water</div> <div>17,843,296 m3/year</div> <div>Error Margin [+/-]: 5.8%</div>	
			<div>Unbilled Unmetered Consumption</div> <div>0 m3/year</div> <div>Error Margin [+/-]: 0.0%</div>		
	<div>Water Losses</div> <div>17,843,296 m3/year</div> <div>Error Margin [+/-]: 5.8%</div>	<div>Commercial Losses</div> <div>4,713,236 m3/year</div> <div>Error Margin [+/-]: 24.3%</div>	<div>Unauthorized Consumption</div> <div>4,584,781 m3/year</div> <div>Error Margin [+/-]: 25.0%</div>		
			<div>Customer Meter Inaccuracies and Data Handling Errors</div> <div>128,455 m3/year</div> <div>Error Margin [+/-]: 3.0%</div>		
		<div>Physical Losses</div> <div>13,130,060 m3/year</div> <div>Error Margin [+/-]: 11.8%</div>			

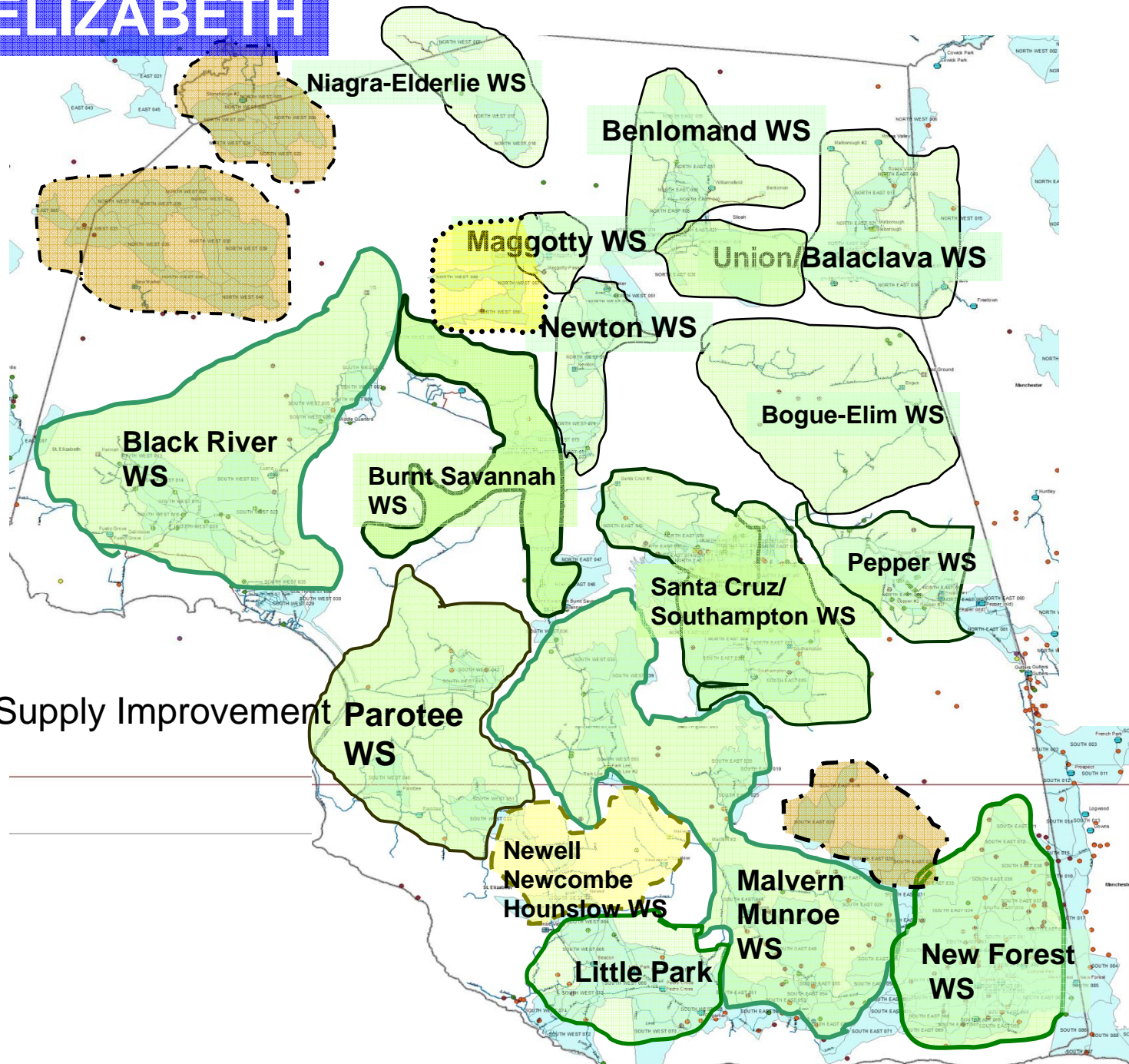
ST. ELIZABETH WS

WATER BALANCE

Water Losses - Volume and Value (Cost)



ST. ELIZABETH



Water Supply Improvement
\$3.3

ST. ELIZABETH - YR 2010

Supply Zone	Supply	Population	Base Demand	Technical Losses	Surplus/ Deficit
Elderslie/Niagara	42,000	640	25,600	19,139	(2,739)
Siloah-Aberdeen W/S	840,000	5,847	268,828	139,566	431,606
Maggotty WS	504,000	3,087	141,931	203,537	158,532
Union/Balaclava W/S	230,000	5,657	260,092	11,946	(42,038)
Newton-Haughton WS	1,080,000	2,194	100,874	746,021	233,106
Black River WS	1,637,000	13,915	639,752	1,140,063	(142,815)
Burnt Savannah W/S	691,000	6,687	307,448	487,392	(103,840)
Bogue-Elim	648,000	3,978	182,897	419,325	45,778
Santa Cruz/Southampton	1,541,000	20,591	946,732	1,045,035	(450,768)
Pepper/Goshen W/S	1,080,000	4,535	208,506	49,563	821,932
Parottee/Hopewell W/S	606,000	6,256	287,632	122,448	195,920
Malvern/Munro	1,000,000	19,440	893,793	214,939	(108,732)
Pedro Plains	2,404,000	5,882	270,455	1,143,238	990,306
New Forest	1,824,000	15,823	727,499	1,433,114	(336,612)
TOTAL	14,102,000	122,393	5,502,124	7,163,156	1,433,981

ST. ELIZABETH - YR 2030

System	Supply	Population	Base Demand	Technical Losses	Deficit
Black River WS	1,637,000	14,054	646,180	1,140,062.96	(149,243)
New Market WS	17,000	5,837	268,355	6,970	(258,325)
Parottee/Hopewell W/S	606,000	6,319	290,522	160,216	193,030
Burnt Savannah W/S	691,000	6,754	310,537	487,392	(106,929)
Malvern/Munro	1,000,000	19,635	902,774	214,939	(117,713)
Pedro Plains	2,404,000	5,942	273,173	1,143,238	987,589
Bull Savannah WS	1,824,000	15,982	273,173	1,143,238	(343,922)
Santa Cruz/Southampton	1,541,000	20,798	956,245	1,045,035	(460,280)
Pepper/Goshen W/S	1,080,000	4,581	210,601	49,563	819,837
Bogue-Elim	648,000	4,018	184,734	419,325	43,941
Union/Balaclava W/S	230,000	5,714	262,705	11,946	(44,651)
Maggotty WS	504,000	3,118	143,357	203,537	157,106
Siloah-Aberdeen W/S	840,000	2,543	116,901	8,072	715,027
Newton-Haughton WS	1,080,000	2,216	101,887	746,021	232,092
TOTAL	14,102,000	117,510	4,941,144	6,779,555	1,667,558

ST. ELIZABETH

BLACK RIVER WATER SUPPLY

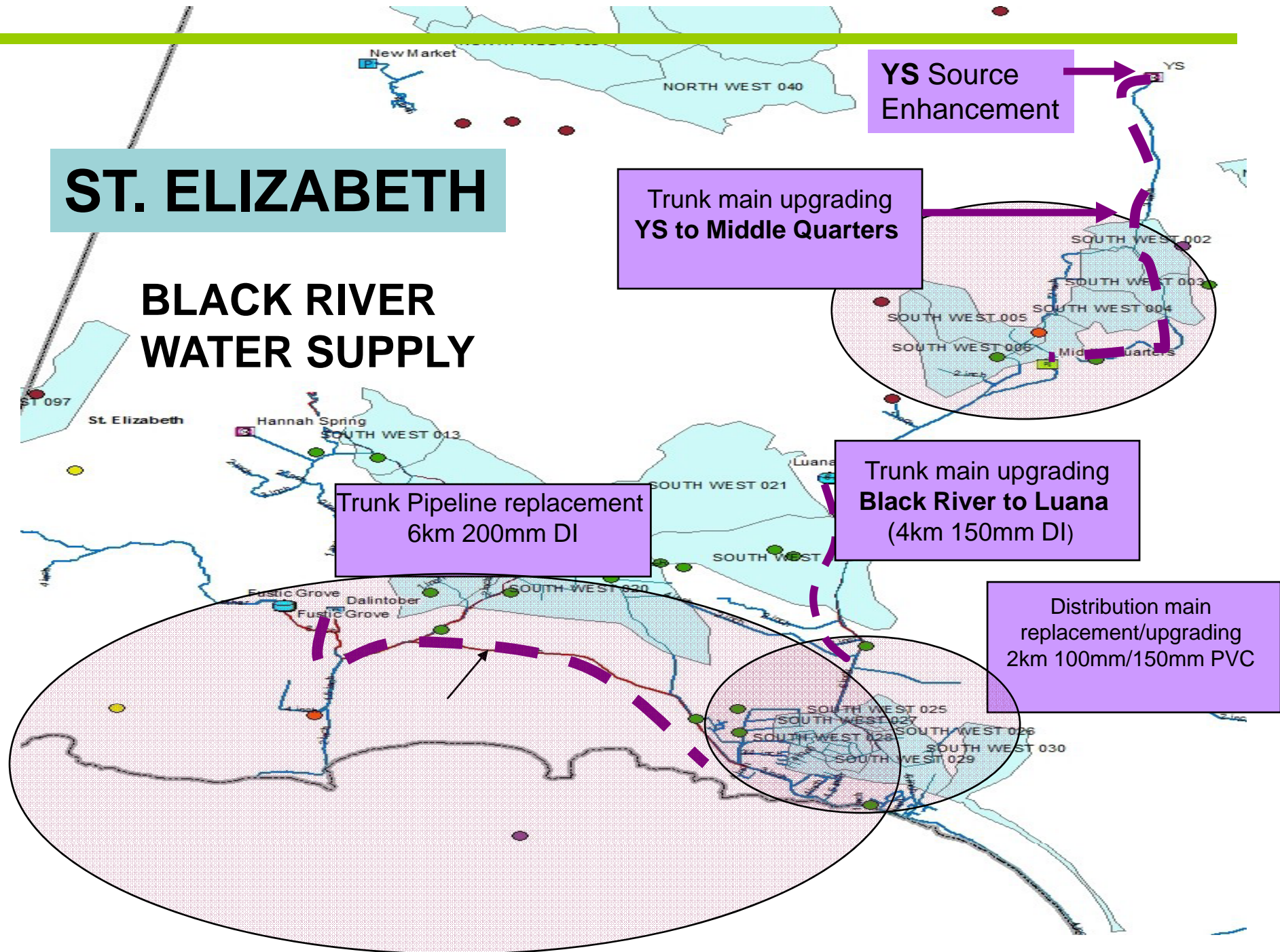
YS Source
Enhancement

Trunk main upgrading
YS to Middle Quarters

Trunk main upgrading
Black River to Luana
(4km 150mm DI)

Trunk Pipeline replacement
6km 200mm DI

Distribution main
replacement/upgrading
2km 100mm/150mm PVC



Major Issues and Project Cost

Major Issues

Refurbishing/ Upgrade of Water Production Sources

- Intake Works
- Water Treatment Plant rehab



Major Issues



Network refurbishing to reduce technical losses and improve service level

- Replacement of pipeline
- Pressure zoning and pressure management
- Refurbishing/replacement of water storage tanks



Comprehensive NRW Audit

- Network survey to define and locate pipes (material and size) & fittings
 - (valves, PRV, fire hydrants)
 - to draw up the network inventory.
 - All the information gathered on site will be transferred in GIS
- Investigation of all the NWC facilities (production facilities, reservoirs and pumping stations).
 - All defects and anomalies detected and remedial works for repairs and/or upgrading have must be clearly stated for every facility.
- Supply & pressure management
 - Pressure zoning and installation of pressure control valves
 - level measurement of reservoirs
 - flows on trunk mains and selected take-offs
- Network partition into District Metering Area (DMA) to monitor flows and NRW control with definition of equipment (valves and bulk meters) to be installed.
- Establishment and calibration of network models

TARGET TO REDUCE PHYSICAL LOSSES TO LESS THAN 30% Over next 5 years

Major Issues

- **Pumping Equipment rehab**
- **Well Rehabilitation**
 - Approach to KMA
 - Detailed inspection
 - Cleaning
 - Replacement of casings/screens



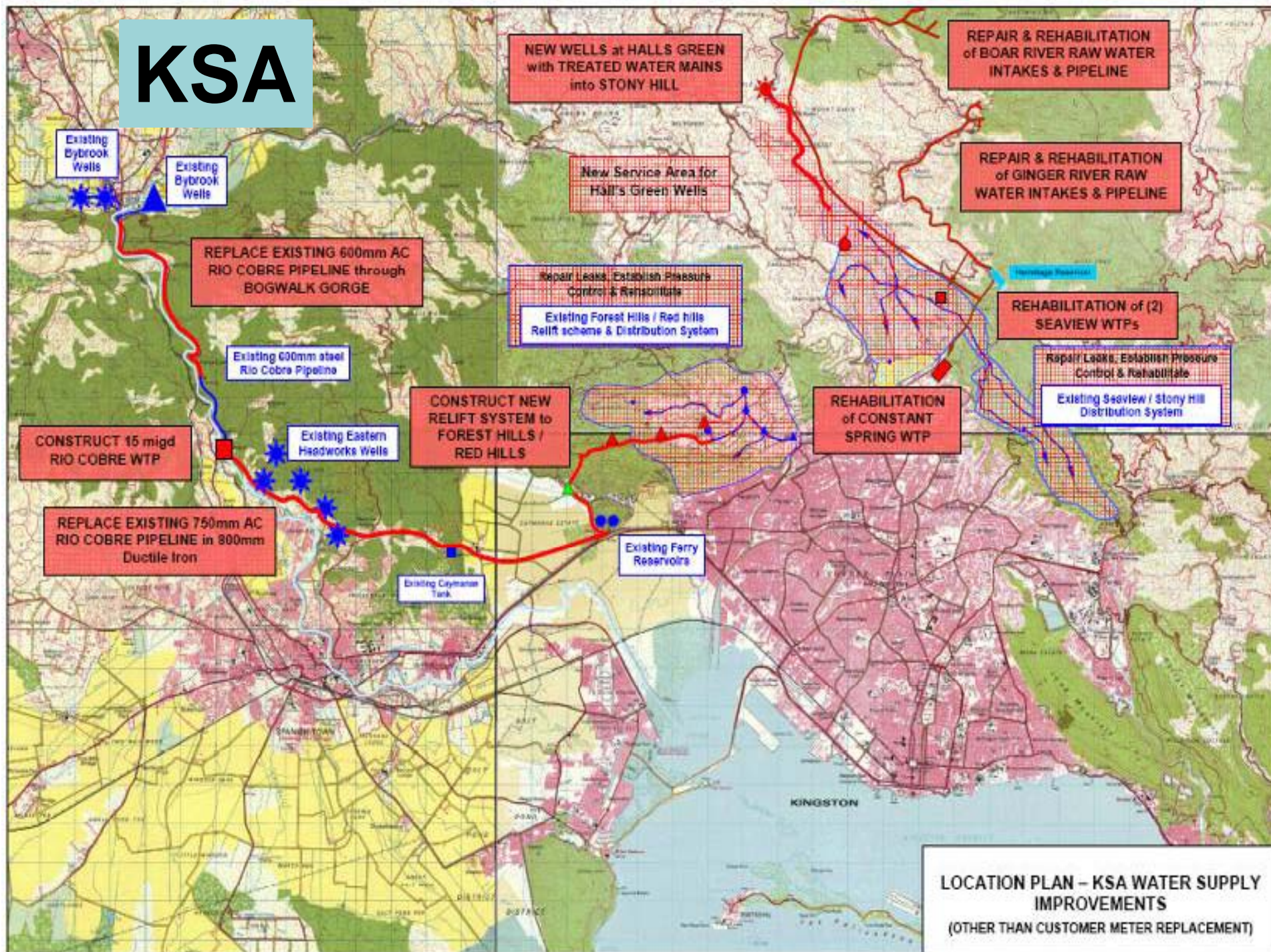
Major Issues

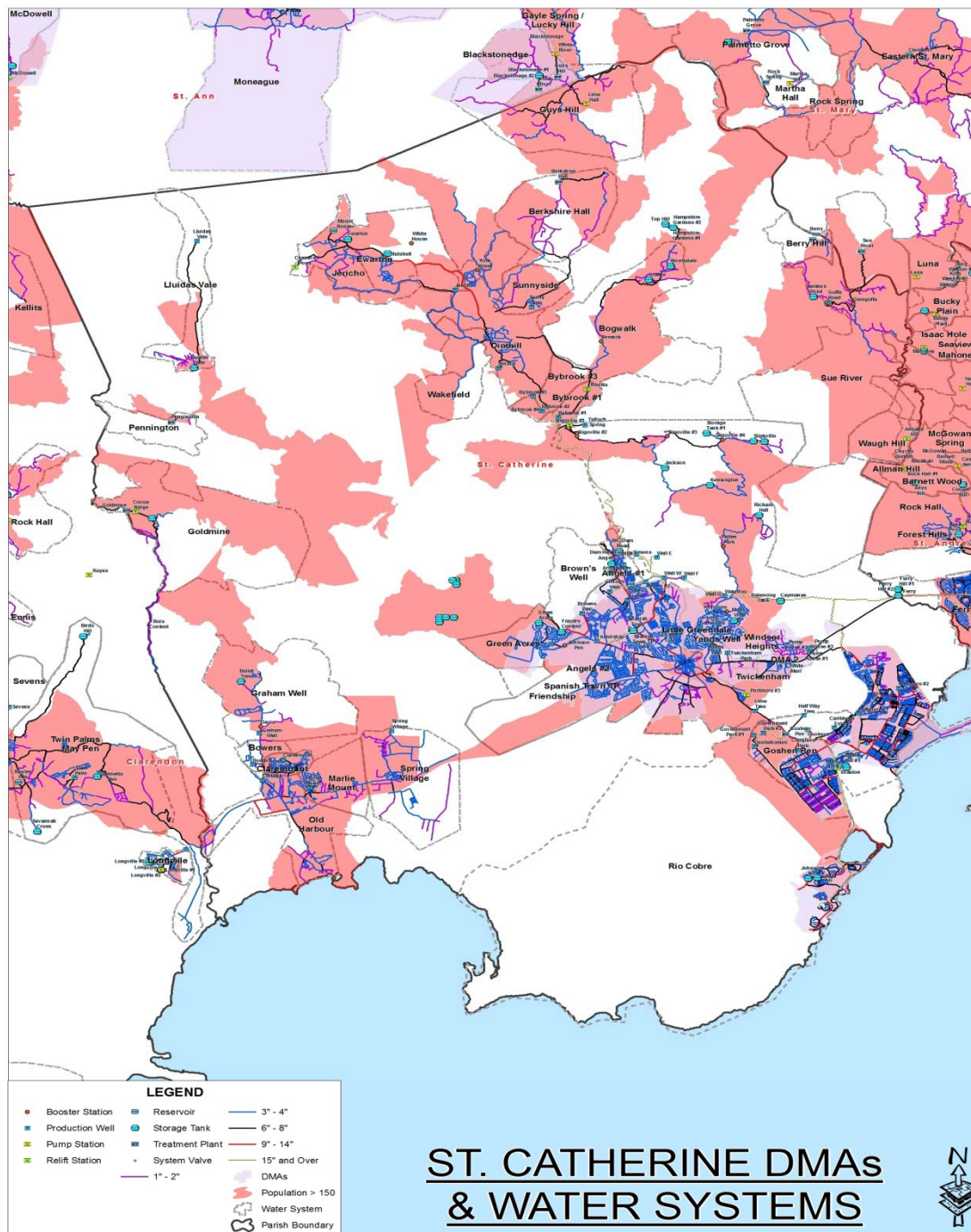
- **Supply Extension**
 - Providing water to areas not now served
 - Providing >85%



Parish	Project Cost
St. Thomas	4,424,132,215
KSA	23,724,737,000
St. Catherine	5,290,917,230
Clarendon	5,845,545,900
Manchester	4,320,000,000
St. Elizabeth	5,115,114,000
Westmoreland	4,336,201,179
Hanover	5,473,200,000
St. James	12,860,280,000
Trelawny	6,588,120,000
St. Ann	6,650,000,000
St. Mary	10,119,070,000
Portland	4,924,700,000
TOTAL	99,672,017,525

KSA





Overview

Distribution Systems: **17**

Population 2010: **~284,600**

Projected Population 2030: **~301,676**

Average Production: **~37 MGD**

Average Monthly Consumption
within major divisions:

Avg Billed Consumption:

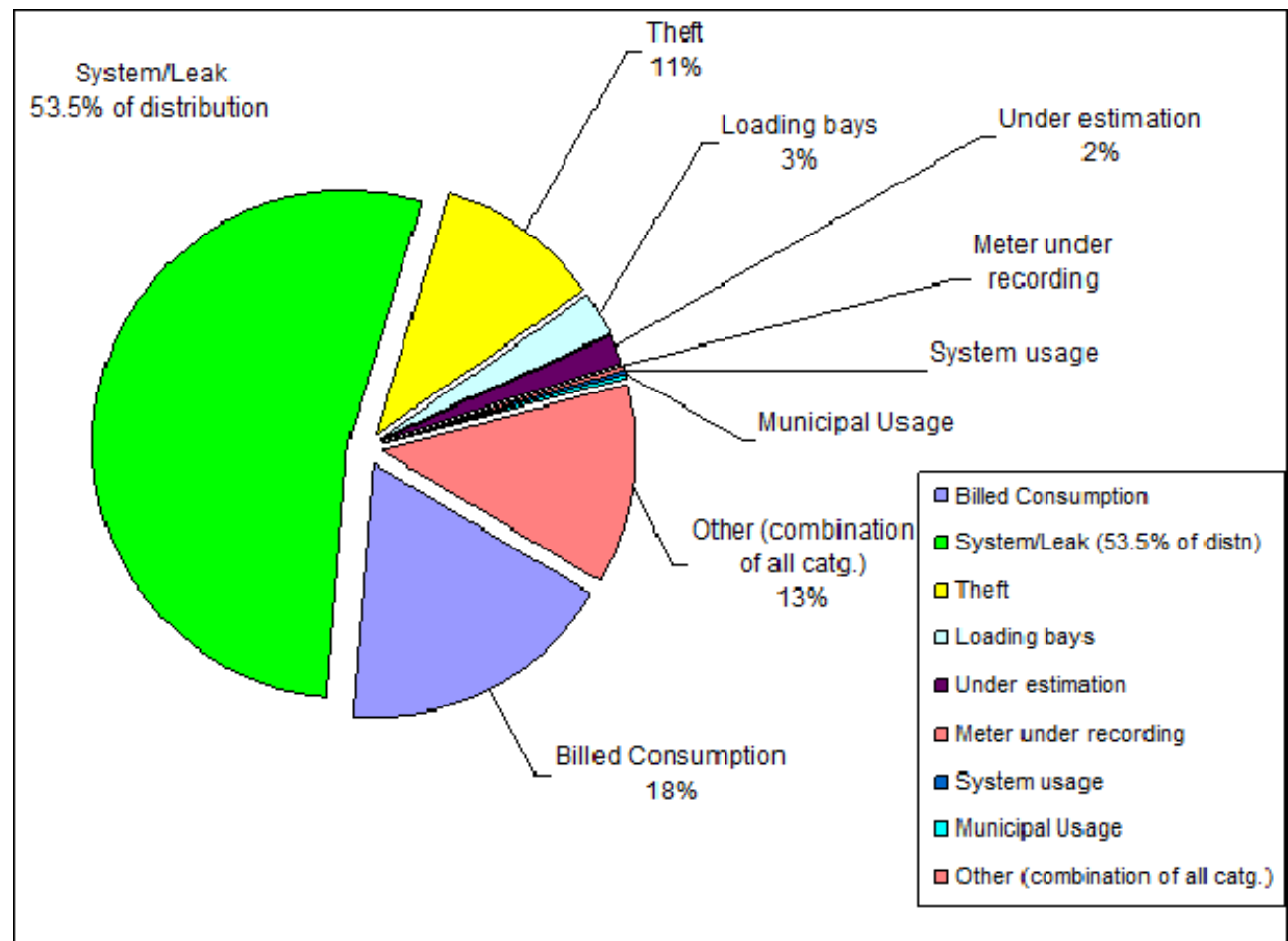
10 MGD

(i.e Revenue Water is 27% of
production)

CLARENDON

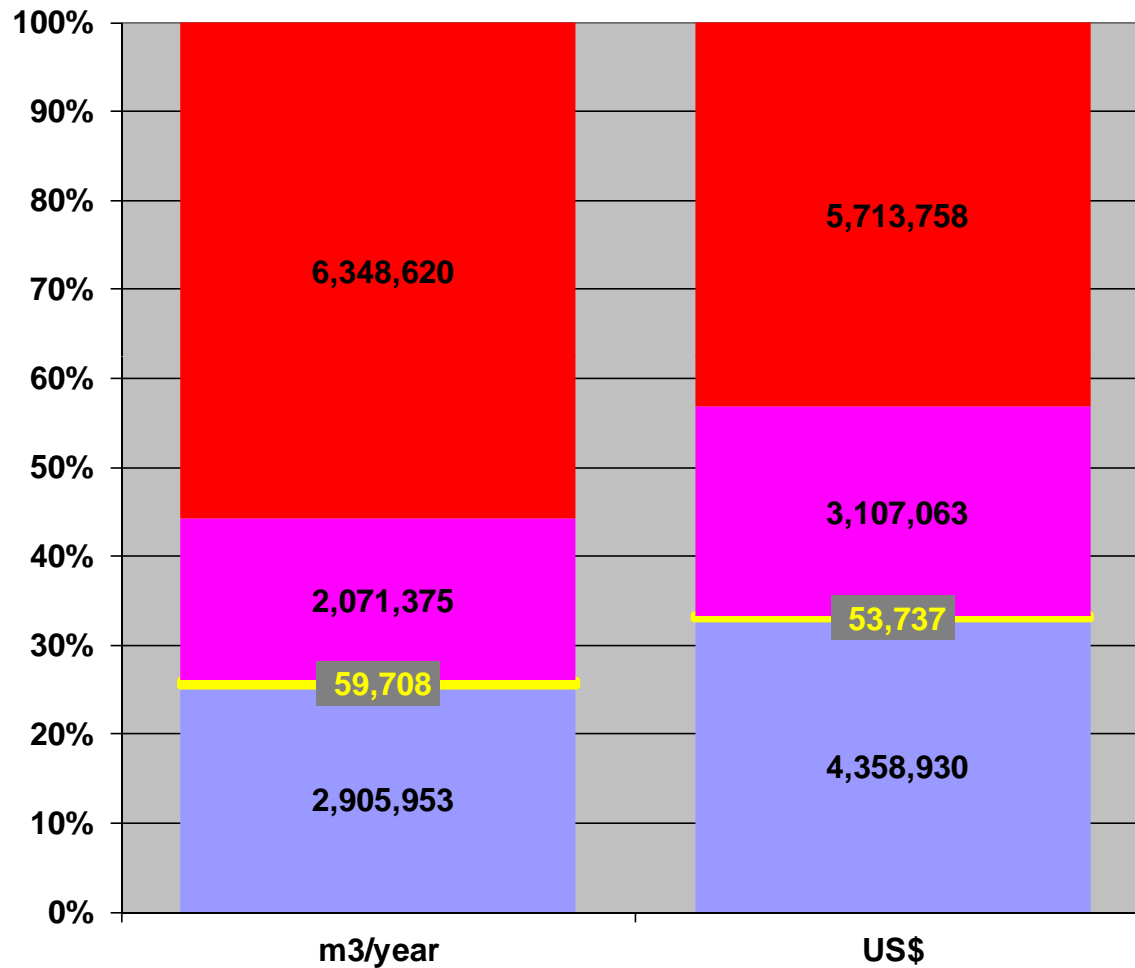
Average Production : 538 MGM

Category	Volume (MGM)
Billed Consumption	94.96
System/Leak	287.86
Theft	57.00
Loading Bays	15.00
Under Estimation	10.54
Meter Under Recording	0.40
System Usage	2.00
Municipal Usage	2.00
OtherR	68.30
TOTAL	538.06



MANCHESTER

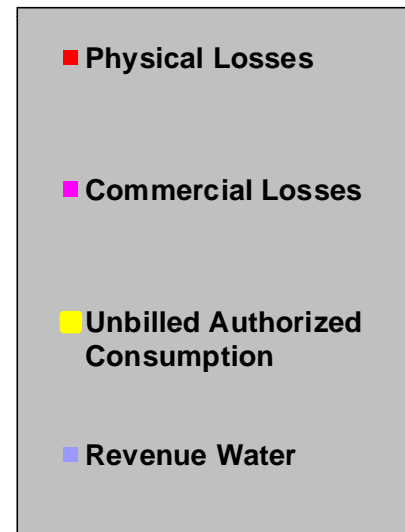
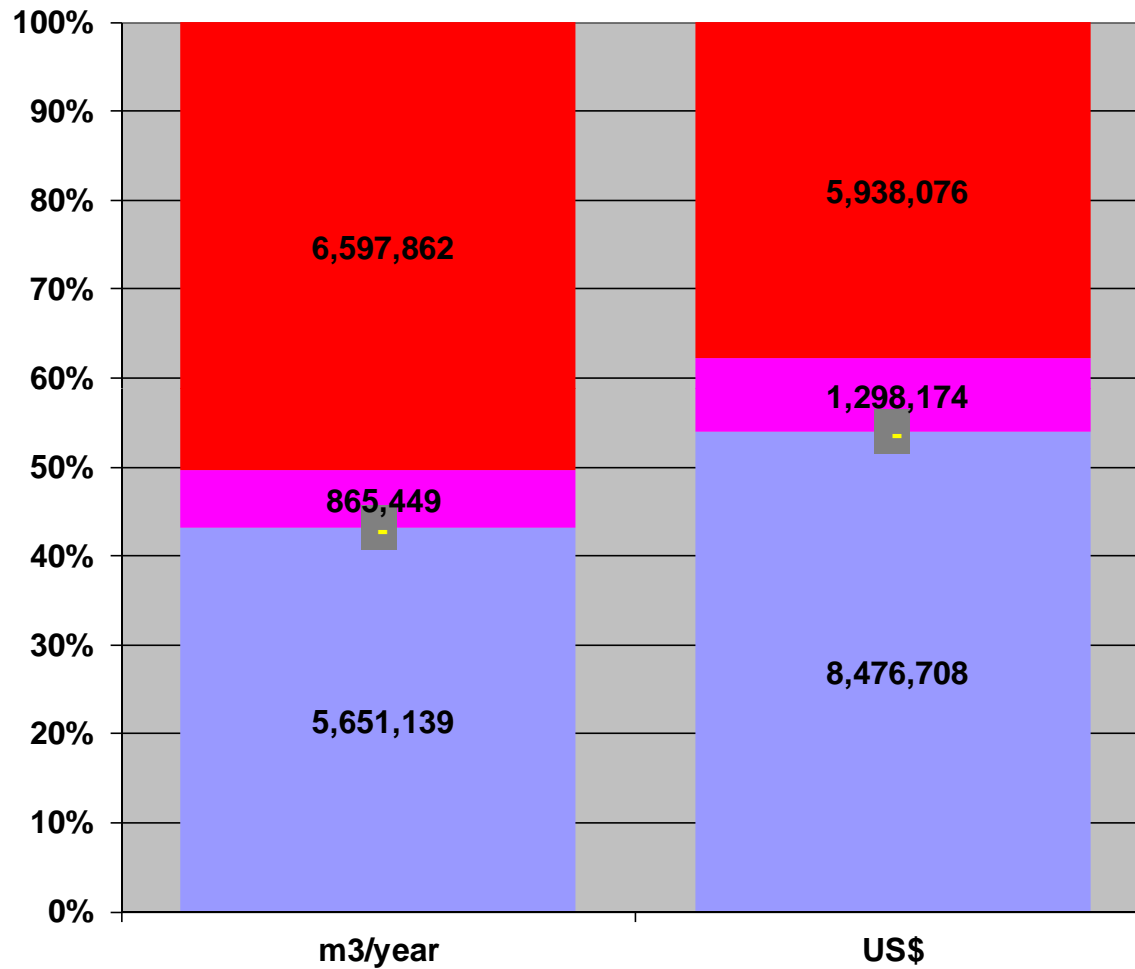
Revenue Water – 25% of Production
Commercial losses – 20% of Production
Physical Losses – 55% of Production



- Physical Losses
- Commercial Losses
- Unbilled Authorized Consumption
- Revenue Water

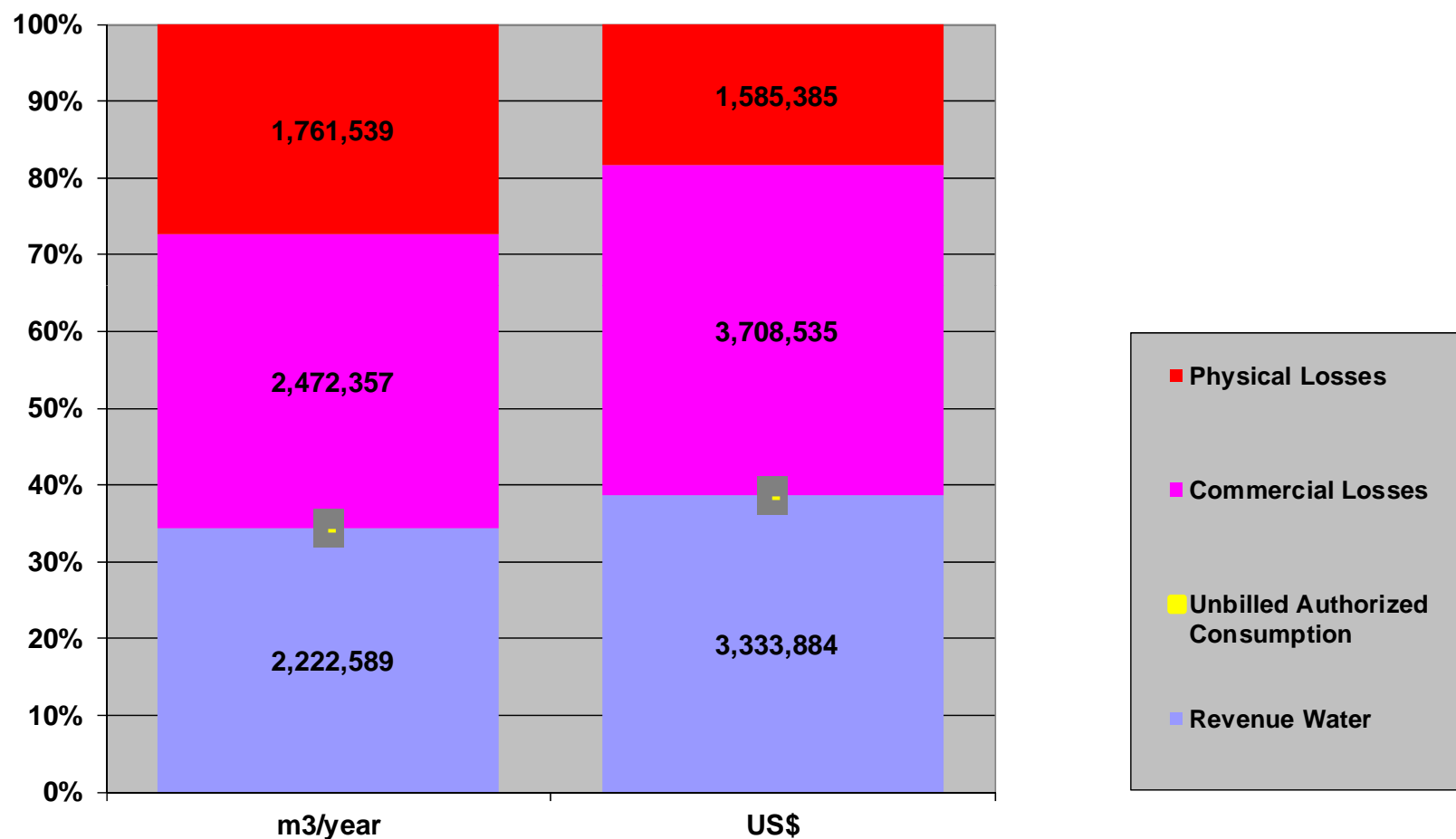
HANOVER

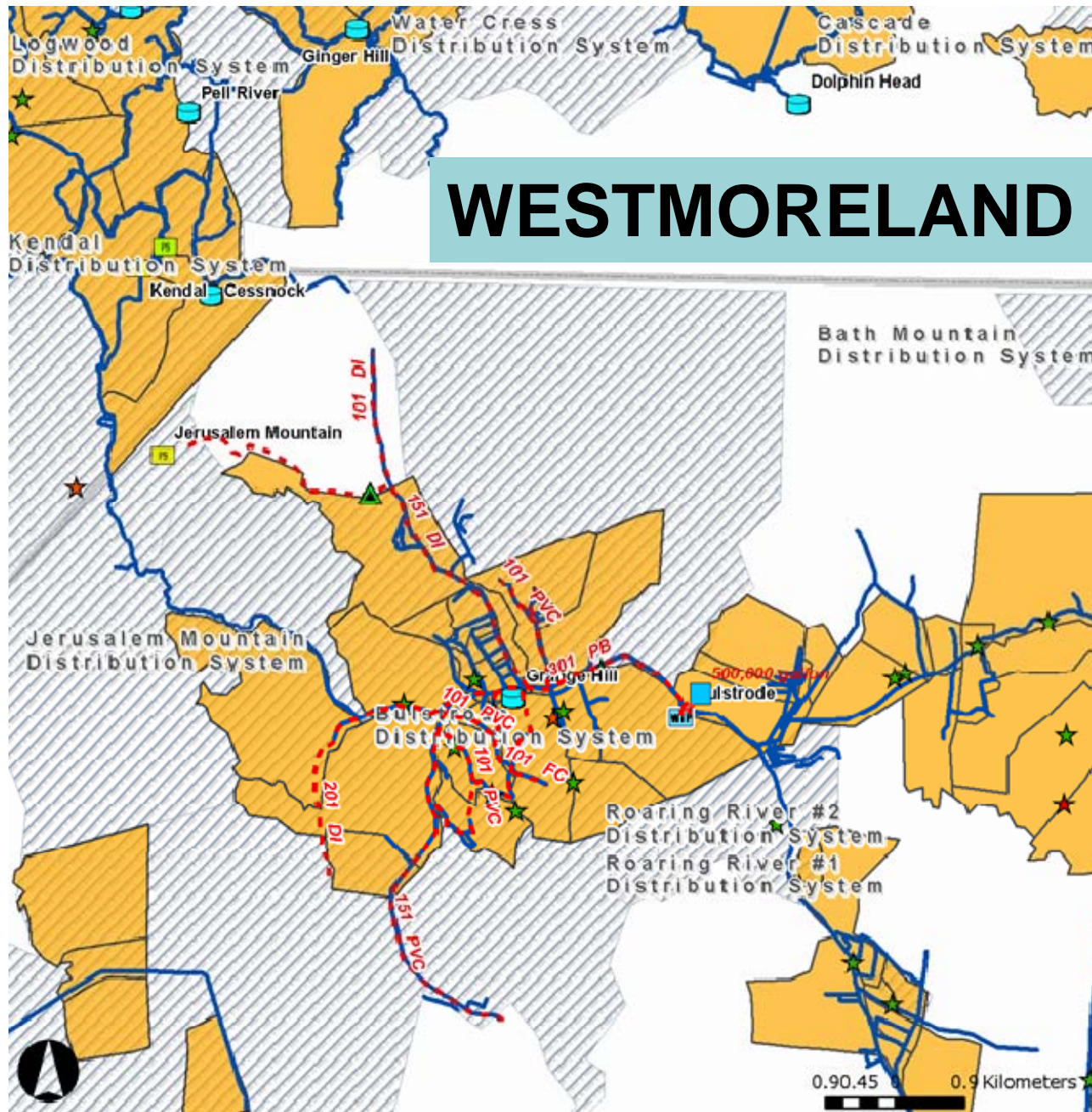
Revenue Water – 43% of Production
Commercial losses – 7% of Production
Physical Losses – 50% of Production



TRELAWNY

Revenue Water – 33% of Production
Commercial losses – 40% of Production
Physical Losses – 27% of Production





Replace 4.5 Km
distribution line
from Grange Hill
Little London to 8"
DI to reduce
leakage levels

Replace 16 Km
distribution main
within Savannah-la-
mar/Little London
system to reduce
NRW

Install a 0.5 MG
water tank to
improve pressure
control, reduce
energy cost and
improve reliability

Est Cost : \$420m



APPROACH TO DEVELOPING SEWERAGE PLANS

Consolidation of Wastewater

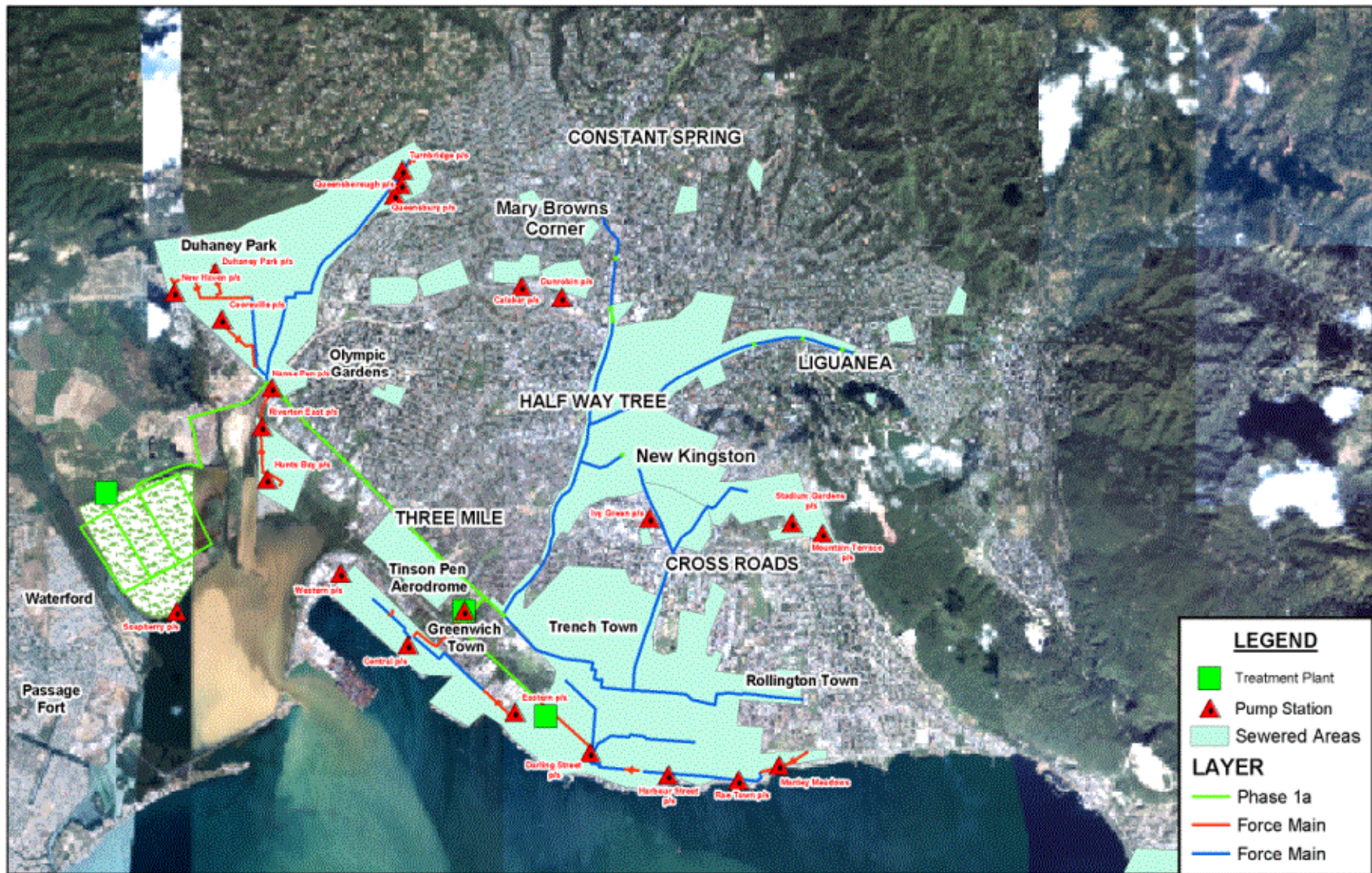
- Rehabilitate existing WWTPs in order that plant effluent discharges meet NEPA standards
- Install trunk sewer to allow retiring of plants
- Maximize use of existing WWT facilities (e.g. Soapberry)
- Replace old sewer (e.g. downtown Kingston)



Draft Scheduling of Sewerage Projects

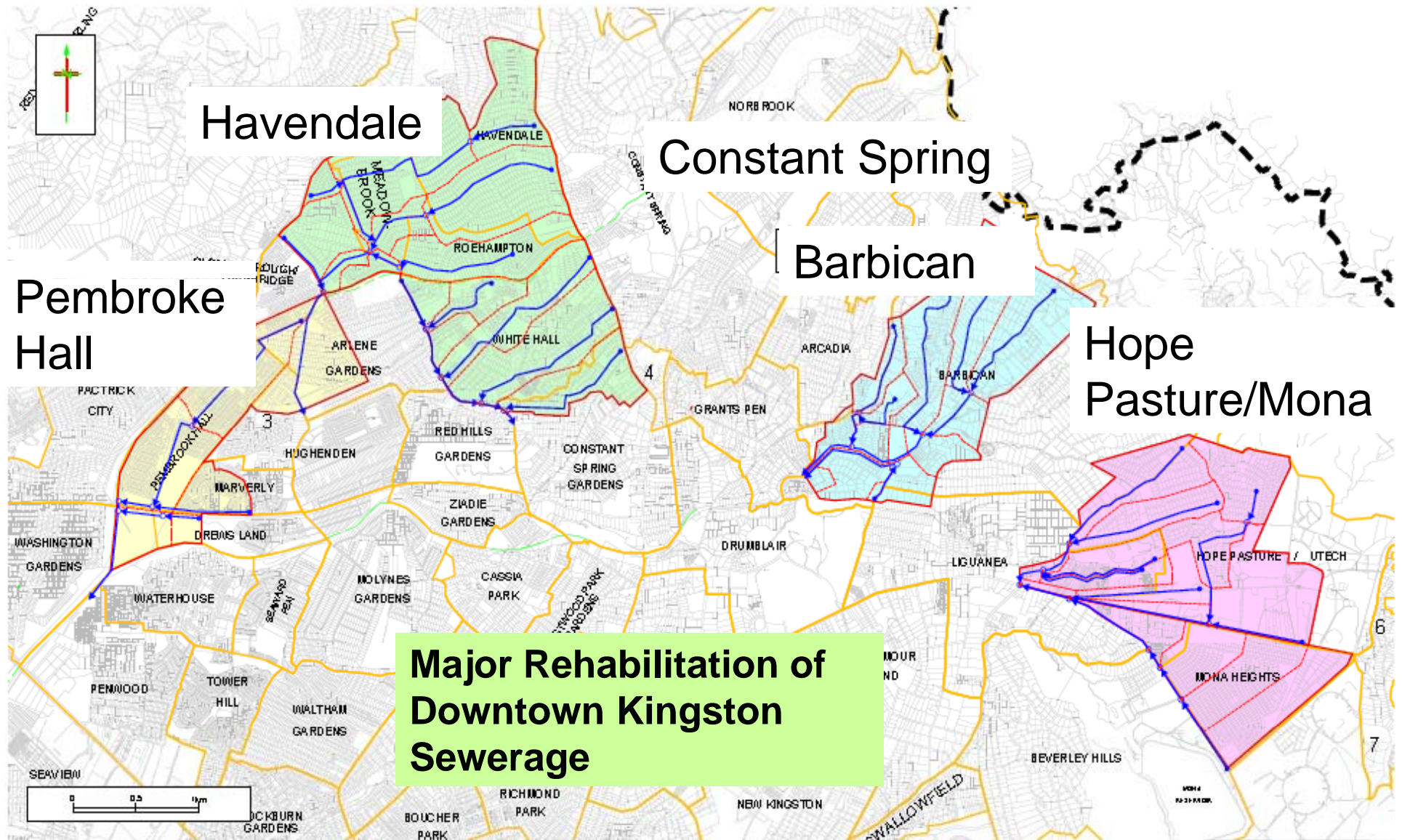
Category	Projects	Implementation Period
1	<ul style="list-style-type: none"> •Rehabilitation of under performing WWTP •KSA (extending sewer network) •Portmore •Greater Spanish Town •Old Harbour •May Pen 	2011 - 2016
2	<ul style="list-style-type: none"> • KSA (extension of Soapberry; extending sewer network) •Port Maria •Port Antonio •Montego Bay (extension of the network) •Falmouth •Savannah La Mar 	2014 - 2019
3	<ul style="list-style-type: none"> •Buff Bay •Annotto Bay •Runaway Bay •St. Ann's Bay •Mandeville 	2017 – 2022
4	<ul style="list-style-type: none"> •Morant Bay •Lucea •Black River •Santa Cruz 	2019 – 2024
5	<ul style="list-style-type: none"> •Oracabessa •Linstead 	2022 – 2025

KSA SEWERAGE – EXISTING SEWERED AREAS

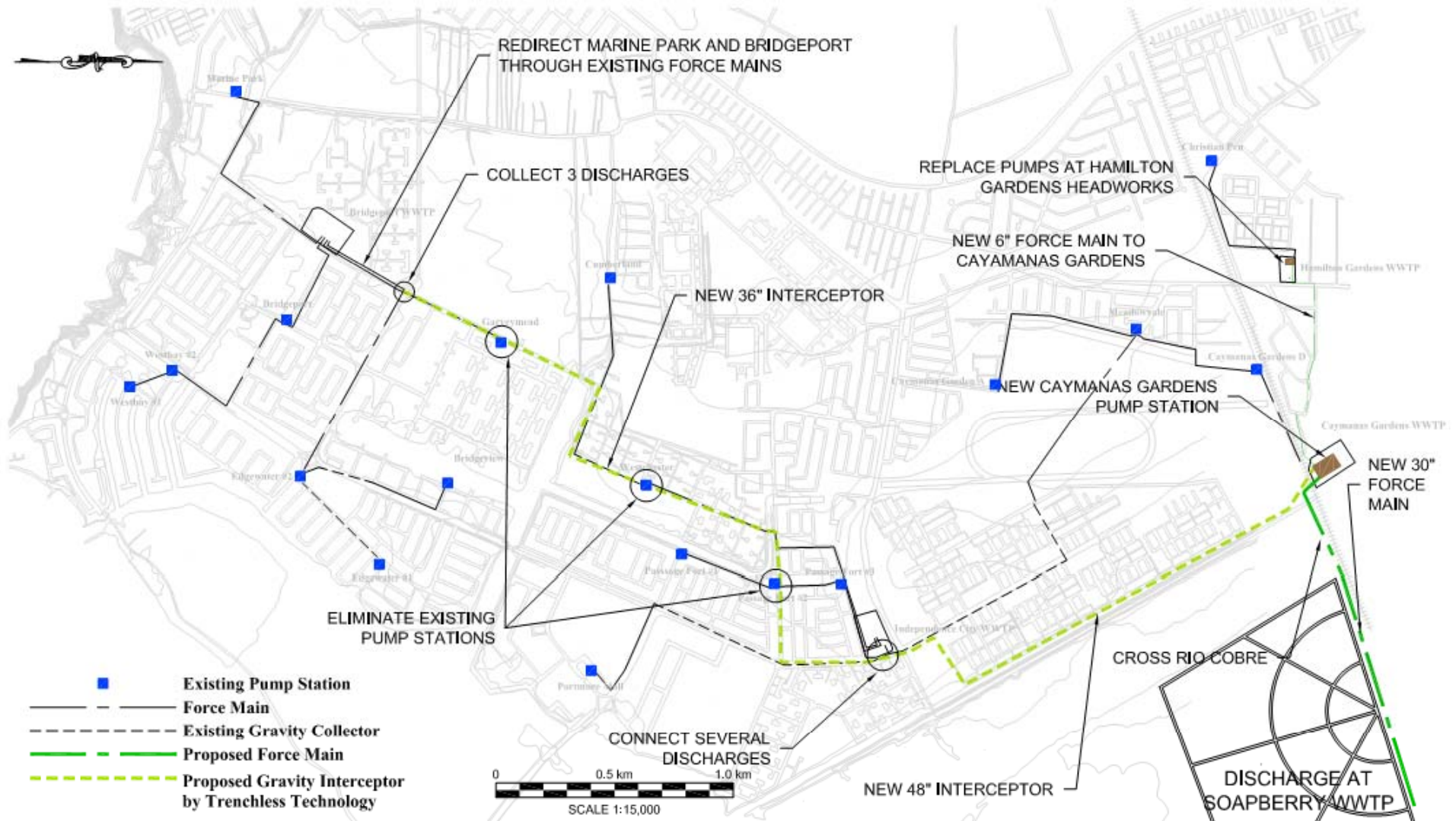


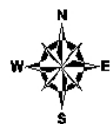
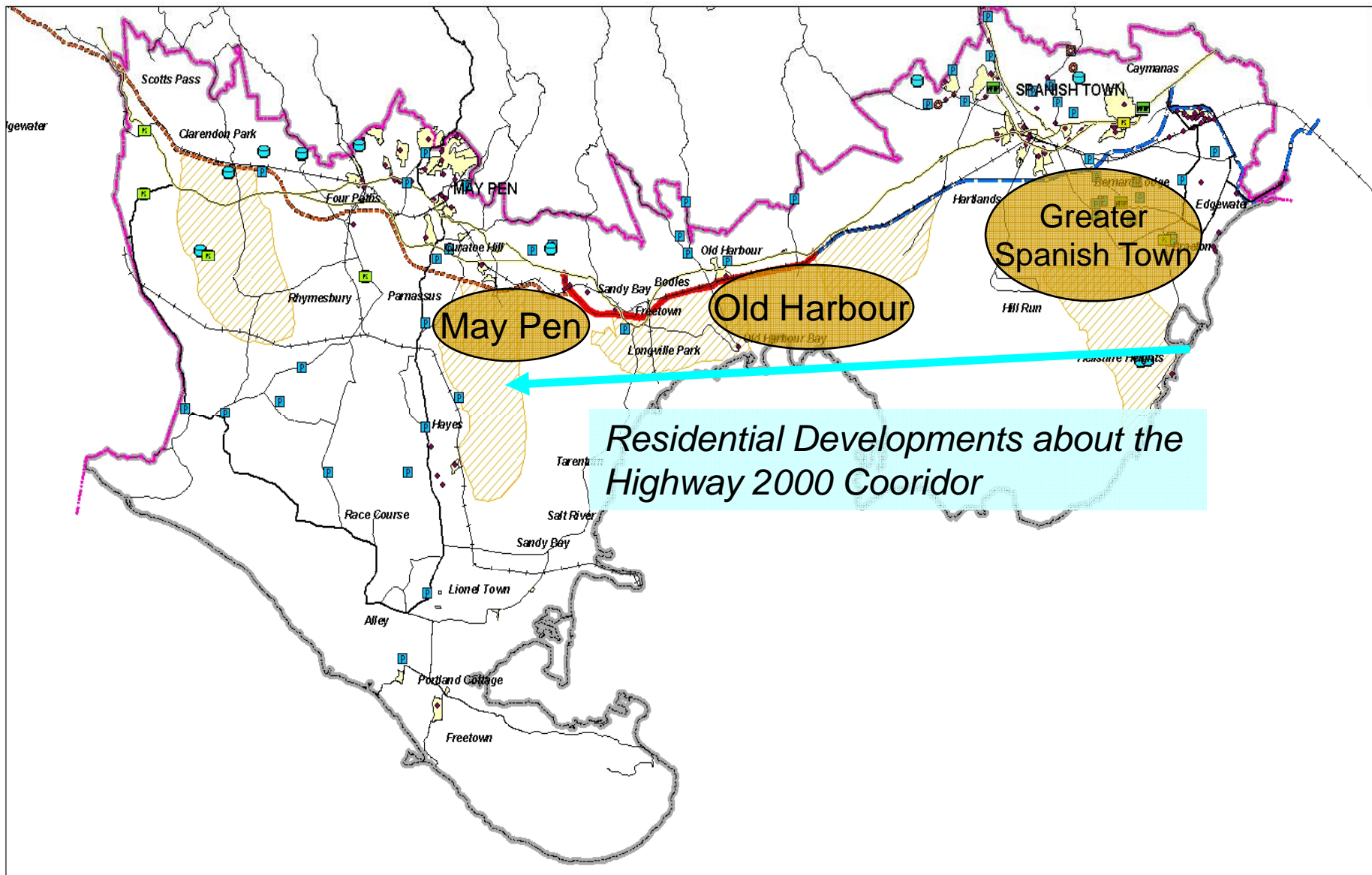
0 2,800 5,600 11,200 Meters

SEWER EXTENSION OF KSA SEWERAGE – Medium Term



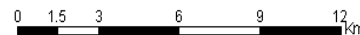
Redirecting of Sewage from Sections of Portmore to Soapberry





Legend		CLASS		STATUS	
	Booster Station		CLASS A		Existing
	Production Well		CLASS B		Proposed
	Pump Station		CLASS C		Under Construct
	Relift Station		Project Boundary		
	Storage Tank				
	Treatment Plant				
	Squatter Community				
	Railway				
	Squatter Settlement				
	Parish Boundary				
	Newton				

HIGHWAY 2000 CORRIDOR, PORTMORE TO CLARENDON PARK



Prepared By : GIS Unit
National Water Commission
Strategic Planning Department
28 - 48 Barbados Avenue
Kingston 5.
October 2007



OTHER TOWNS

- Build on work already done for Port Antonio Sewerage
- Determine requirement for sewage treatment
- Identify potential sites for WWTP for each town
- Project cost estimates
- Agree on Selection Criteria
- Review Scheduling



Implementation

Implementation

- NWC plans to use K-Factor funds to finance projects to
 - Reduce level of NRW (e.g. pipeline replacement, pressure management, establishing DMA)
 - Rehab wastewater treatment plants
 - Extend sewerage in KSA
- NWC pursuing other means to finance the proposed works (e.g.IDB)

Implementation

- Project Development and Implementation
 - NWC in-house resources
 - Use of Program Managers to support
 - RFP out to be returned by November 4 2011
 - Support for 4 years
- Available resources in the country to undertake the proposed work is an issue

***NWC striving to improve service reliability
and to achieve its vision :***

***In 2015 NWC is the No. 1 water services
utility in the Caribbean and Latin
America in terms of coverage, customer
satisfaction, reliability, efficiency,
compliance and viability***