Updated 10/19/15

Infrastructure Workshop

Utility Department

October 2015

Agenda

- Renewal and Replacement (R&R) Program
- Master Planning Process
- Sewer Master Plan
- Future Policy Decisions Moving Forward

R&R Program

Knowing our past and looking towards our future…

How do we respond to R&R infrastructure challenges?

How do we rate as a Nation?

"Our estimates are that this is a trillion-dollar program," says David LaFrance, CEO of the American Water Works Association. "**About half of that trillion dollars will be to replace existing infrastructure**. The other half will be putting into the ground new infrastructure to serve population growth and areas that currently aren't receiving water."

Drinking Water

2013 GRADE D

t the dawn of the 21st century, much of our drinking water infrastructure is nearing the end of its useful life. There are an estimated 240,000 water main breaks per year in the United States. Assuming every pipe would need to be replaced, the cost over the coming decades could reach more than $1 trillion, according to the American Water Works Association (AWWA). The quality of drinking water in the United States remains universally high, however. Even though pipes and mains are frequently more than 100 years old and in need of replacement, outbreaks of disease attributable to drinking water are rare.

A = Exceptional
B = Good
C = Mediocre
D = Poor
F = Failing

AMERICA'S GP

D+

GRADING METHODOLOGY ›

2013 REPORT CARD FOR AMERICA'S INFRASTRUCTURE ASCE

NAVIGATION MENU

Wastewater

2013 GRADE D

apital investment needs for the nation's wastewater and stormwater systems are timated to total $298 billion over the next twenty years. Pipes represent the largest capital need, comprising three quarters of total needs. Fixing and expanding the pipes will address sanitary sewer overflows, combined sewer overflows, and other pipe-related issues. In recent years, capital needs for the treatment plants comprise about 15%-20% of total needs, but will likely increase due to new regulatory requirements. Stormwater needs, while growing, are still small compared with sanitary pipes and treatment plants. Since 2007, the federal government has required cities to invest more than $15 billion in new pipes, plants, and equipment to eliminate combined sewer overflows.

A = Exceptional
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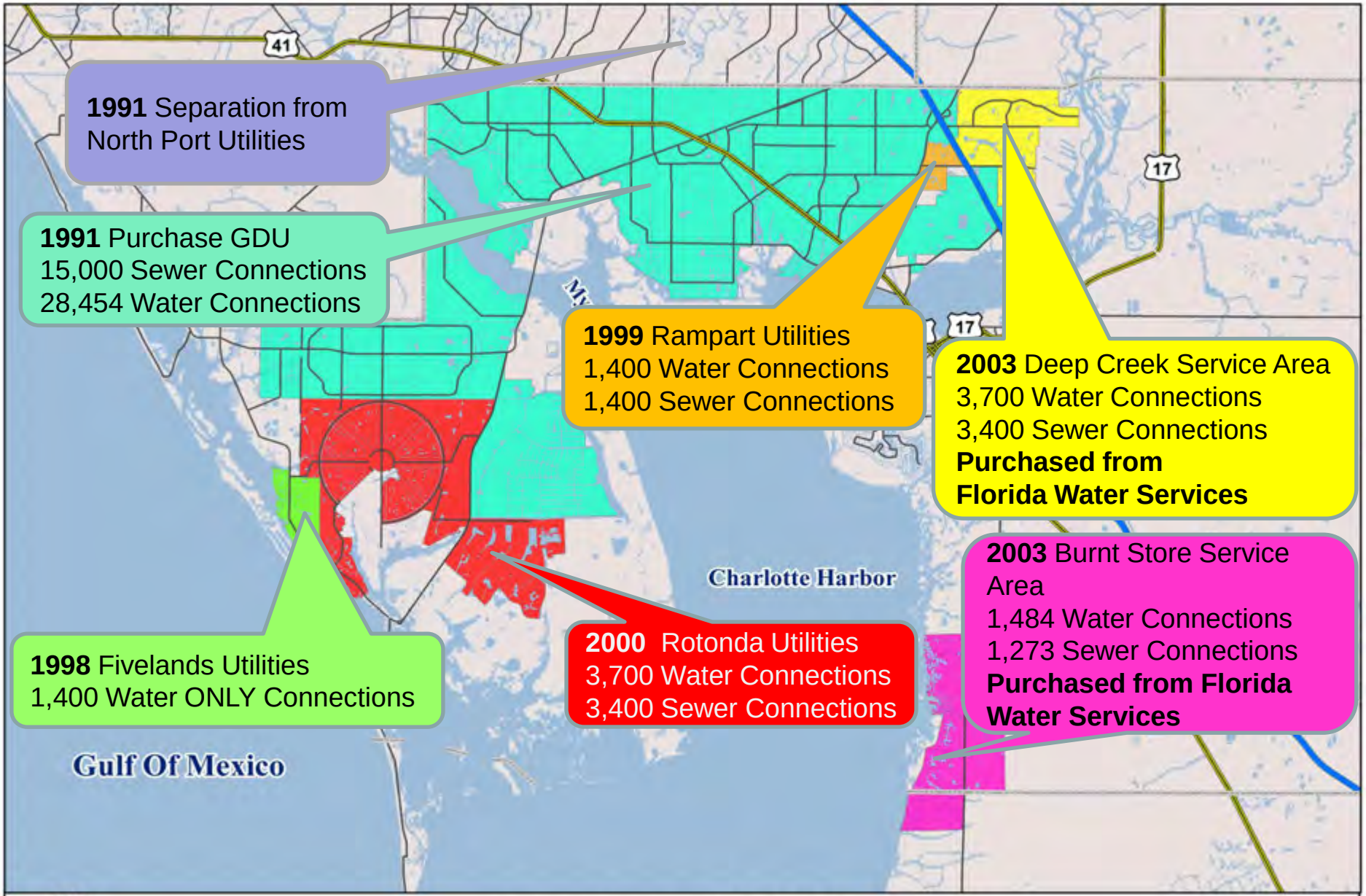
AMERICA'S GPA

D+

GRADING METHODOLOGY ›

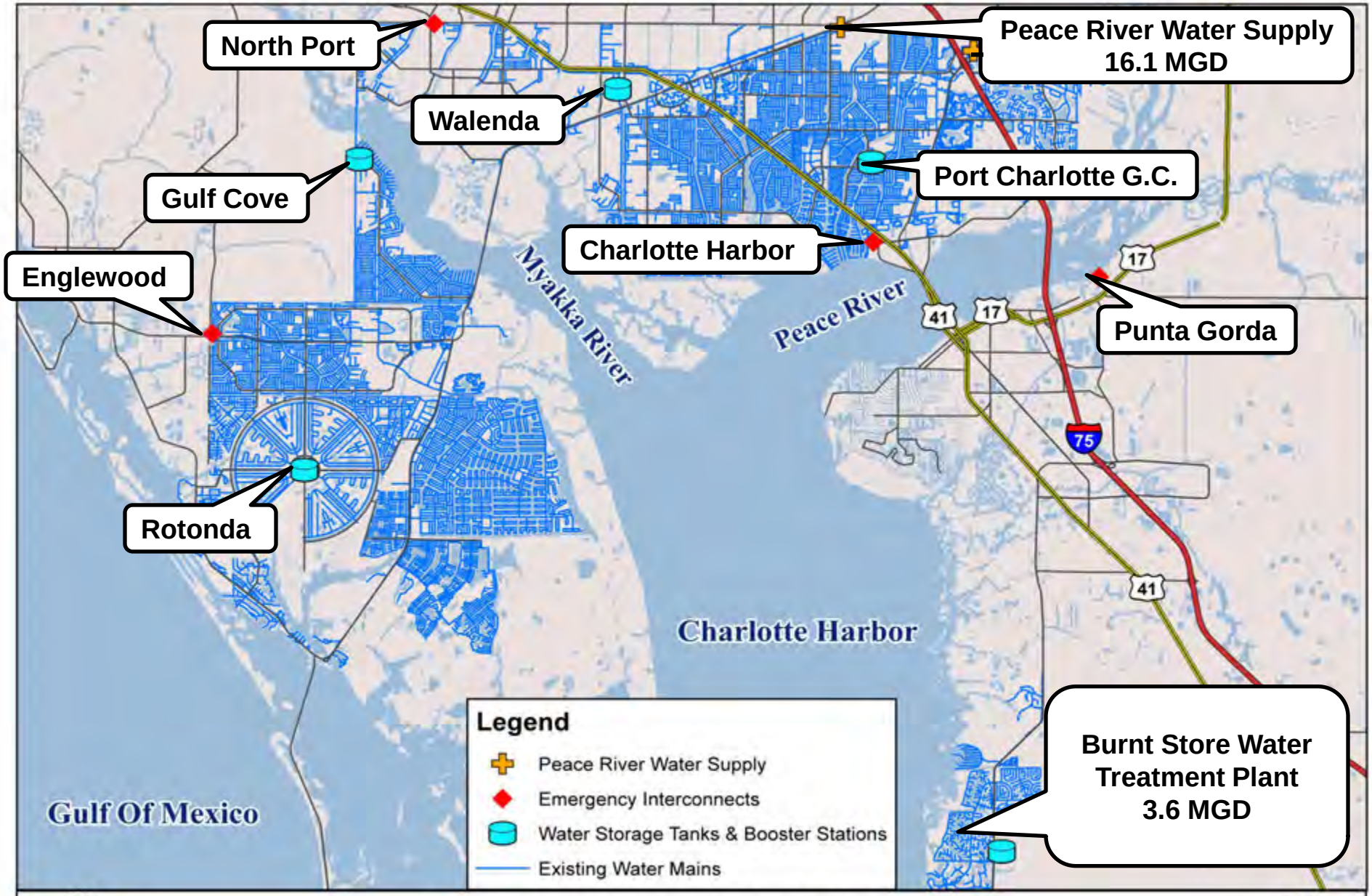
Back to the Future - Through Our Past

- Review History of Asset Acquisition
- Review Existing Condition of Underground Assets
- Review Replacement Value of Underground Assets
- Establish R&R Funding and Staffing Needs
- Identify Initial R&R Focus Areas
- Identify Potential Funding Sources



Purchased Utility Service Area

NOT TO SCALE



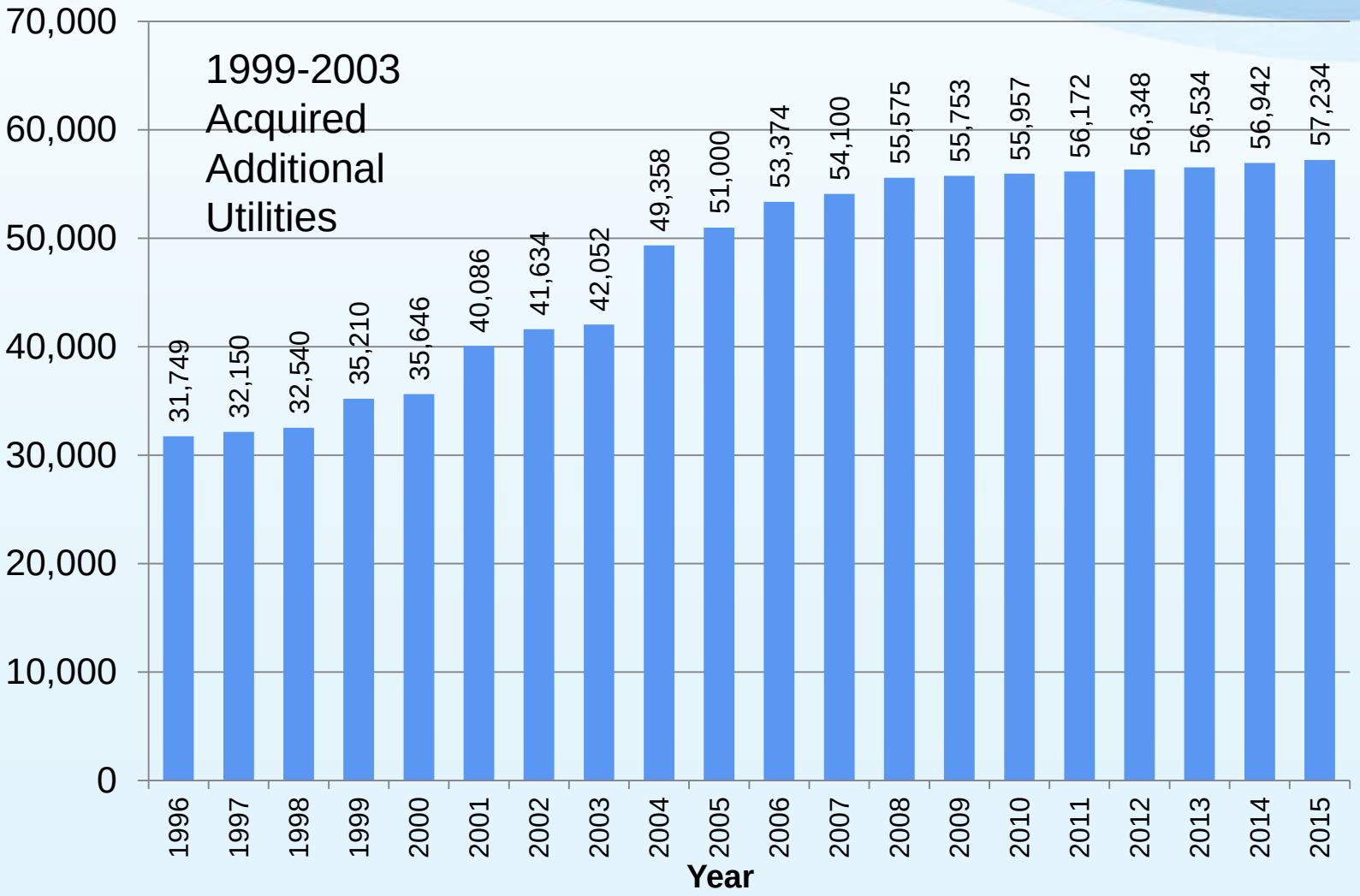
Charlotte County Utilities
Existing Water Infrastructure and Interconnects

NOT TO SCALE

Potable Water System

- One Reverse Osmosis Water Treatment Facility
- 4 Booster Pump Stations
- 10 MG of Storage
- **1,427 miles of Water Mains**
- 5,096 Fire Hydrants
- 16,619 Valves
- **57,234 Water Customer Connections**
- 138-square-mile Service Area

Potable Water Connections



Industry Standard Annual R&R Program*

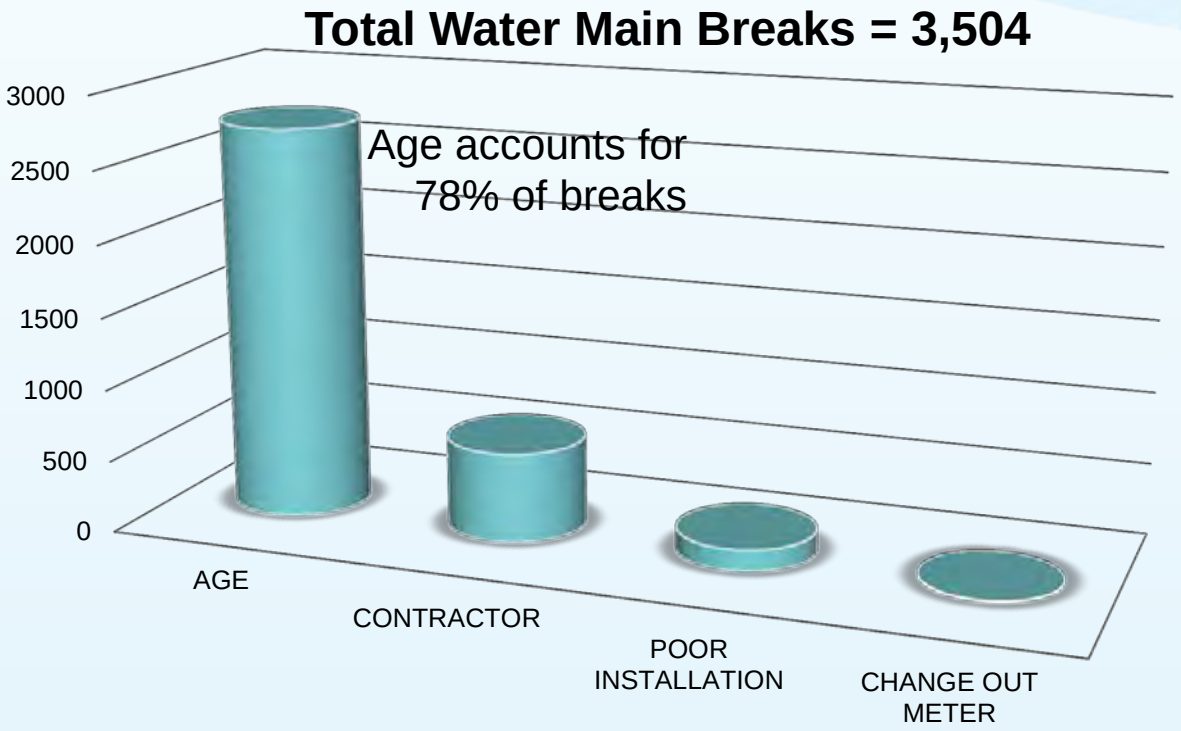
- Based upon average 100 year life span
- Replace approximately 1% of piping annually
- Equals 14 miles of water main annually

*Source:
American Water Works Association

American Society of Civil Engineers

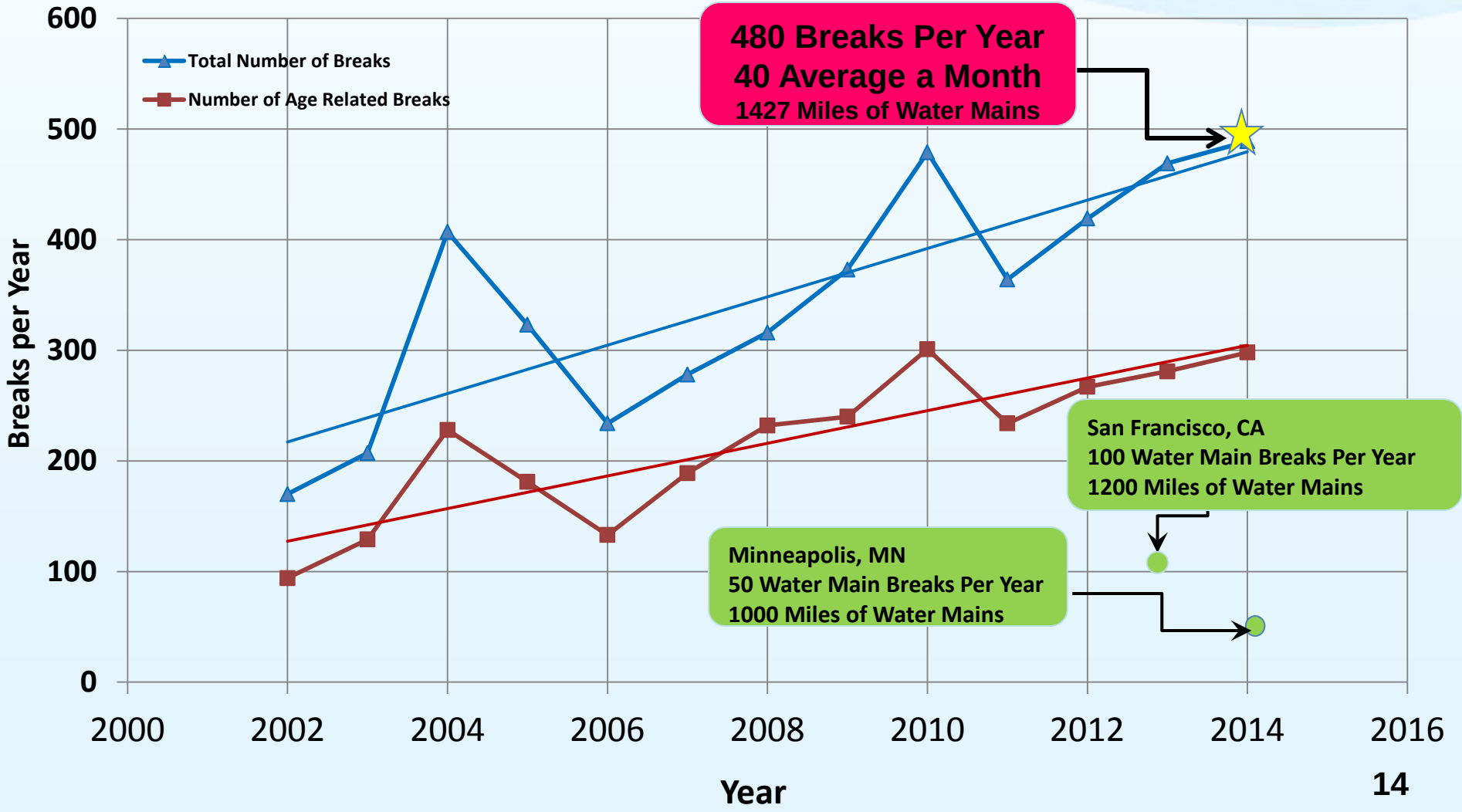
Water Main Break Causes 2003 – 2014

(3” sized pipes or greater)

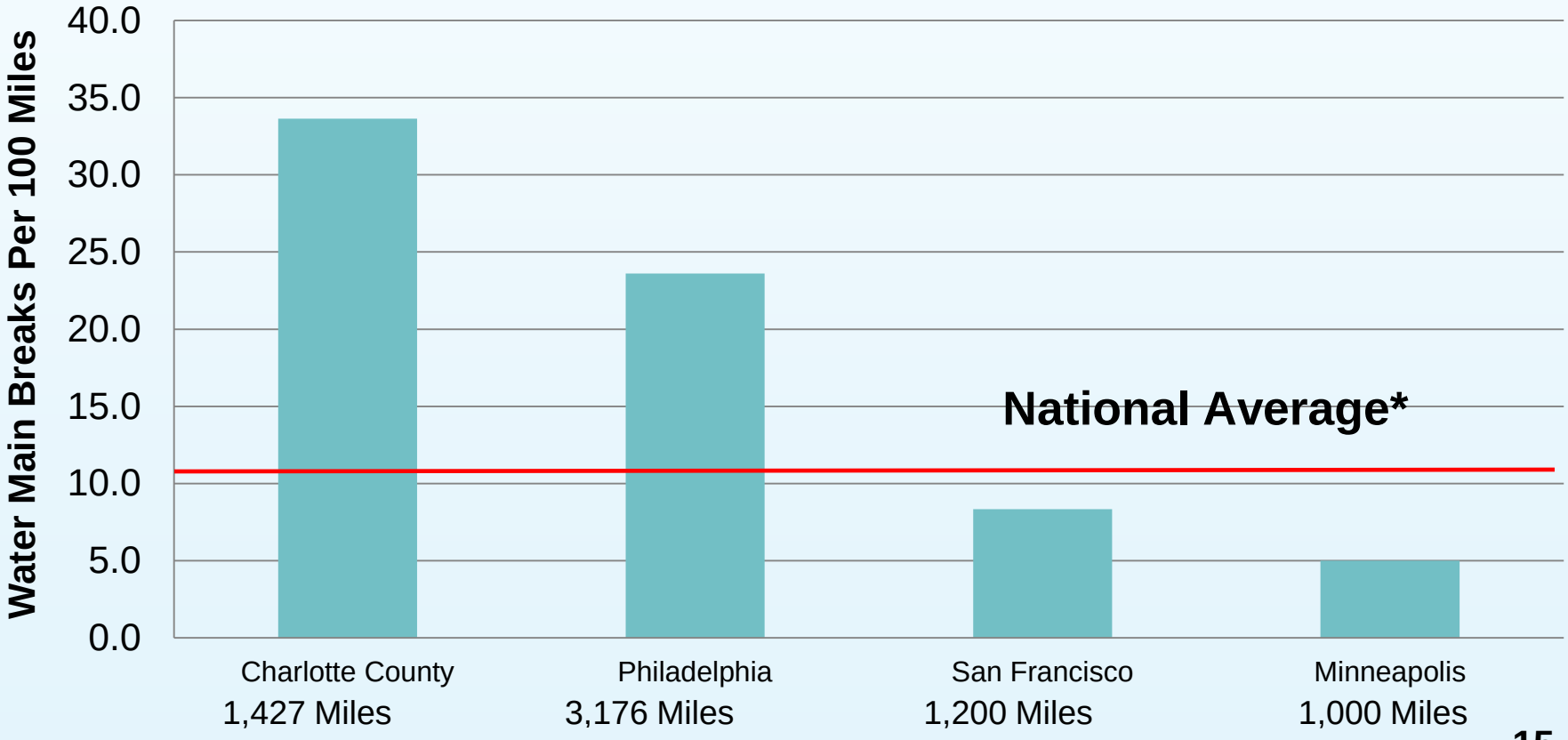


Total Counts of Water Main Break Causes From 2003 – 2014
Age = 2,722
Contractor (3rd Party Damage) = 621
Poor Installation = 149
Change Out Meter = 12
Total Breaks = 3,504

Potable Water Main Breaks Trend From 2002 - 2014



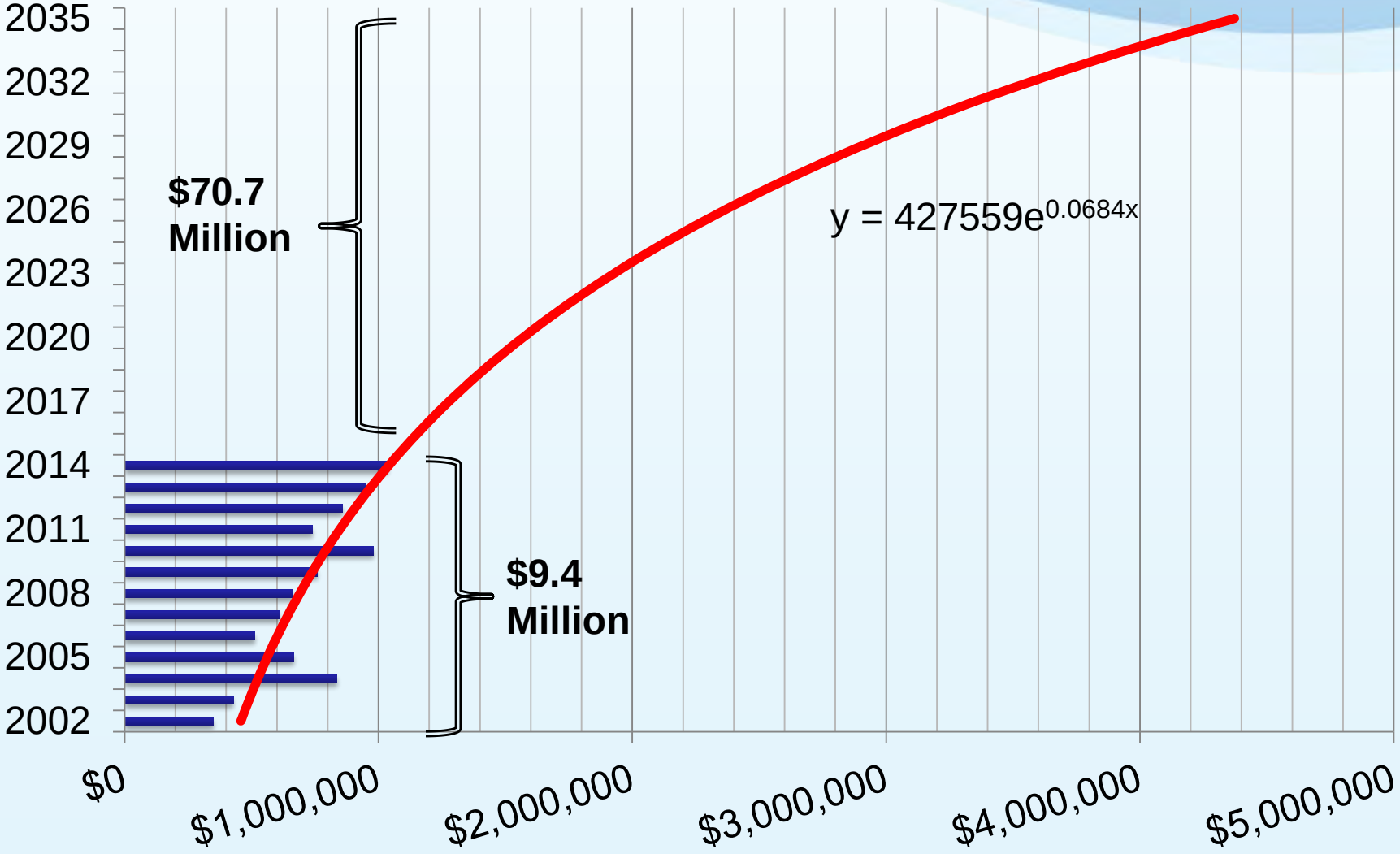
How Our System Compares
Water Main Breaks per 100 miles



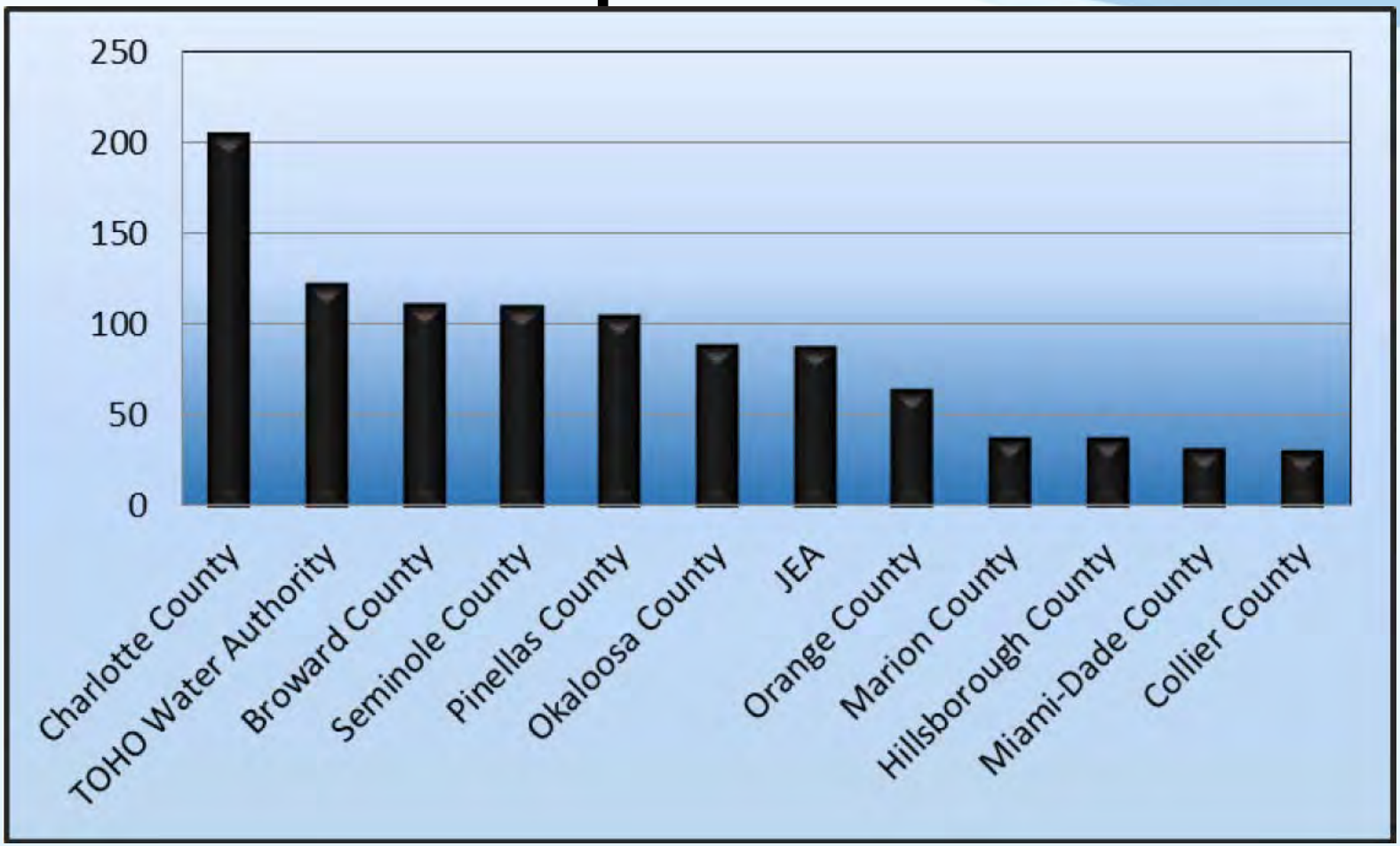
2014

*Source: Water Main Breaks in the USA and Canada: A Comprehensive Study, April 2012 – Utah State University

Water Main Break Cost Trend

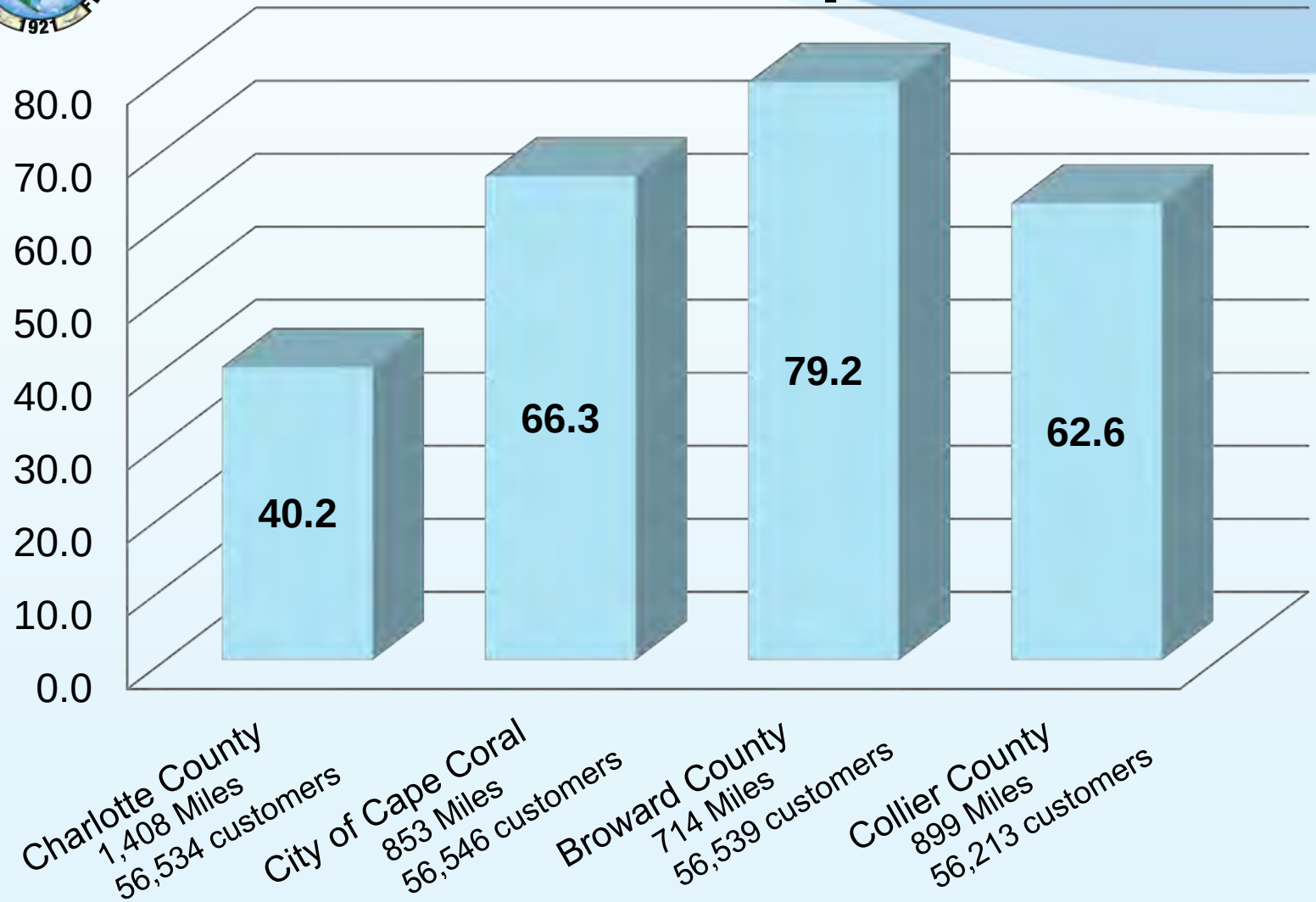


Charlotte County vs. Statewide In Water Main Leaks and Breaks per 100 miles



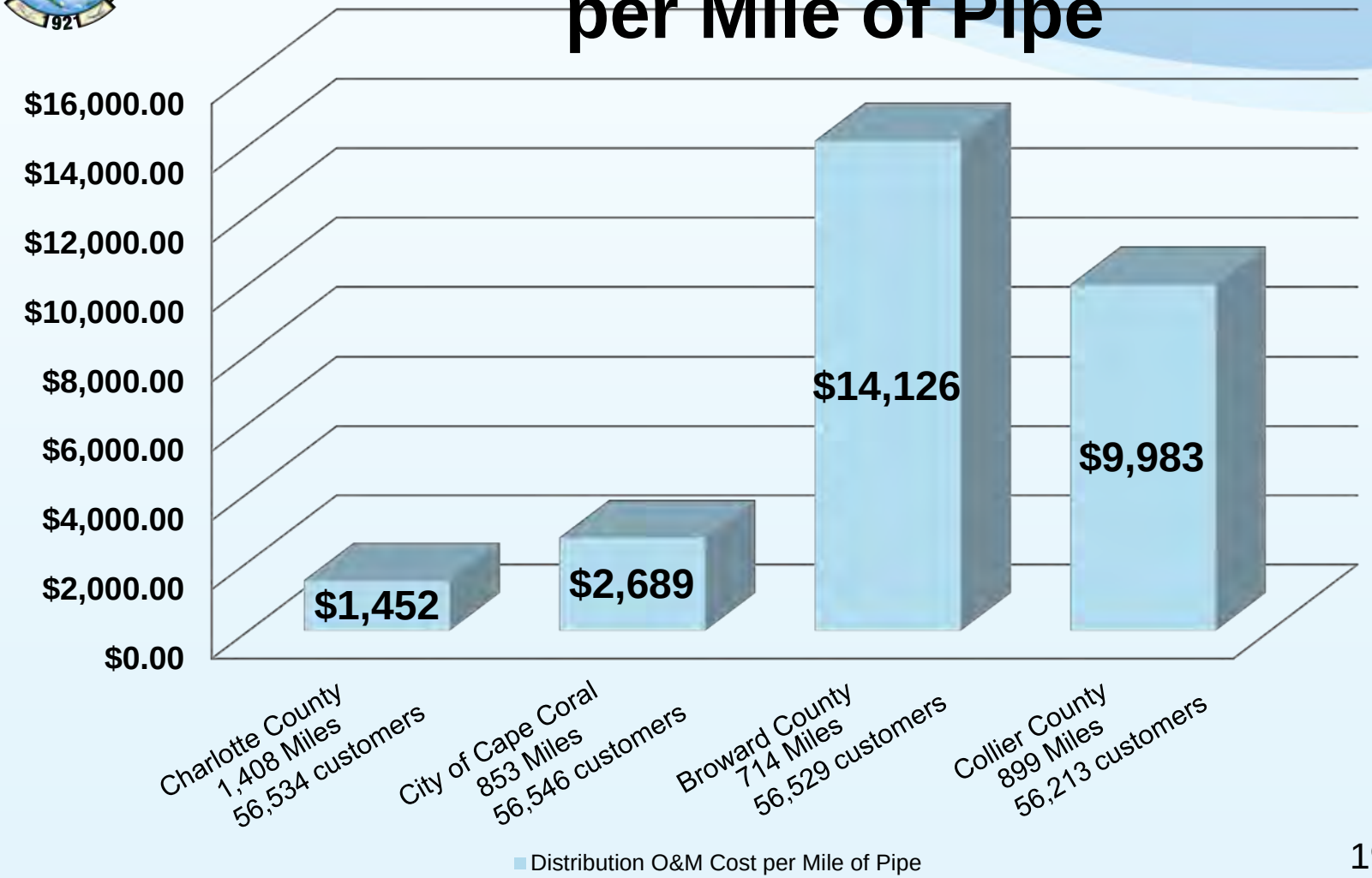
Source: Florida Benchmarking Consortium FY12/13 Annual Services Report

Water Customers per Mile of Pipe



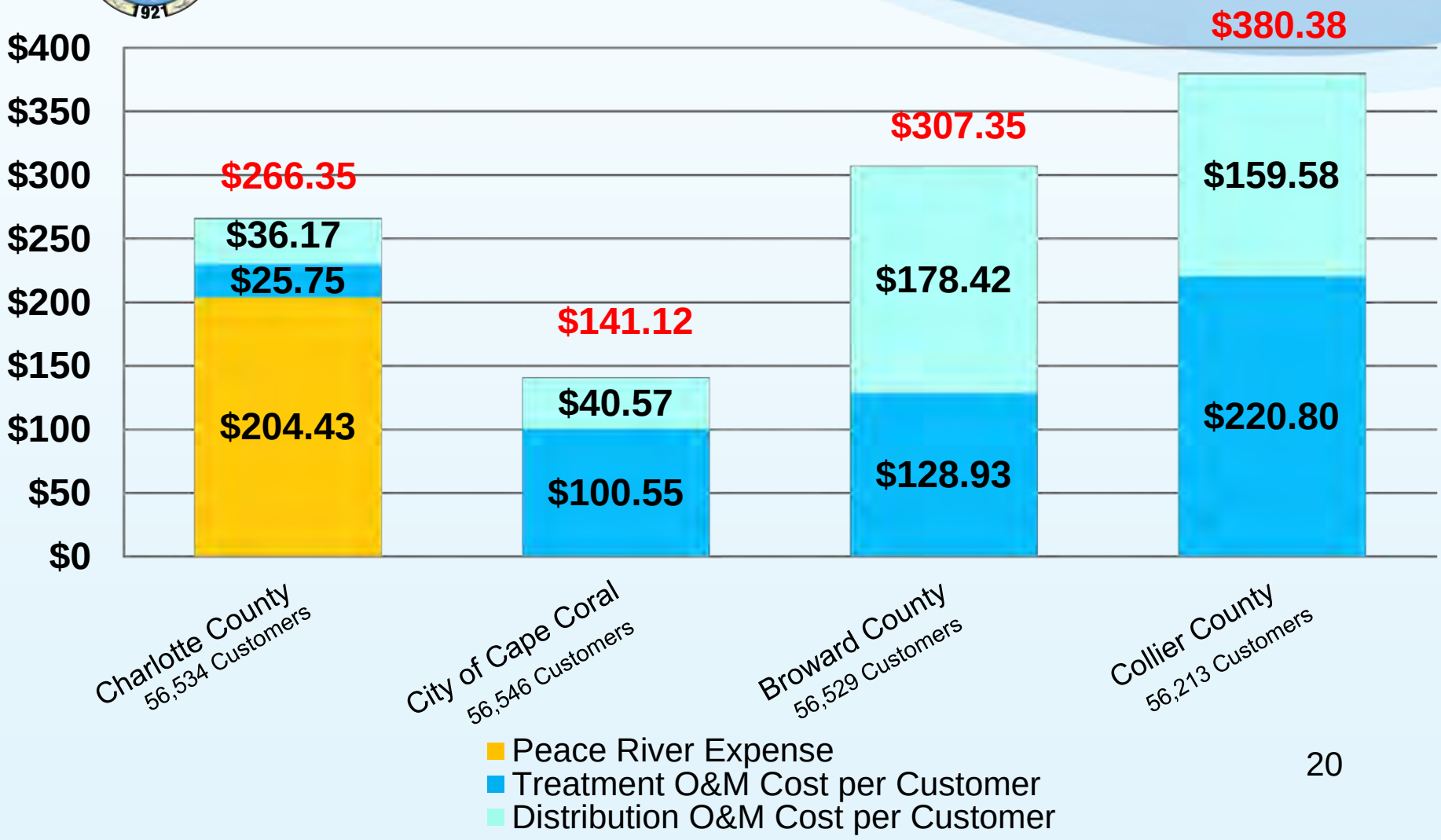
Source: Florida Benchmarking Consortium FY12/13 Annual Services Report

Water Distribution Operations and Maintenance (O&M) Expenditures per Mile of Pipe



Source: Florida Benchmarking Consortium FY12/13 Annual Services Report

Water Supply Operations & Maintenance (O&M) Expenditures per Customer



Source: Florida Benchmarking Consortium FY12/13 Annual Services Report

Less is Not More!

- 40 customers per mile of pipe equates to fewer rate payers contributing to expenses
- Spending less money on O&M now adds more costs to R&R tomorrow
- Customers expect to have quality water when they want and need it
- **Tomorrow is Today!**

Questions - Discussion

Now let’s look at the sewer system …

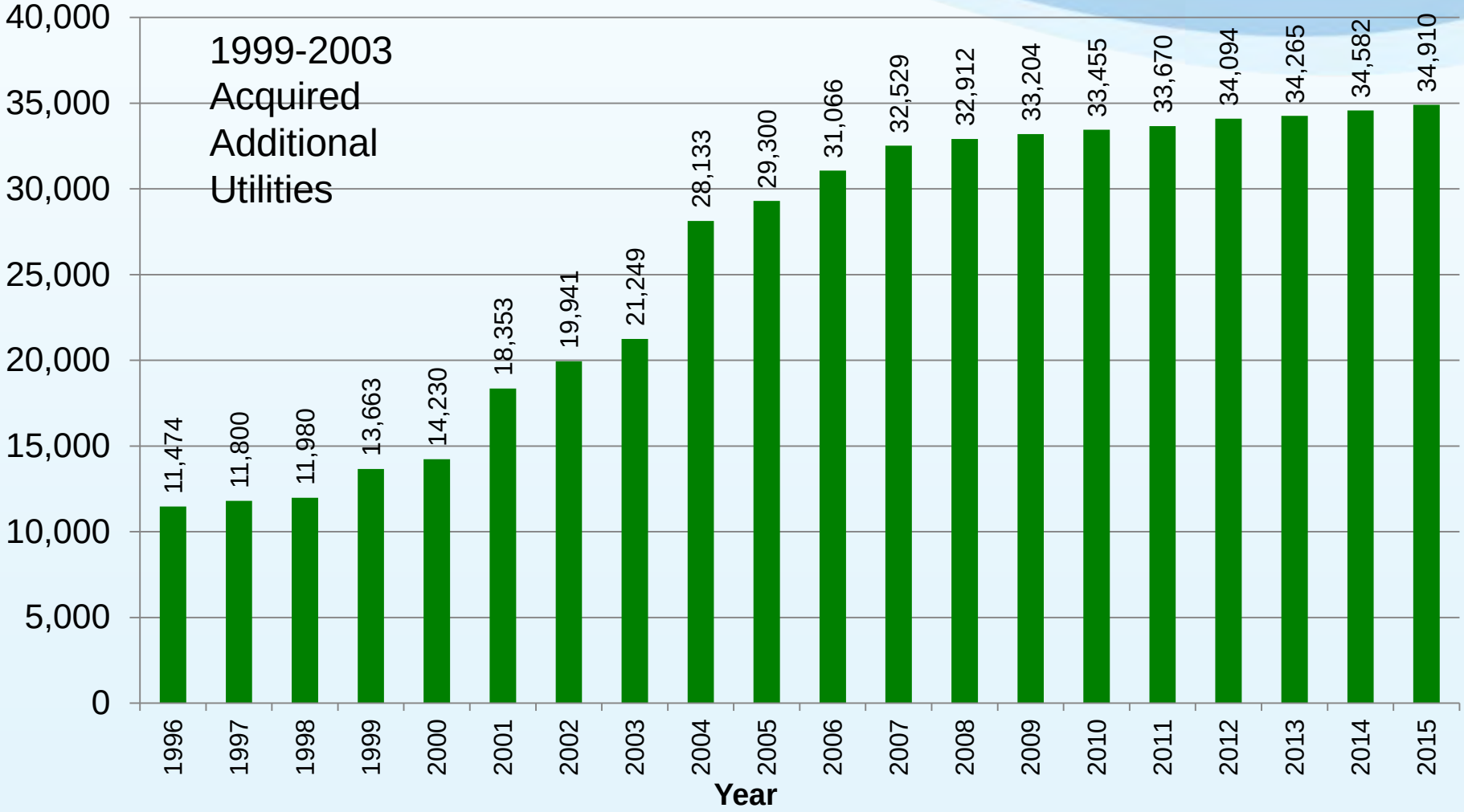
Charlotte County Utilities
Existing Wastewater Infrastructure

NOT TO SCALE

Sewer System

- ✓ 4 Water Reclamation Facilities
- ✓ 2 Reclaimed Water Storage/Booster Stations
- ✓ 1 In-line Reclaimed Water Booster Pump Station
- ✓ 57 Miles of Reclaimed Water Mains
- ✓ **906 Miles of Sewer Mains**
- ✓ 291 Sewer Lift Stations
- ✓ 7,578 Manholes
- ✓ **34,910 Sewer Customer Connections**
- ✓ 44.72 Square Miles of Service Area

Sewer Connections

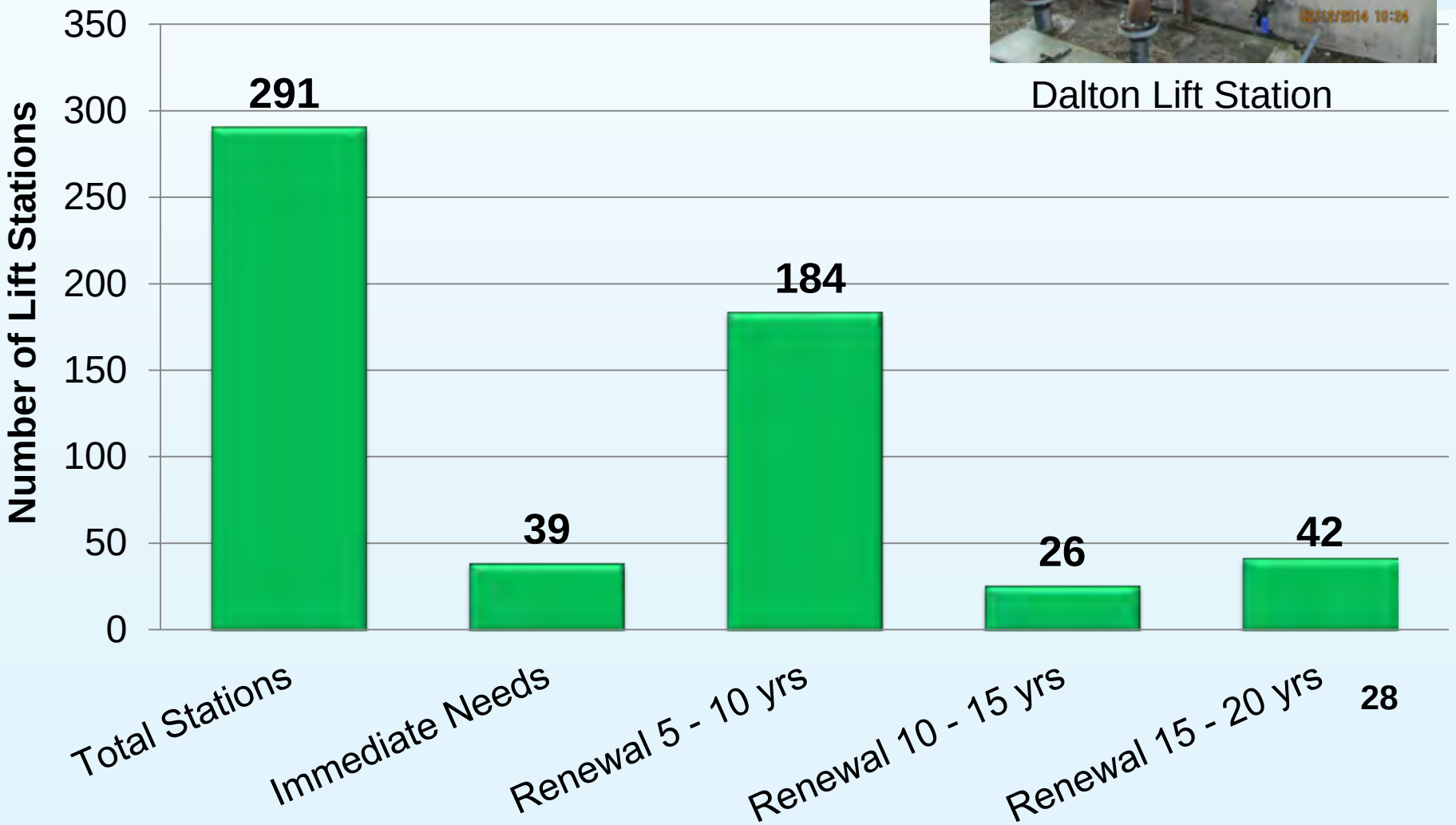


Ounce of Prevention is Worth a Pound of Cure

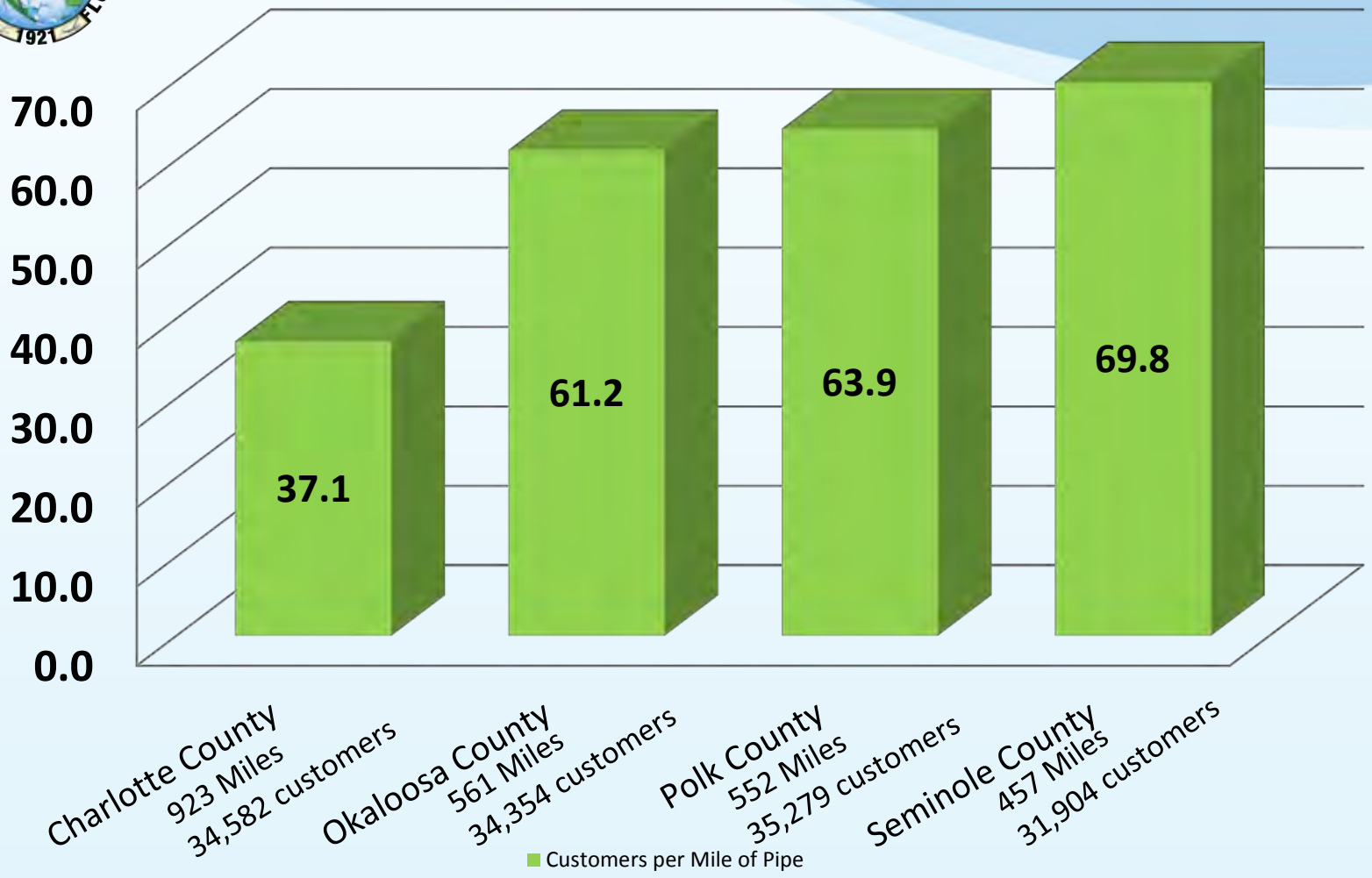
- As assets age and deteriorate the risk of failure increases
- Costs to repair the failure are more than just monetary challenges
- A proper R&R program minimizes emergency failure management
- Optimal strategy is to avoid failure altogether

Lift Station Renewal Needs

Dalton Lift Station

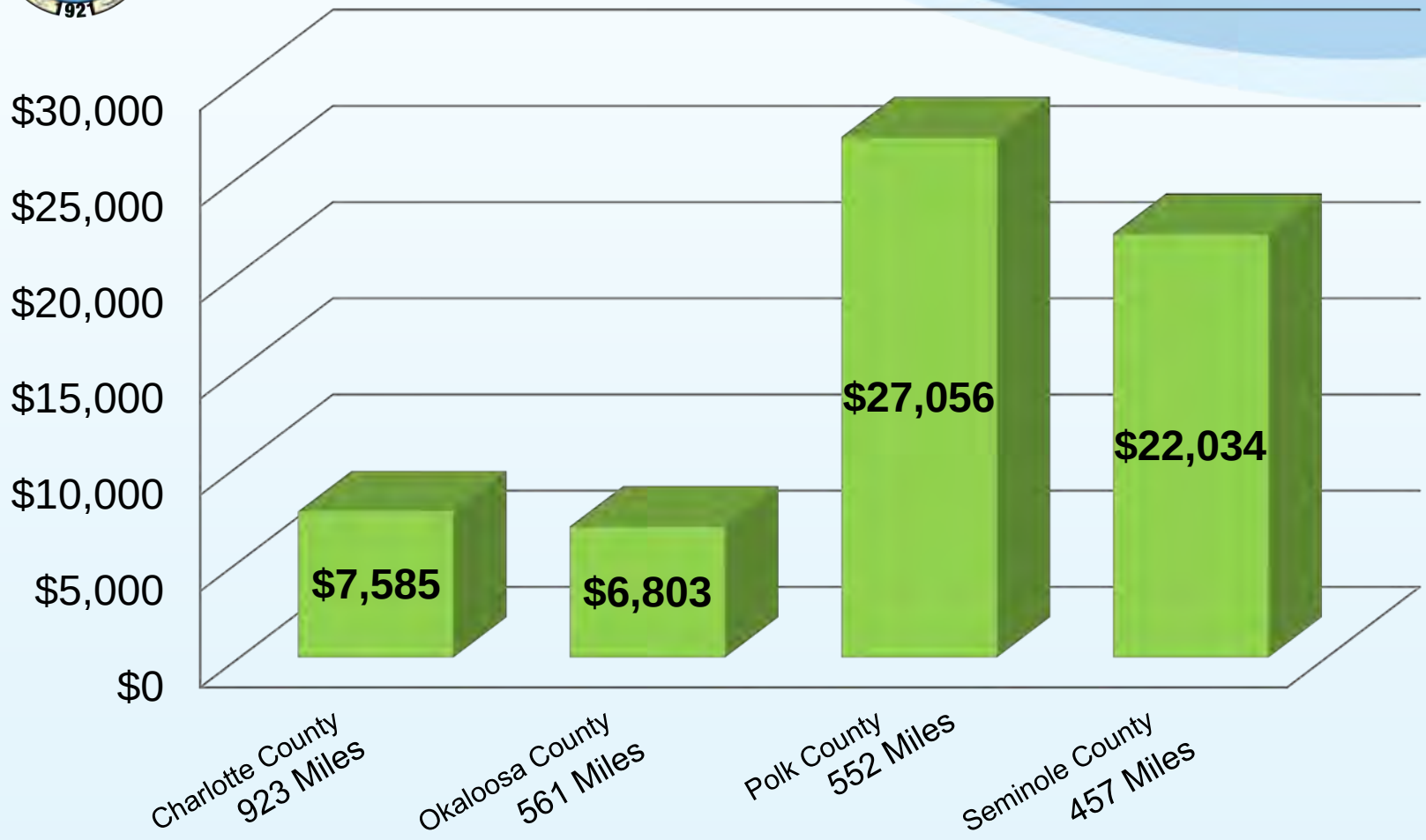


Sewer Customers per Mile of Pipe



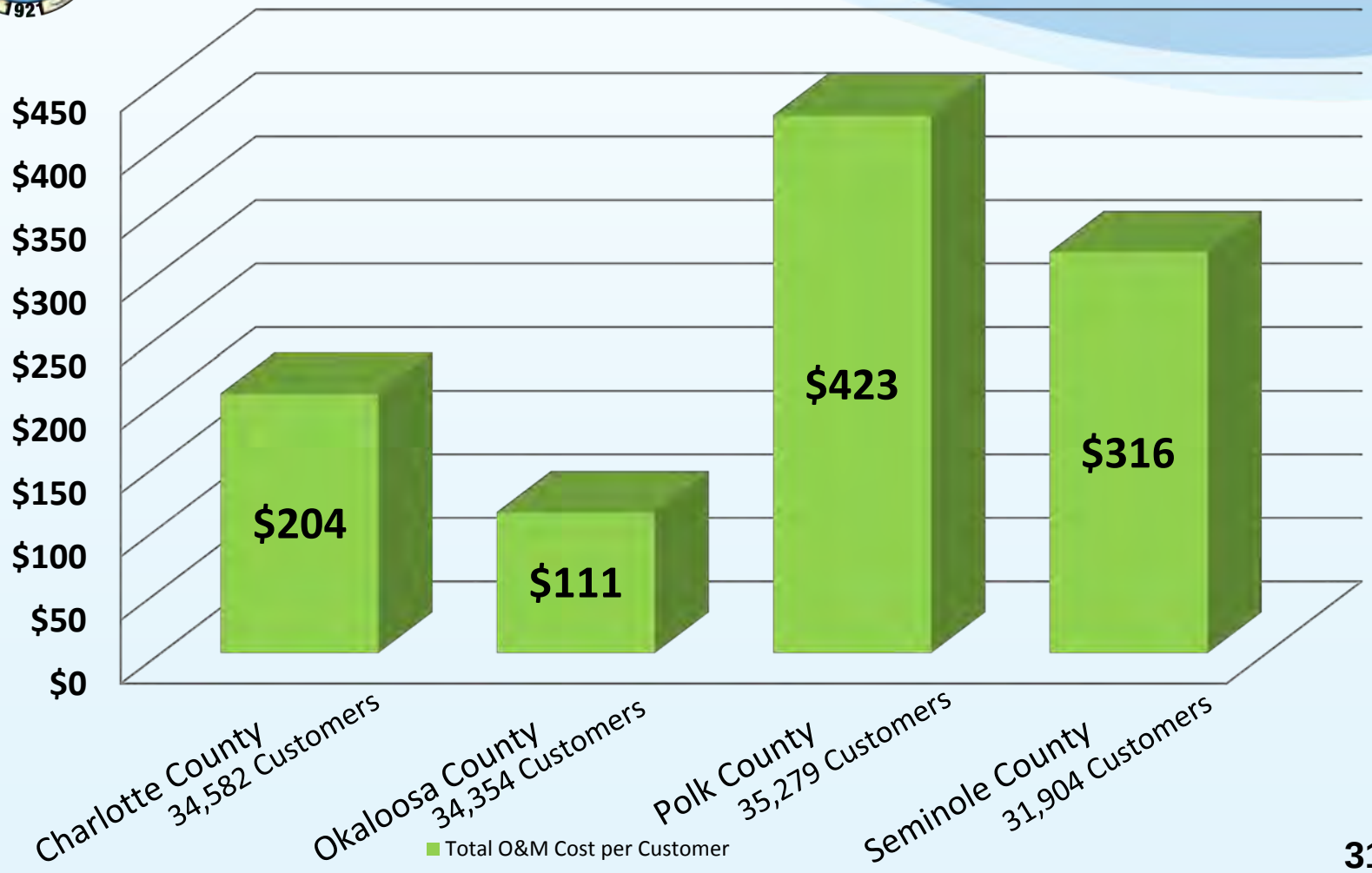
Source: Florida Benchmarking Consortium FY12/13 Annual Services Report

Sewer Service O&M Expenditure per Mile of Pipe



Source: Florida Benchmarking Consortium FY12/13 Annual Services Report

Sewer Service O&M Expenditures per Customer



Source: Florida Benchmarking Consortium FY12/13 Annual Services Report

Again ... Less is Not More!

- 37 customers per mile of pipe equates to fewer rate payers contributing to expenses
- Spending less money on O&M now adds more costs to R&R tomorrow
- Costs to repair the failure are more than just monetary challenges
  - Public Inconvenienced
  - FDEP notified
- **Tomorrow is Today!**

Past Pipeline Failures

Factors Leading to Failure

Factor	Description
Top Factors:	1. Aging – Over time an accumulation of physical and chemical stressors deteriorate material integrity 2. Original inferior pipe material
Physical Stressors	Soil loads, point loads (improper bedding), axial loads from soil movements, dig-ins
Chemical Stressors	Internal and external corrosion caused by factors such as aggressive water/soil, microbes, electrical currents, oxygen gradients and bi-metallic connections

Murdock Circle April 9, 2013

12” Water Main Break

Cost of Repair = $ 4,800

Paulson Drive Closed!
July 8, 2014

- Major water main break
- 12 Hour Repair
- Traffic signals disabled
- Repair Cost = $ 32,000
- Major Commercial Area
- Affected Customers: 13
  - 19000, 19020, 19100 Murdock Circle.
  - 1490, 1400, 1400A, 19010, 1370, 1340, 1360 Tamiami Trail.

Scotten Ave. February 23, 2015

Aging Pipe: Service Break

Cost of Repair = $ 1,600

Olean Blvd. March 23, 2015

4” valve broken off of a 12” water main

Cost of Repair = $ 4,500

Aging Force Main - Quesada Avenue

Original Construction Date: 1987
Replaced: July 2014
Repair Cost: $ 96,200

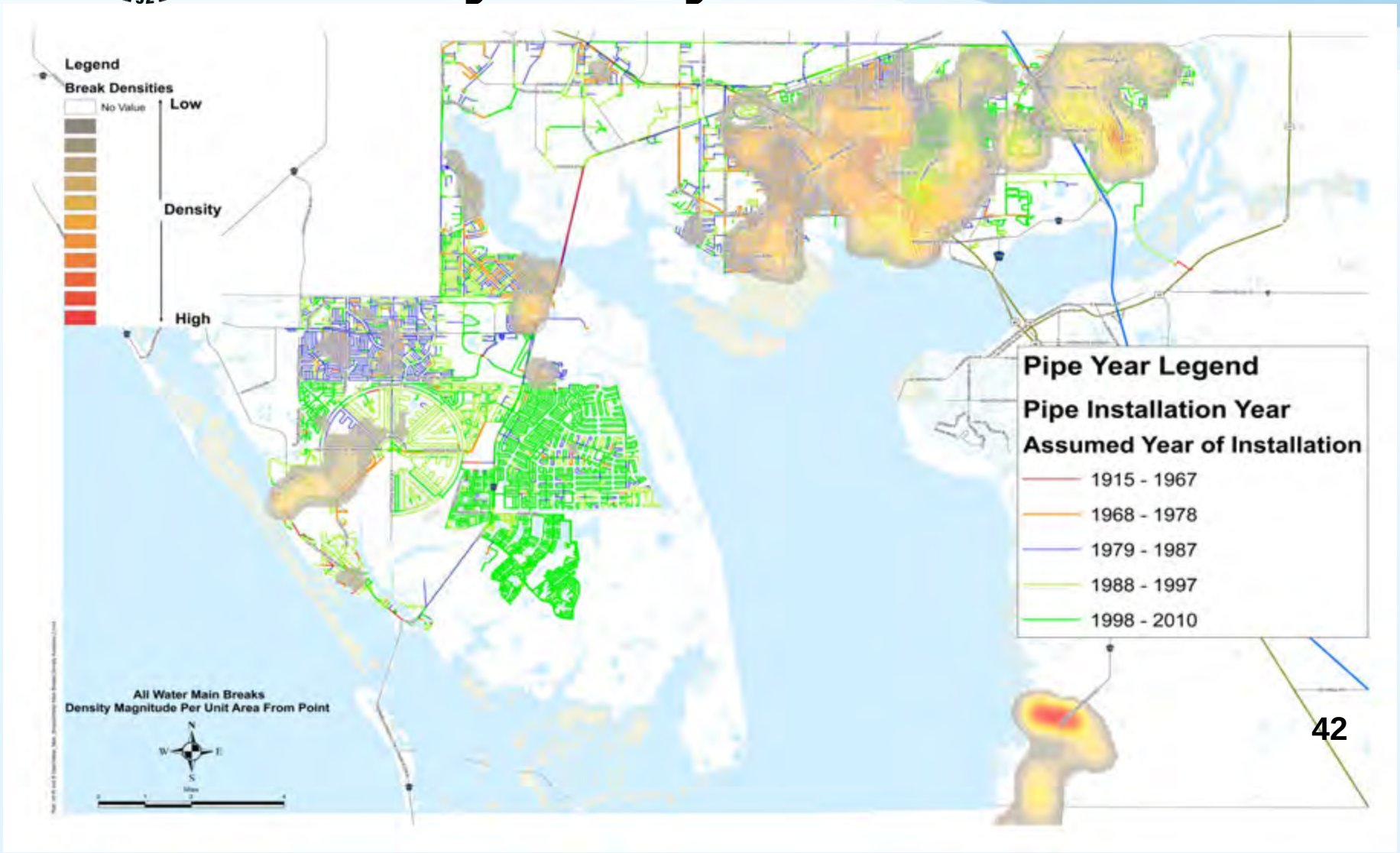
Due to Stressors, its lifetime was only 27 years

Questions - Discussion

What Do We Do Now?

- Identify Magnitude of Problem
- Develop Asset Management Plan
- Implement Program

Water Main Breaks: Density Analysis



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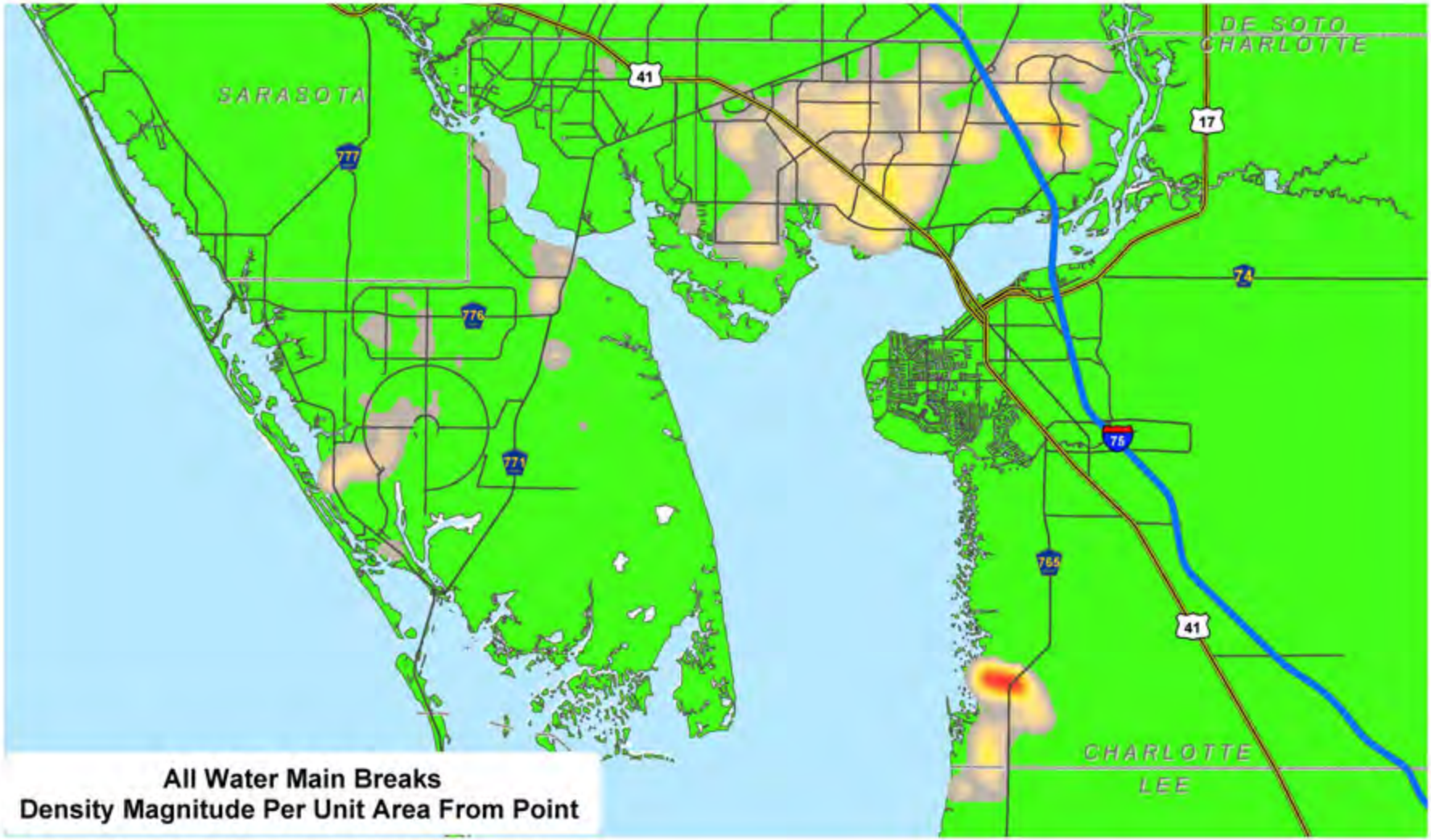
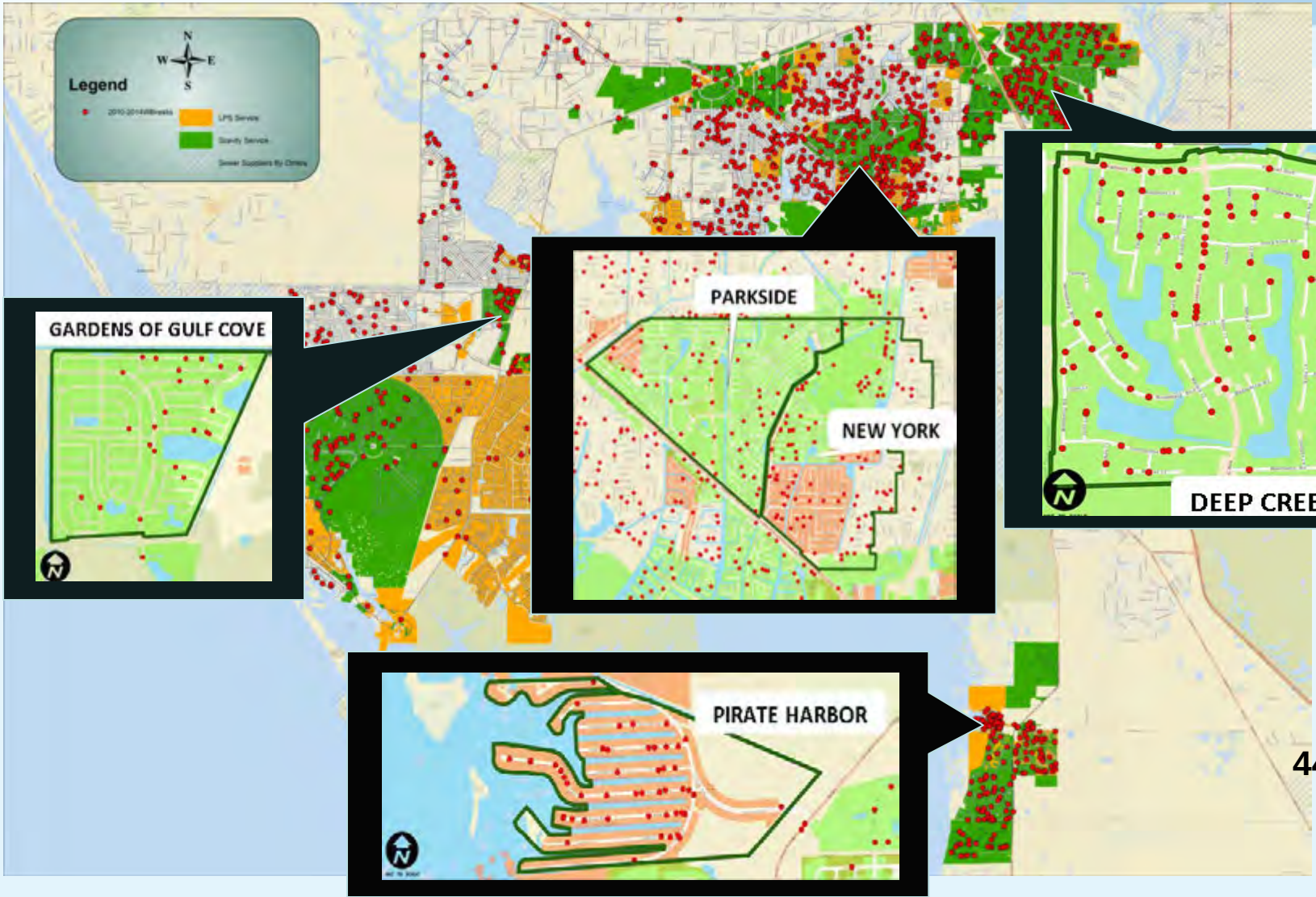
Water Main Breaks-Density Analysis

Utilities



Targeted R&R Locations



Estimated R&R Program Costs

Area	Miles of Water Main	Miles of Sewer/LPS Force Main	Miles of Gravity Sewer	OnSite LPS Sewer Systems	Number of Sewer Lift Stations	Total Rehabilitation Cost
Total County	**1,427**	**542**	**364**	**7,775**	**291**	**$1,583,754,432**
Industry Standard R&R Avg 1% annually	**14.3**	**5.4**	**3.6**	**78**	**3**	**$15,837,544**
Initial R&R Focus Areas (2017-2026)						
Deep Creek	11.7	2.9	11.1	0	8	$22,048,938
Gardens of Gulf Cove	10.7	0.5	9.7	0	1	$17,607,805
New York Section	33.9	17.8	8.8	828	10	$44,639,164
Parkside	36.3	4.6	31.4	142	8	$61,008,989
Pirate Harbor	4.5	0.0	0.0	0	0	$2,603,437
Misc. Lift Stations	0.0	0.0	0.0	0	12	$2,160,000
Subtotal	**74.8**	**22.4**	**40.2**	**970**	**39**	**$150,068,333**

R&R Staffing Needs

CCU Division	Additional Staffing to Support R&R Program	Fiscal Year
Construction	15	2016
Engineering	5	2017
Administrative Support	1	2017
Sewer Collection	6	2018
Water Distribution	6	2018
Total	33	

Proposed R&R Funding Options

- Annual Needs $15,800,000
  - Current annual budget $ 5,500,000
  - Balance needed $10,300,000

- Funding Options

  -Line Cost Recovery Fee

  -Increase Spending with Debt Service Reduction

  -Additional Budget Transfers

  -Future User Rate Increase

Line Cost Recovery Fee

- Presented to BCC May 2011 and January 2013
- Presently, owners of vacant properties adjacent to existing utility mains pay nothing for utilities
- Existing customers pay for the entire system costs including renewal and replacement
- Therefore, this program asks these owners of vacant property to assist existing customers to help offset the cost of this R&R program

Magnitude of Problem

- 1,427 miles water main
  - 48% occupied property (57,234 customers)
  - 52% vacant property (61,171 lots)

- 906 miles sewer main
  - 48% occupied property (34,910 customers)
  - 52% vacant property (37,557 lots)

R&R Program Phases

- Phase 1

  Engineering Design & CIP prioritization

- Phase 2

  Transfer East/West Spring Lake Construction crews to R&R

- Phase 3

  Increase R&R Capital Expenditures to $16 Million Annually as Revenues Increase & Debt Levels Decrease

American Water Works Association

"Restoring existing US Water systems as they reach the end of their useful lives and extending them to serve a growing population will cost at least 1 trillion during the next 25 years, if the US is to maintain its current level of water service"

(OPFLOW December 2014 www.AWWA.org/opflow)

American Water Works Association

"Delaying the investment may result in:

- Degrading water service
- Increasing water service disruptions
- Increasing expenditures for emergency repairs"

(OPFLOW December 2014 www.AWWA.org/opflow)

Rebuilding Today for a Better Tomorrow

By adopting such practices, water service providers can save ourselves and our communities money in the long run, while protecting water resources and generating economic growth.

Upon Board Conceptual Approval …

- Develop Detailed R&R Projects Financial Plan
- Develop Detailed R&R Staffing Plan
- Define $8 to $10 Million Annual Capital Projects in Initial R&R Target Areas Until $16 Million Annual R&R Funding is Available
- Develop a Detailed Priority & Scheduling Program for the next 20 Years
- Create an Annual Living Document Updating R&R Needs

Questions - Discussion

Master Planning

Infrastructure Overview

Planning Process Overview

- Utility has prepared components of master planning documents over the past several years
- Utility has been working with engineering consultants to complete targeted studies utilizing hydraulic modeling software
- Engineering consultant will compile previously prepared documentation and complete remaining work activities resulting in final master planning documents

Planning Process Overview

- Master Plan recommends capital improvements that are necessary to provide safe, sufficient and reliable service to the customers and meet federal, state and local regulatory requirements.
- Master Plan guides the scheduling, scope, and cost of capital improvements.
- Master Plan offers the public an overview of existing utilities and future service availability.

Master Plan Components

Evaluation of the following:

- Existing System
- Customer and Demand Projections
- Water Source
- Treatment Facilities
- Pumping, Storage and Distribution/Collection System
- System Expansion
- Consolidation of Private Utilities
- Financial & Funding (Rate Study)
- Policy Decisions

Water System Planning - Status

- Past, Present and Future Presentation – 2013
- Hydraulic modeling assistance to support planning activities – 2013 to present
- Master Layout of Transmission System – Complete
- Plant Expansion and Water Supply Program – In Progress
- Prepare RFP for Consultant – October 2016
- Issue Consultant Contract – January 2017
- Final Water Master Plan – December 2017

Sewer System Planning - Status

- Past, Present and Future Presentation – 2013
- Hydraulic modeling assistance to support planning activities – 2014 to present
- Master Layout of Transmission System and Cost Estimates – Completed
- Plant Expansion Program - Defined
- Prepare RFP for Consultant – November 2015
- Issue Consultant Contract – February 2016
- Final Sewer Master Plan – December 2016

Reclaimed Water System Planning-Status

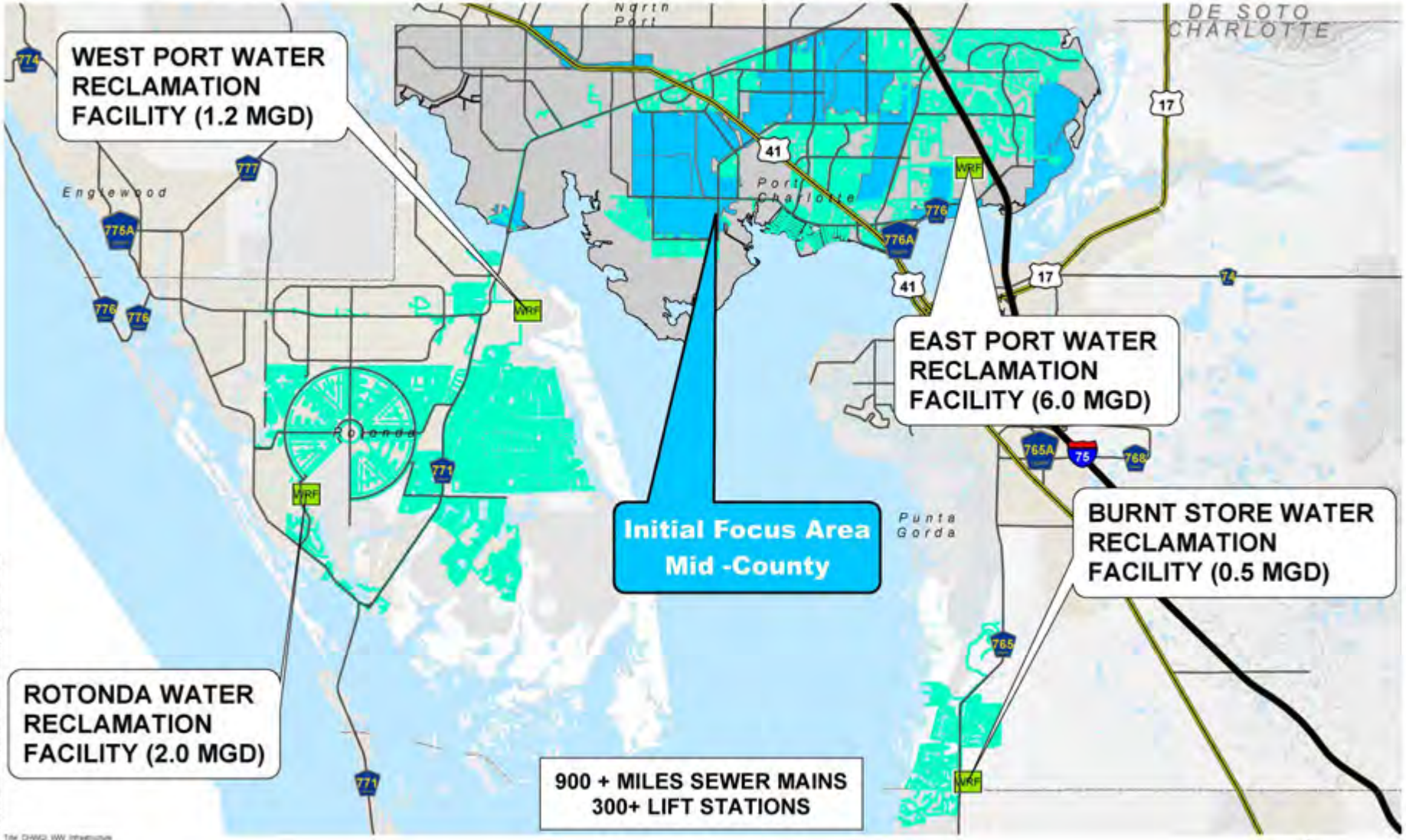
- Past, Present and Future Presentation – 2013
- SWFWMD Grants Ongoing – 2007 to present
- Master Permit Interconnecting Mid-County and West County - 2014
- Hydraulic modeling assistance to support planning activities - 2015
- Prepare RFP for Consultant – October 2016
- Issue Consultant Contract – January 2017
- Final Master Plan – December 2017

Financial Master Plan – Status

- CIP Analyst (internal financial oversight) – July 2015
- Rate consultant began 20 year financial plan – July 2015 to include
  - Revenue Projections
  - CIP Expenses
  - R&R Program Expenses
  - Staffing Needs/Expenses
  - O&M Expenses
  - System Debt Service
- 20 year Financial Plan Complete - January 2016

CHARLOTTE COUNTY

Existing Wastewater Infrastructure



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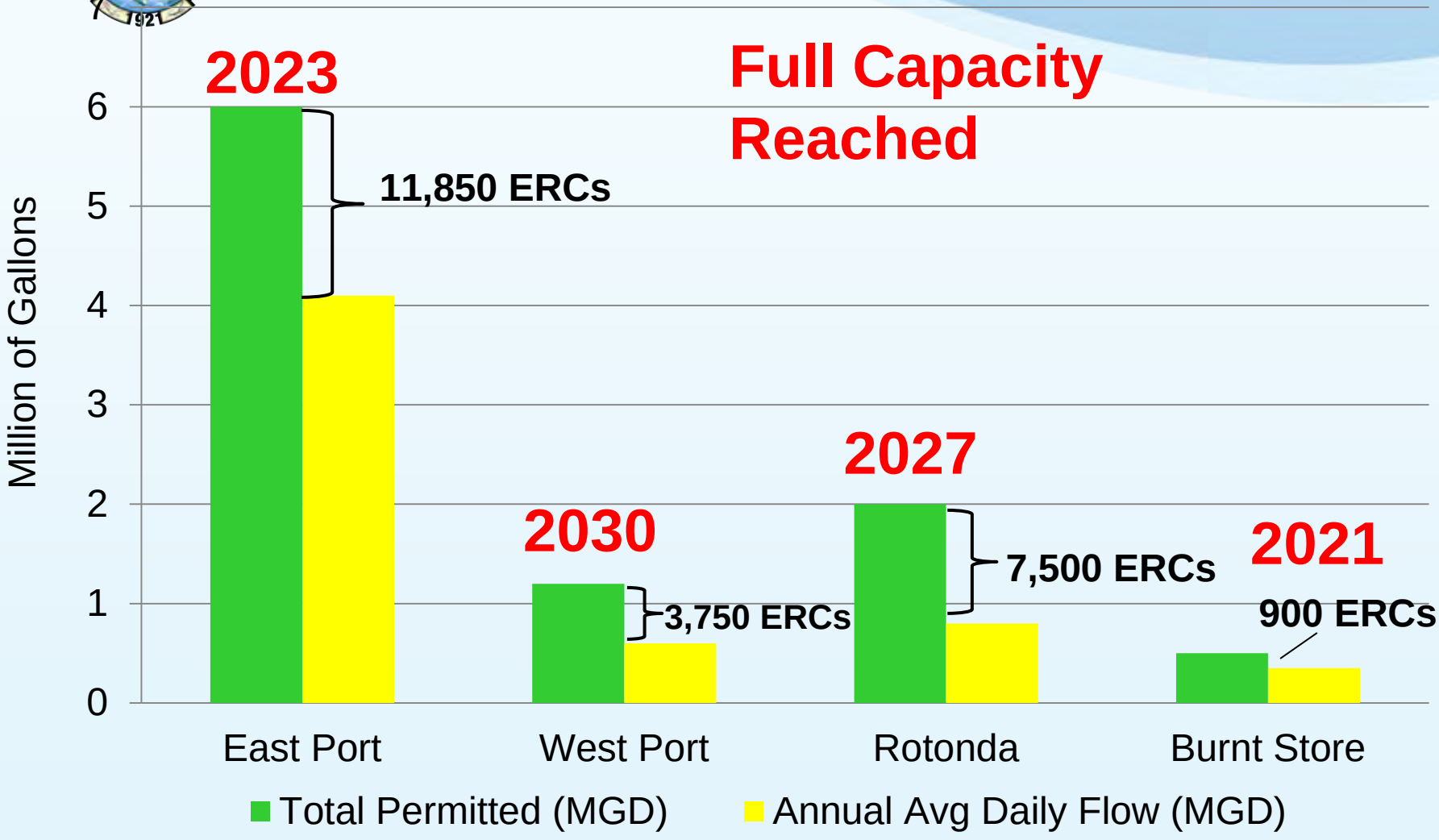
Domestic Wastewater Treatment Facilities

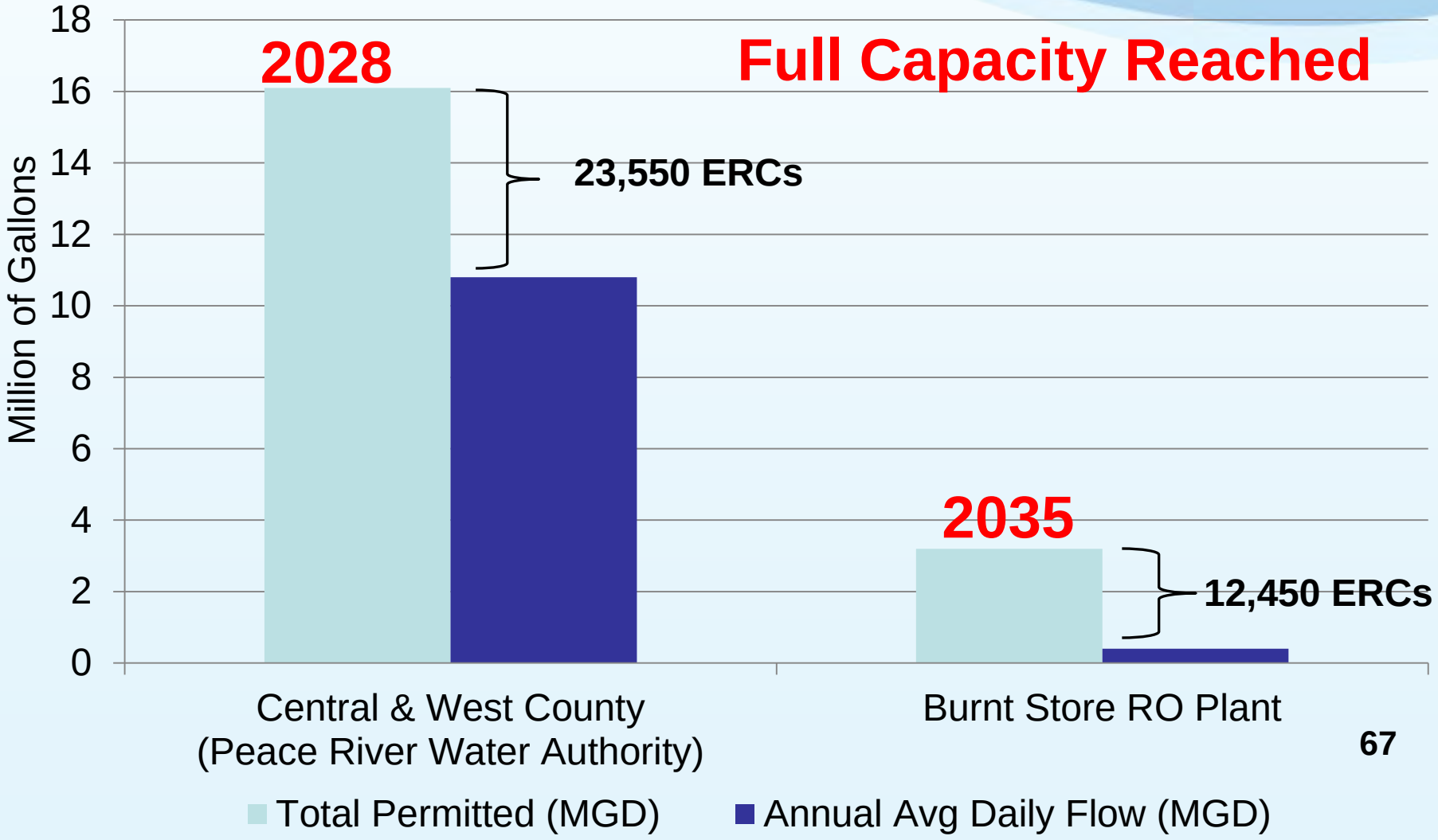
Available Sewer Capacity

Equivalent Residential Connection (ERC)



Available Potable Water Capacity

Equivalent Residential Connection (ERC)



Questions - Discussion

Blue Water Strategy: Onsite System vs Central Sewer

- Onsite systems were originally designed for larger residential lots in sparsely populated areas where centralized, municipal sewer treatment systems did not exist.
- Onsite systems have been allowed to expand into areas not suitable for this type of treatment and disposal of sewage.

Blue Water Strategy: Onsite System vs Central Sewer

- High water tables, sandy soil conditions, increased housing density and proximity to water bodies present significant obstacles to the effective operation of traditional onsite systems.
- Onsite systems also limit the useable space of your yard for landscaping, play equipment, building expansion, pool, etc.
- Central sewer overcomes all of these obstacles.

Ecological Insight

- **Brian E. Lapointe, Ph.D.**
  - Research Professor Florida Atlantic University
- Research Focus Areas include algal physiology and biochemistry, seagrass and coral reef ecology, eutrophication, marine bio-invasions and marine conservation
- Extensive experience in water quality research in South Florida and the Caribbean region
- Has amassed valuable field experience in assessing relations between water quality and the health of tropical seagrasses and coral reefs
- Instrumental in providing research that led to strong phosphate ban and new state regulations for greater nutrient removal from sewage effluent for Monroe County
- Was the first to demonstrate the importance of agricultural nitrogen from mainland sources to development of algal blooms in the Keys.

Sewer Master Plan

Mid-County Expansion Program

- 10 Year Sewer Expansion Program
- Multiple Project Areas Proposed
  - Phase 2
  - US 41
  - Harborview
  - El Jobean
  - Harbor Heights
- Connection of 15,600+ existing homes

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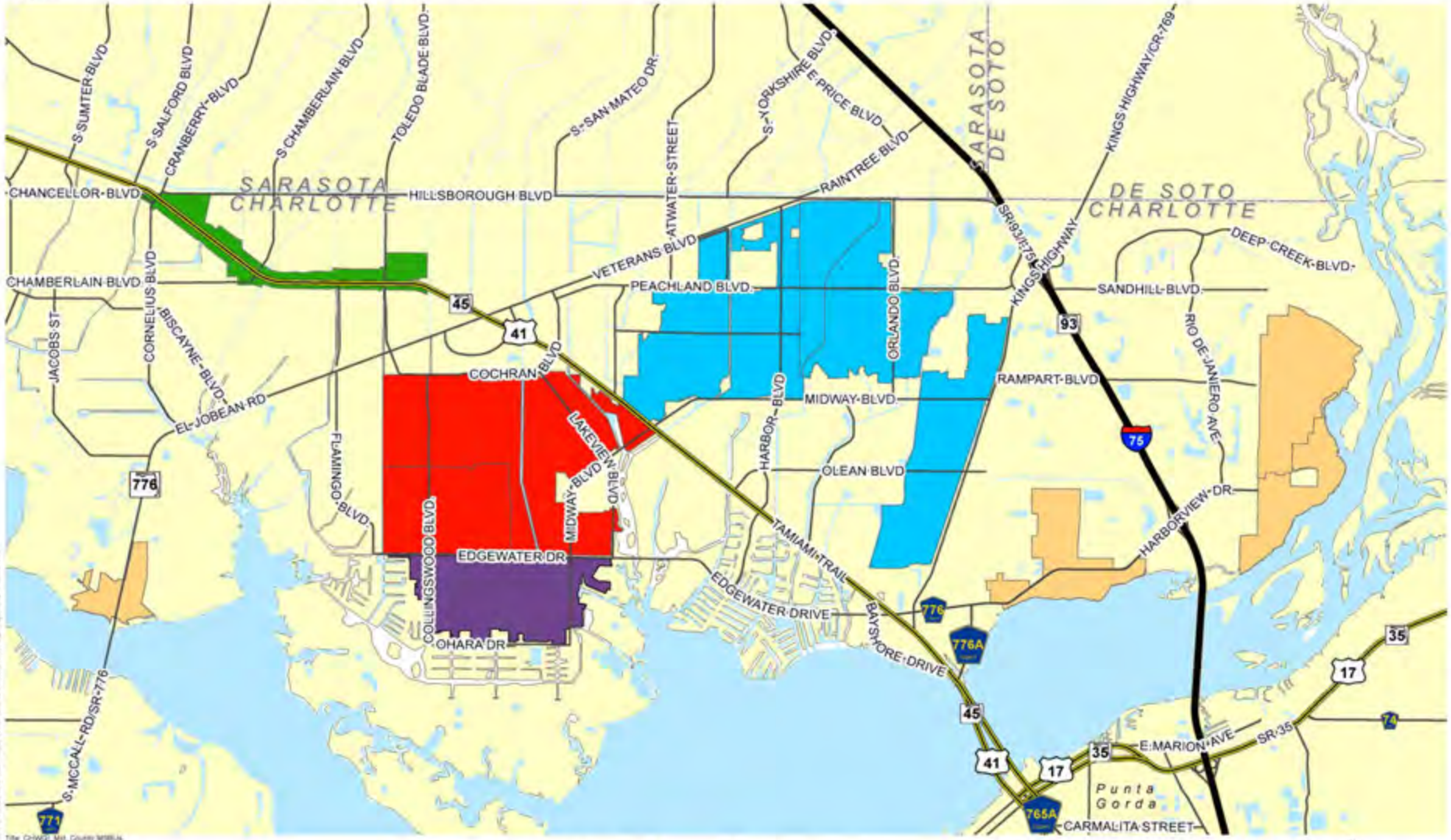
Mid-County MSBU Boundaries



East MSBUs

West MSBUs

Phase 2 MSBU

US 41 Corridor

El Jobean, Harbor View & Harbor Heights

Miles

1 0.5 0 1

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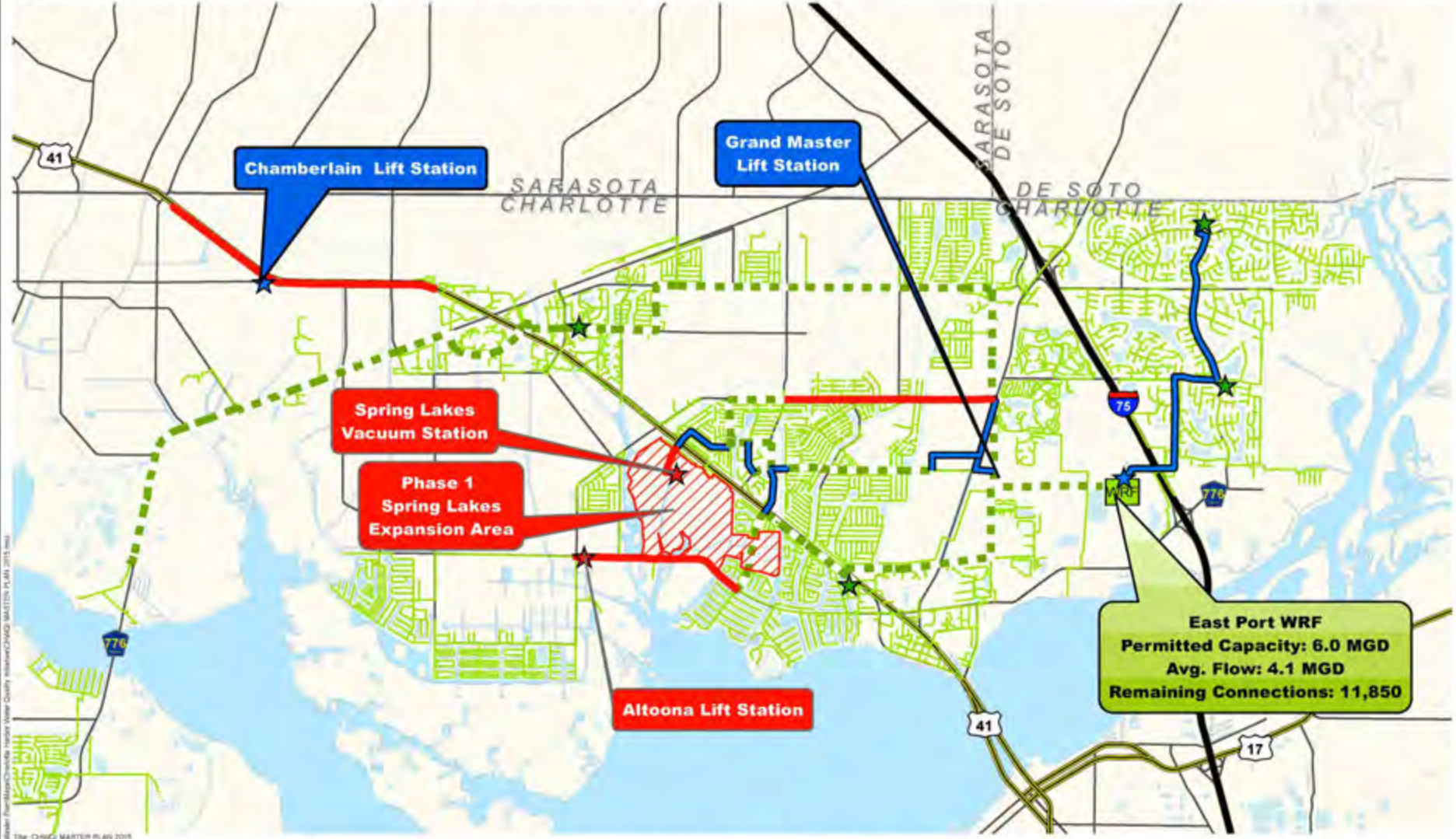
Charlotte Harbor Water Quality Initiative-Existing Infrastructure

CHARLOTTE COUNTY

Charlotte Harbor Water Quality Initiative 2015



Existing or Completed Lift Stations

Lift Station Under Construction

Lift Station Design Stage

Existing Transmission Facilities

Transmission Facilities Under Construction

Transmission Facilities in Design

Under Construction

Miles

1 0.5 0 1

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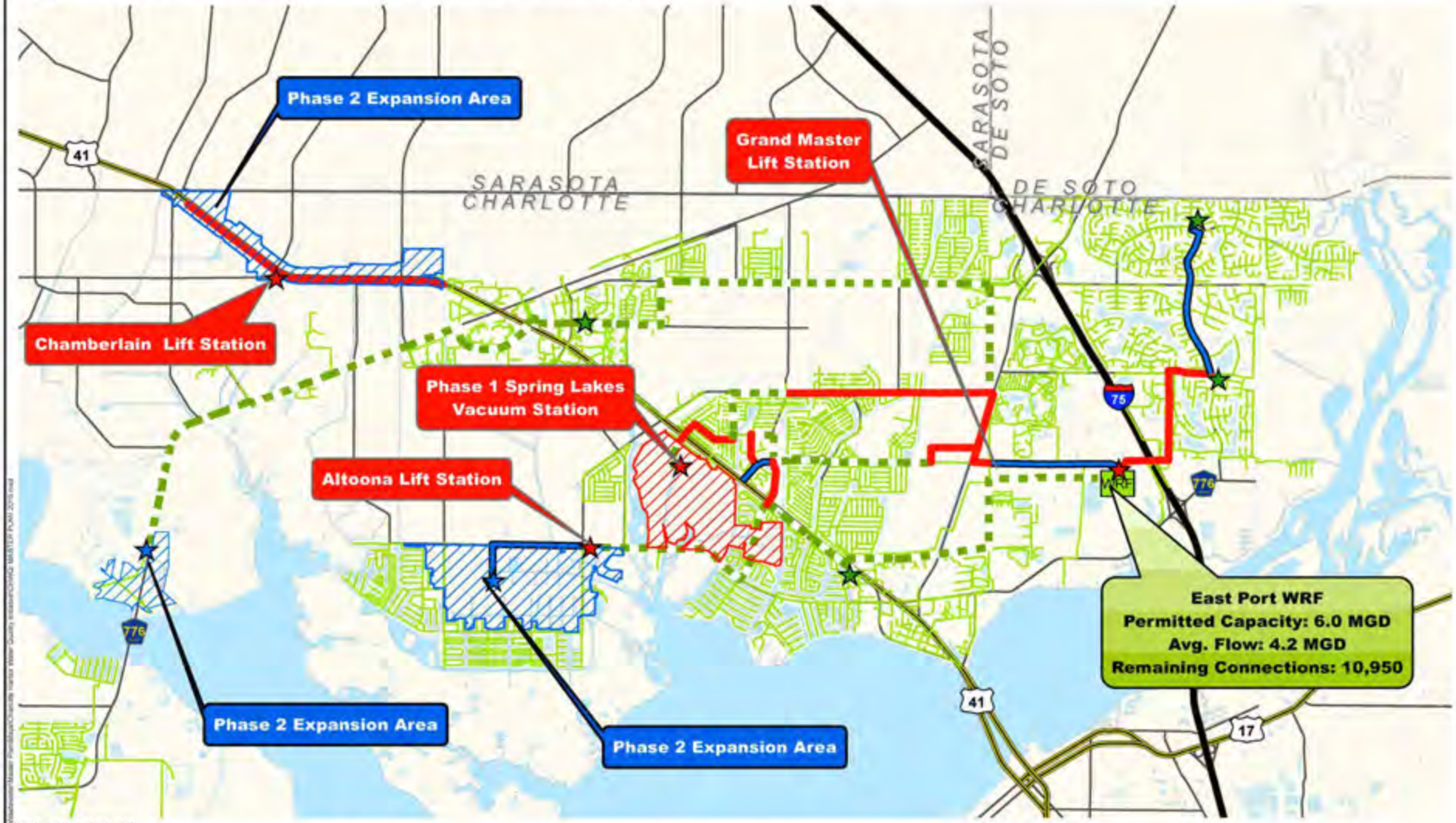
Charlotte Harbor Water Quality Initiative 2016



Existing or Completed Lift Stations
Lift Station Under Construction
Lift Station Design Stage
Existing Transmission Facilities
Transmission Facilities Under Construction
Transmission Facilities In Design
Existing Sanitary System
Under Construction
Design Phase

Miles
1 0.5 0 1

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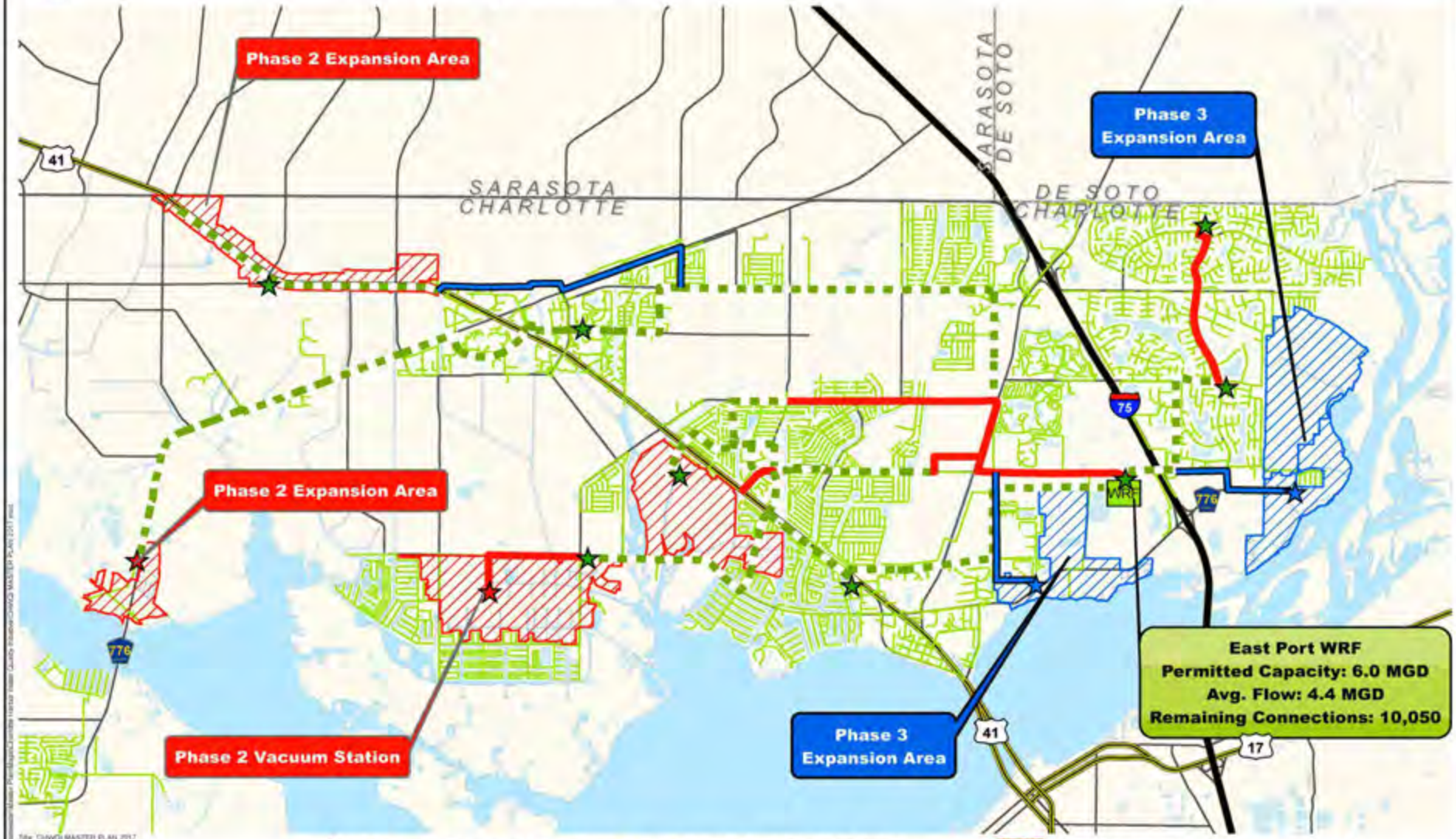
Charlotte Harbor Water Quality Initiative 2017



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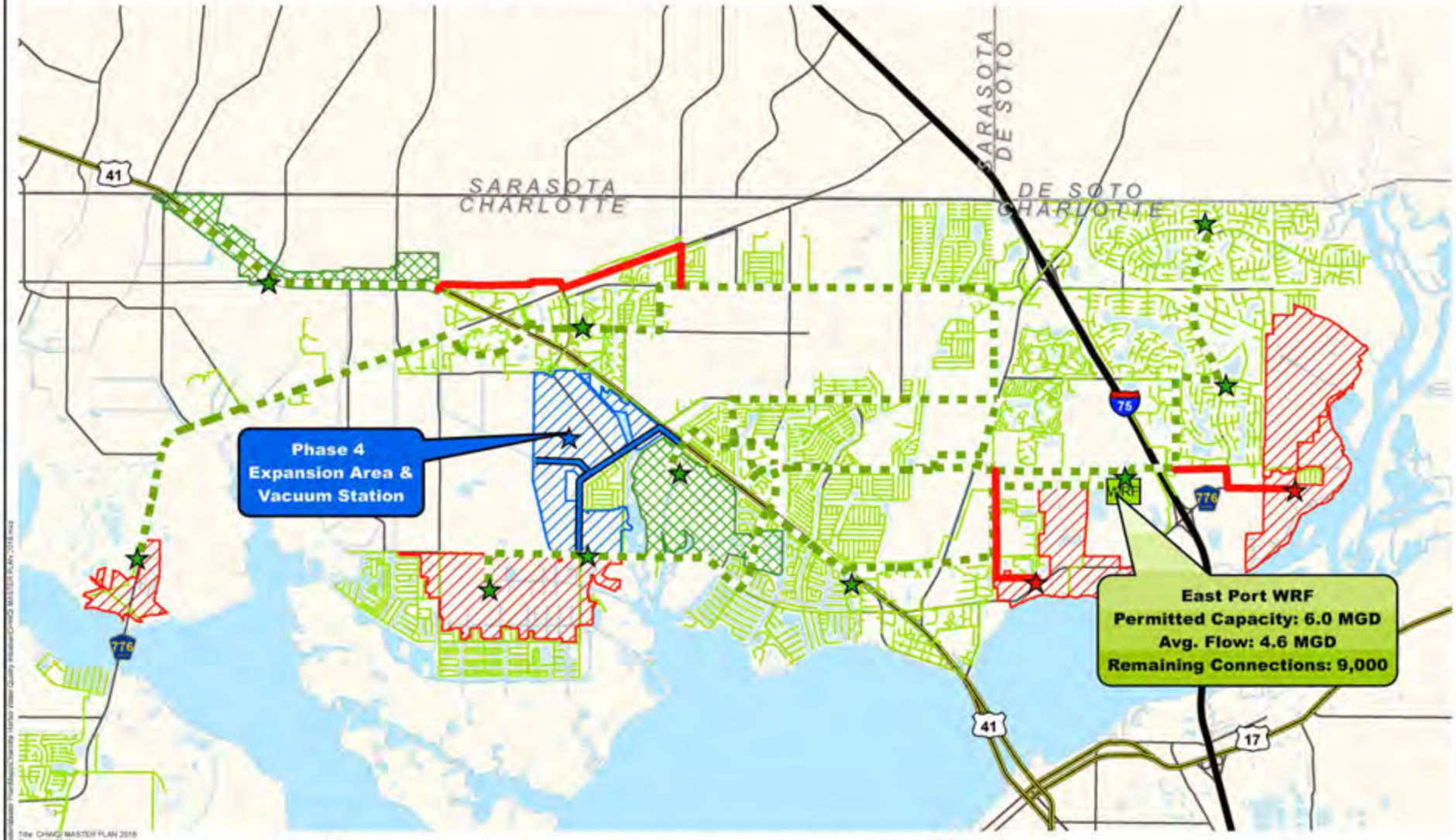
Charlotte Harbor Water Quality Initiative 2018



Completed Construction

Lift Station Under Construction

Design Phase

Existing Transmission Facilities

Transmission Facilities Under Construction

Transmission Facilities In Design

Existing Sanitary System

Completed Construction

Construction Phase

Design Phase

Miles

1 0.5 0 1

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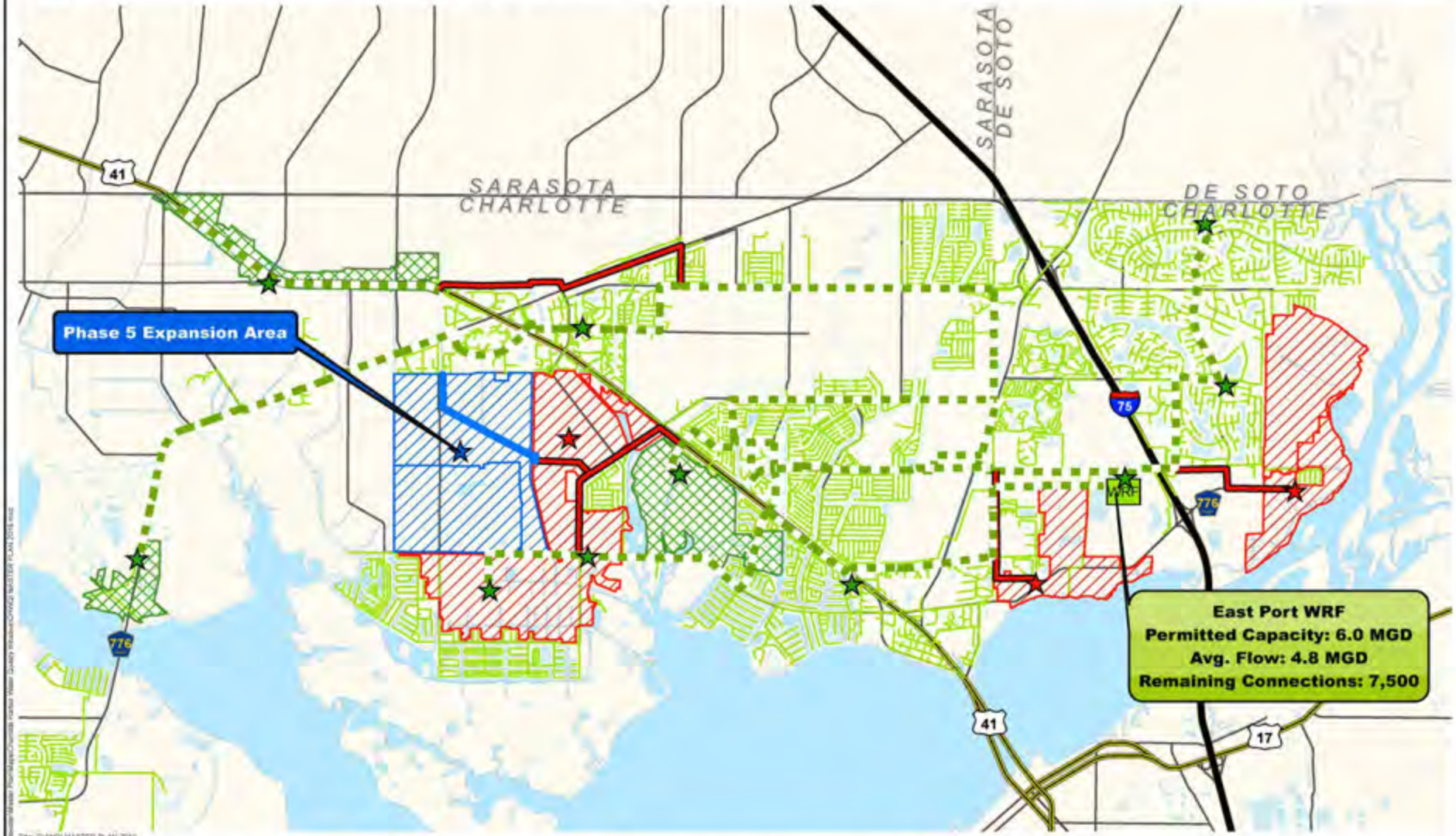
Charlotte Harbor Water Quality Initiative 2019



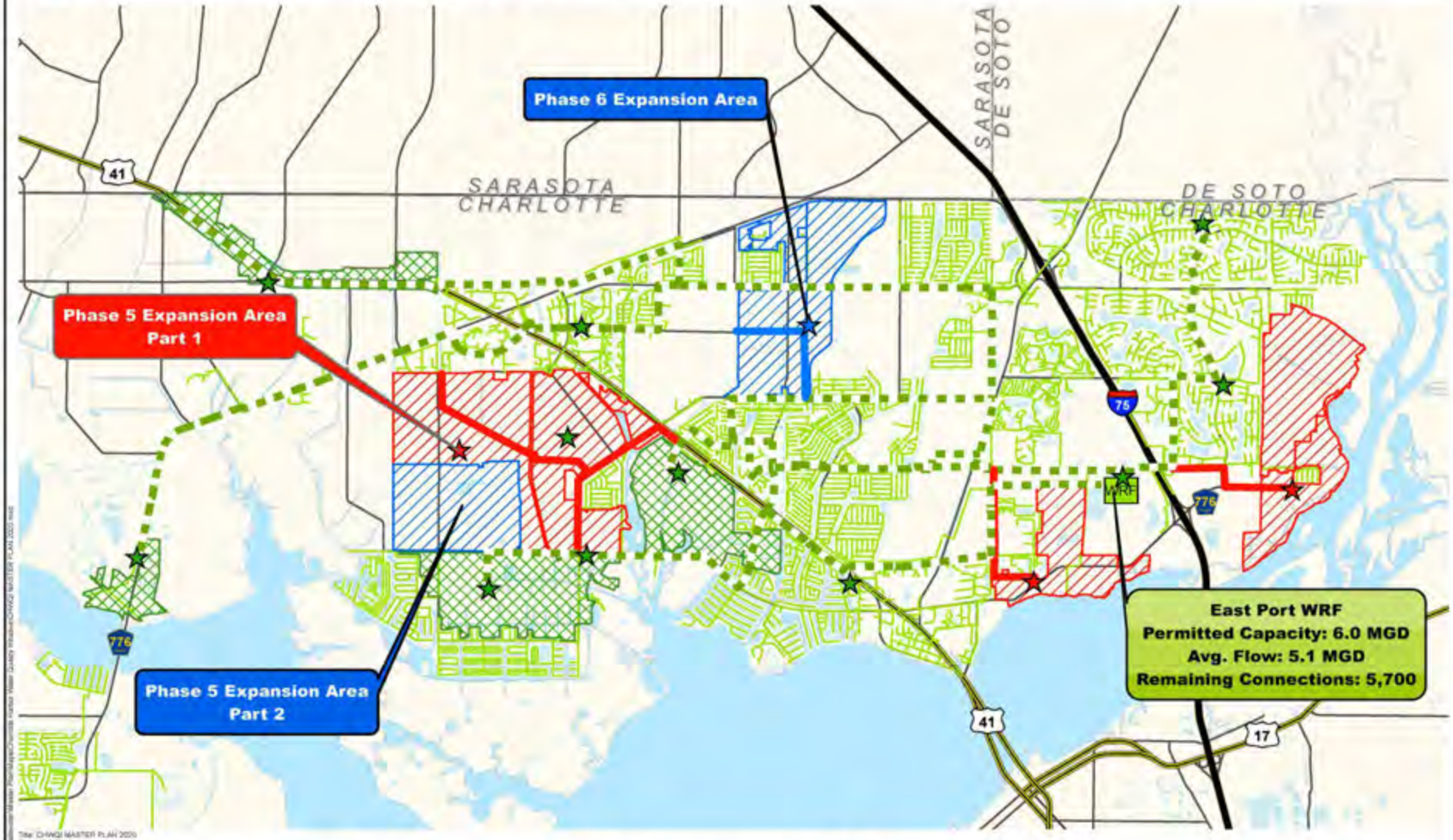
Existing or Completed Lift Stations
Lift Station Under Construction
Lift Station Design Stage
Existing Transmission Facilities
Transmission Facilities Under Construction
Transmission Facilities In Design
Existing Sanitary System
Completed Construction
Construction Phase
Design Phase

Miles
1 0.5 0 1

Questions - Discussion

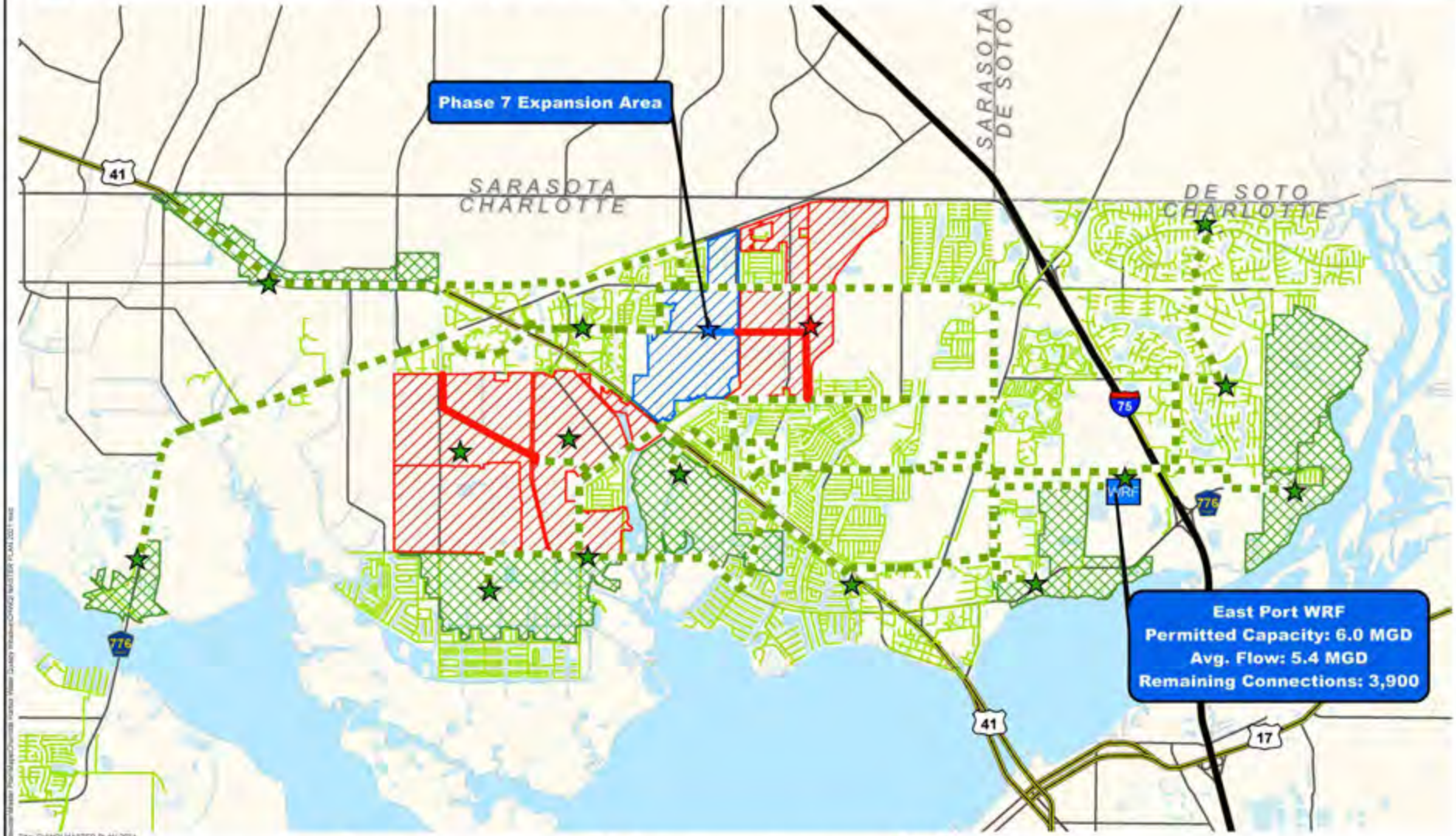
CHARLOTTE COUNTY

Charlotte Harbor Water Quality Initiative 2020



CHARLOTTE COUNTY

Charlotte Harbor Water Quality Initiative 2021

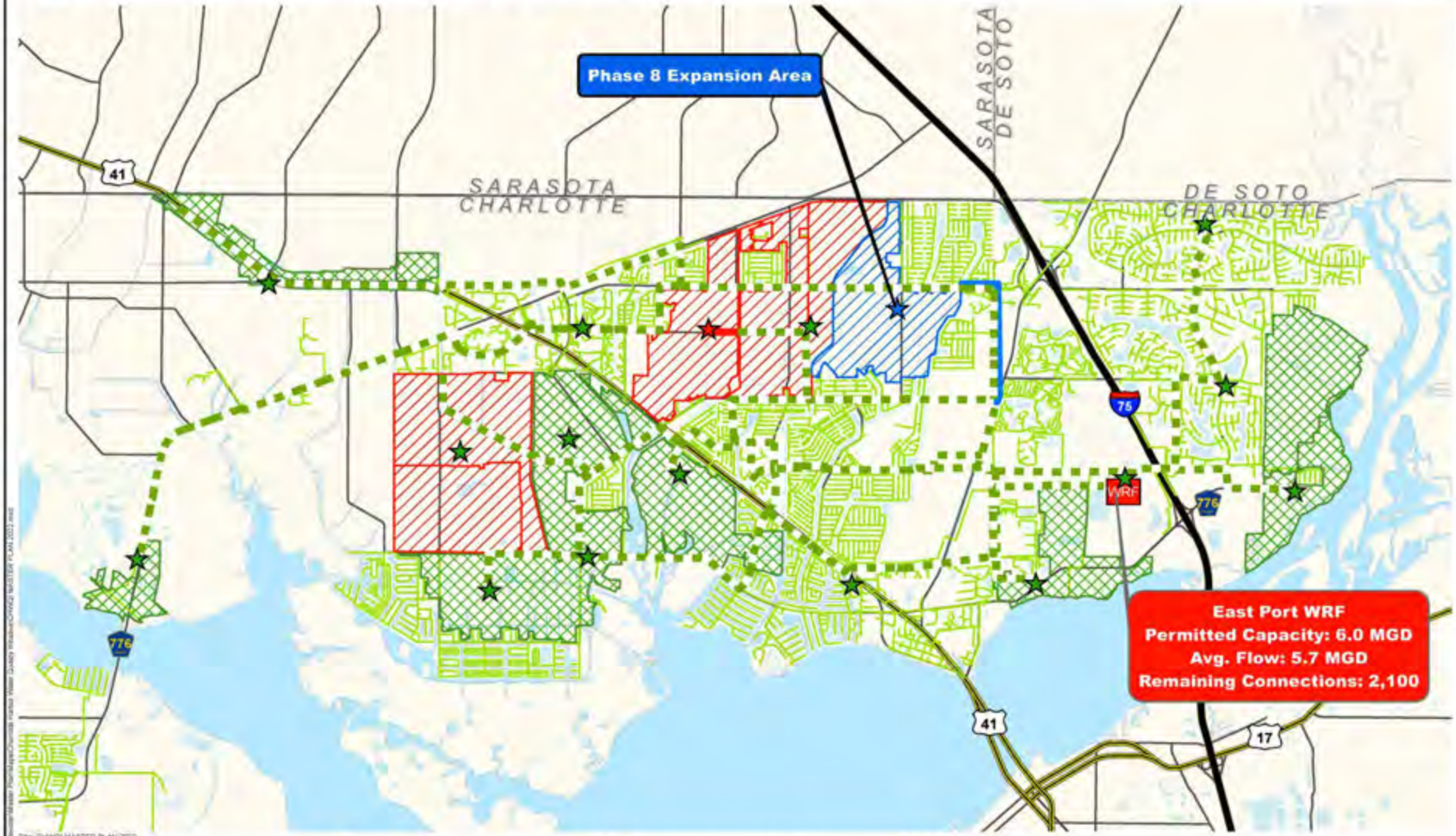


Existing or Completed Lift Stations
Lift Station Under Construction
Lift Station Design Stage
Existing Transmission Facilities
Transmission Facilities Under Construction
Transmission Facilities In Design
Existing Sanitary System
Completed Construction
Construction Phase
Design Phase
WRF Treatment Plant Upgrade Design

Miles
1 0.5 0 1

CHARLOTTE COUNTY

Charlotte Harbor Water Quality Initiative 2022

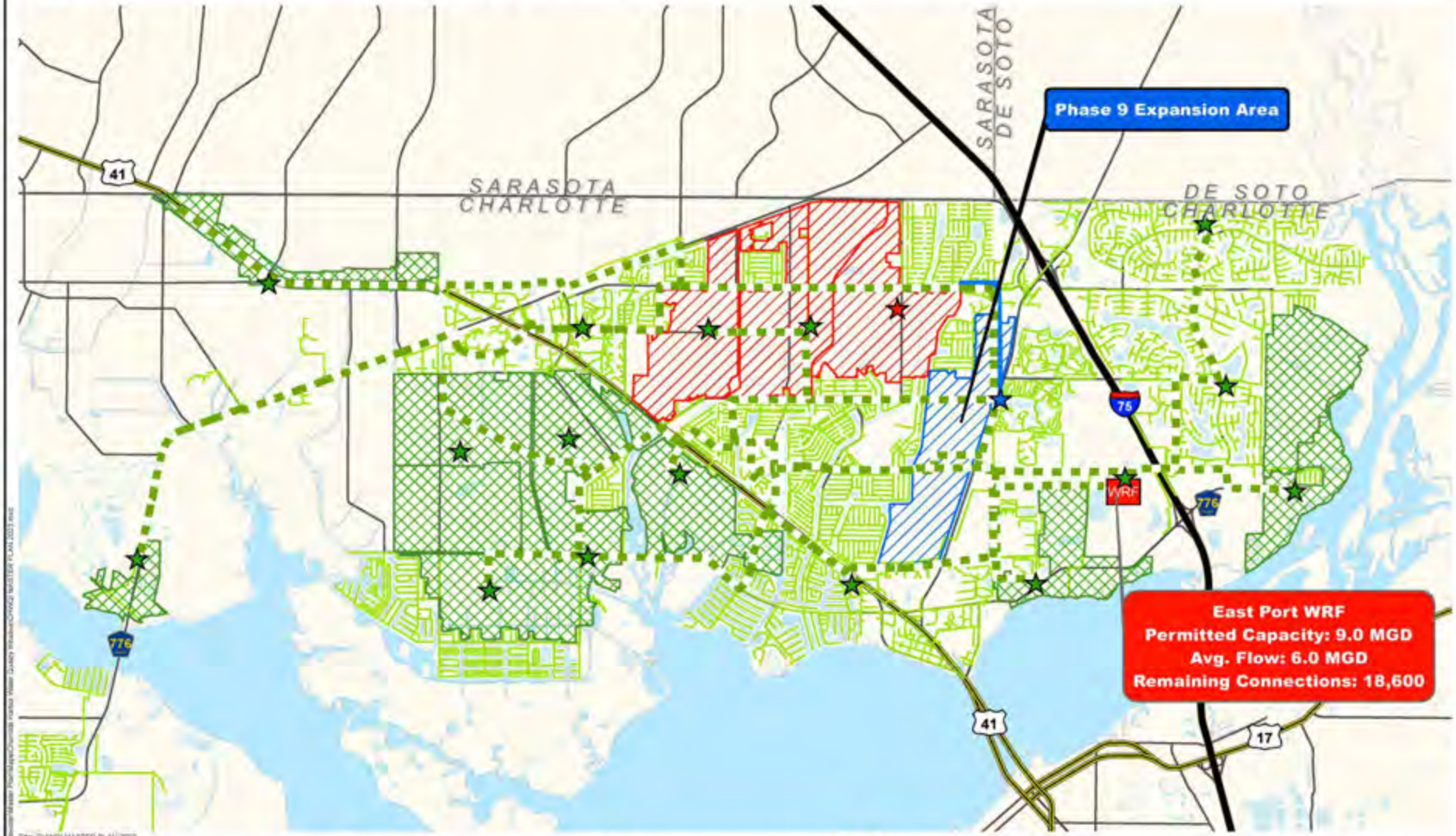


Existing or Completed Lift Stations
Lift Station Under Construction
Lift Station Design Stage
Existing Transmission Facilities
Transmission Facilities Under Construction
Transmission Facilities In Design
Existing Sanitary System
Completed Construction
Construction Phase
Design Phase
WRF Treatment Plant Upgrade Design

Miles
1 0.5 0 1

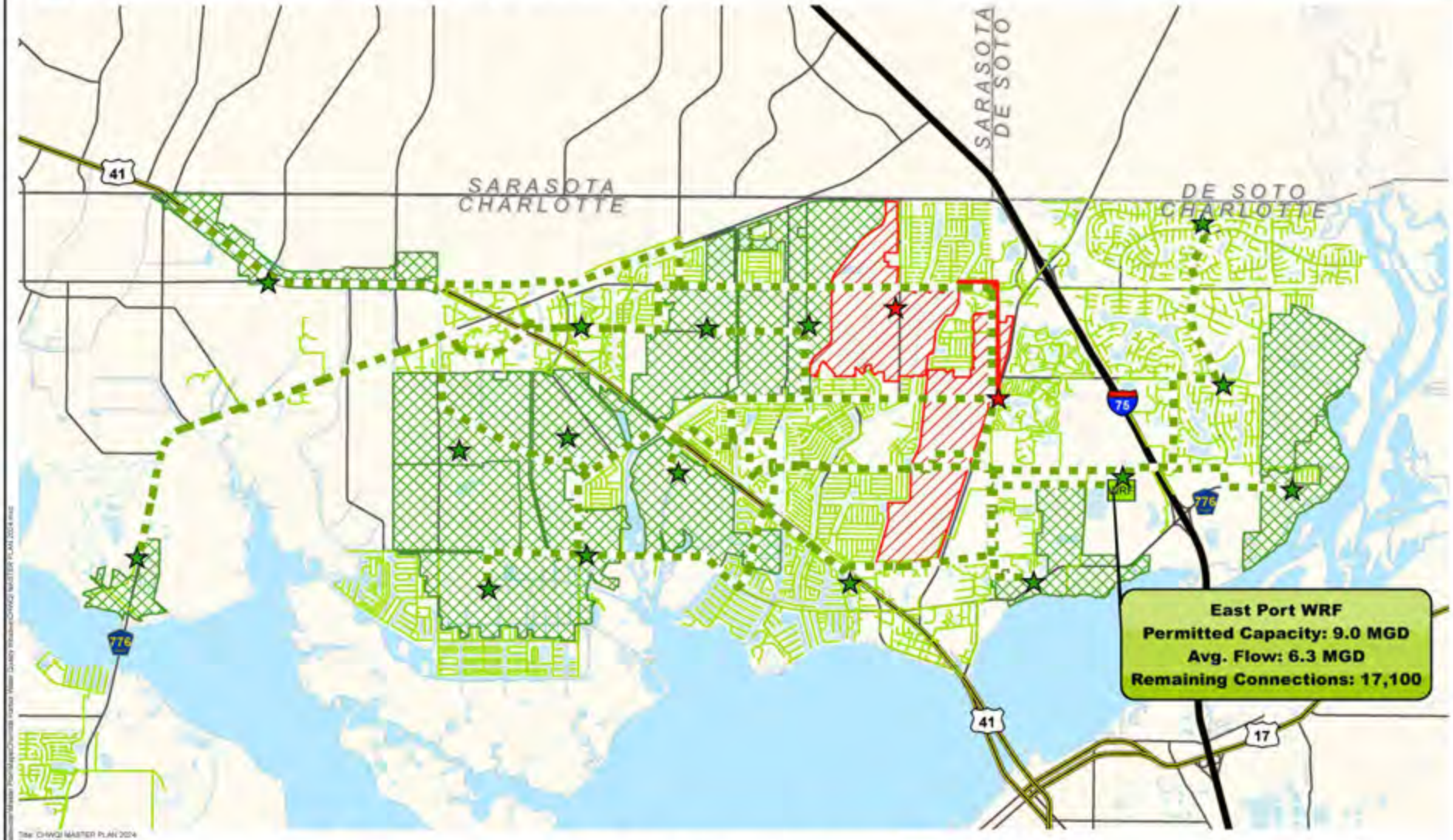
CHARLOTTE COUNTY

Charlotte Harbor Water Quality Initiative 2023



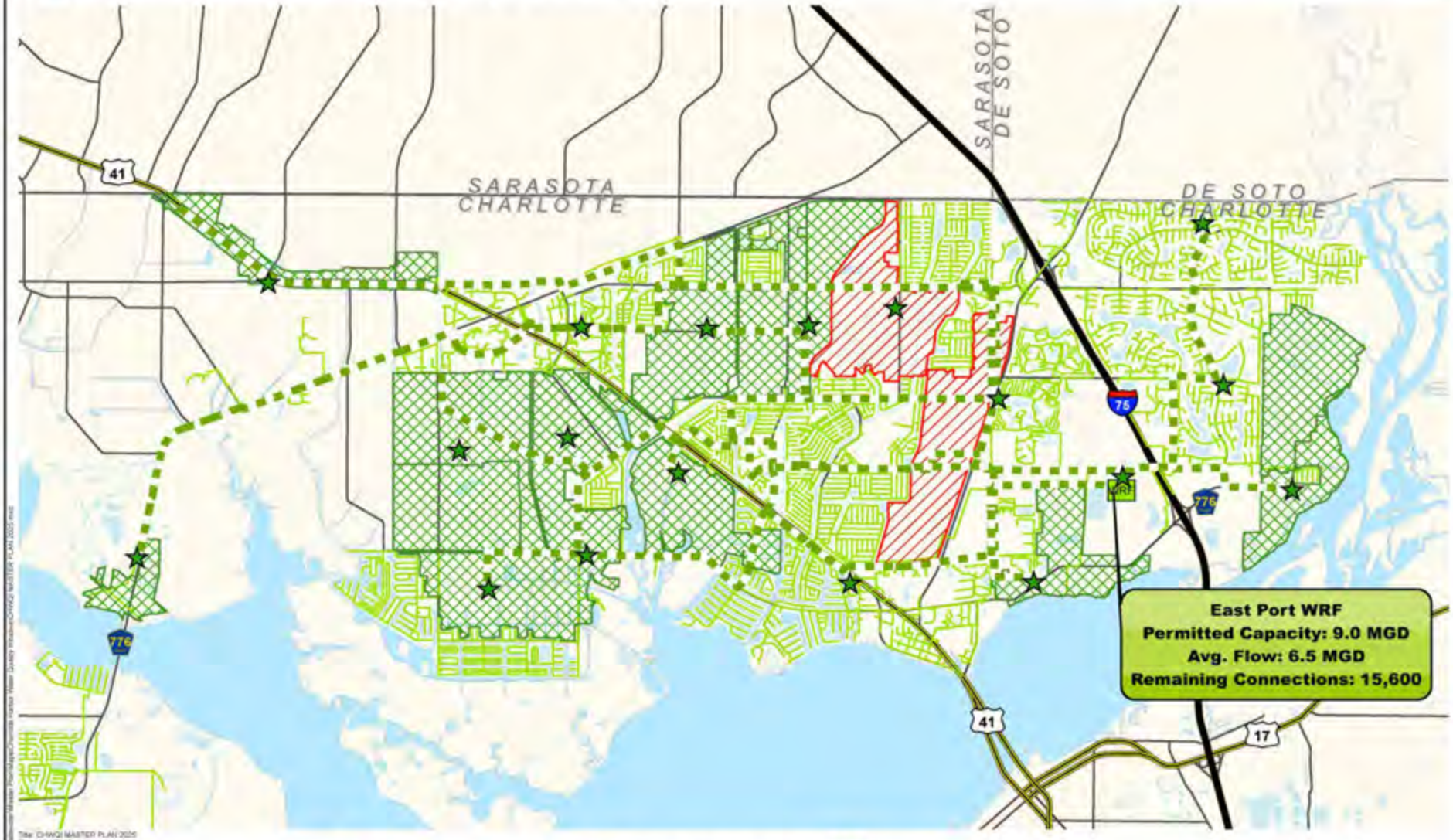
CHARLOTTE COUNTY

Charlotte Harbor Water Quality Initiative 2024



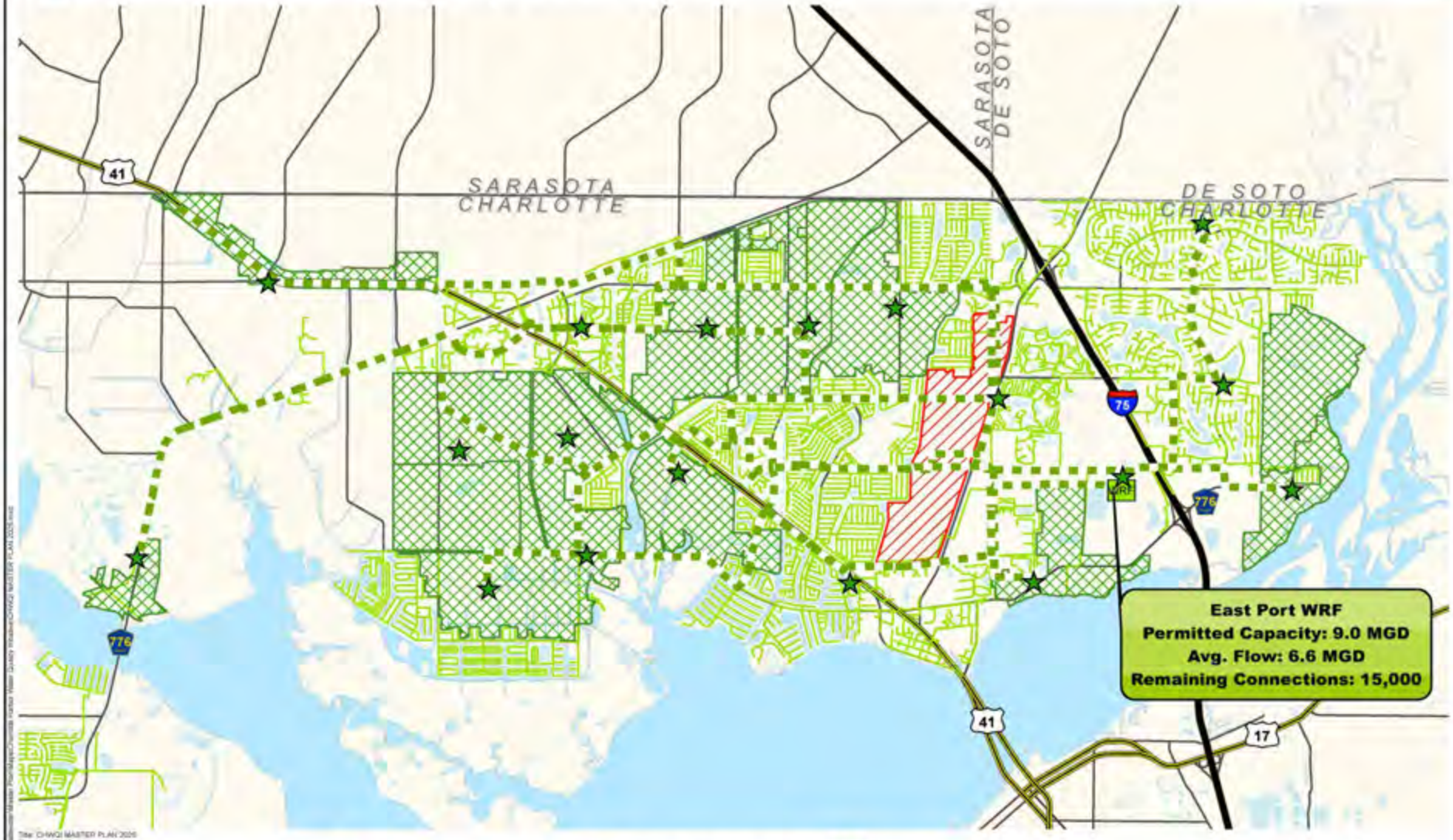
CHARLOTTE COUNTY

Charlotte Harbor Water Quality Initiative 2025



CHARLOTTE COUNTY

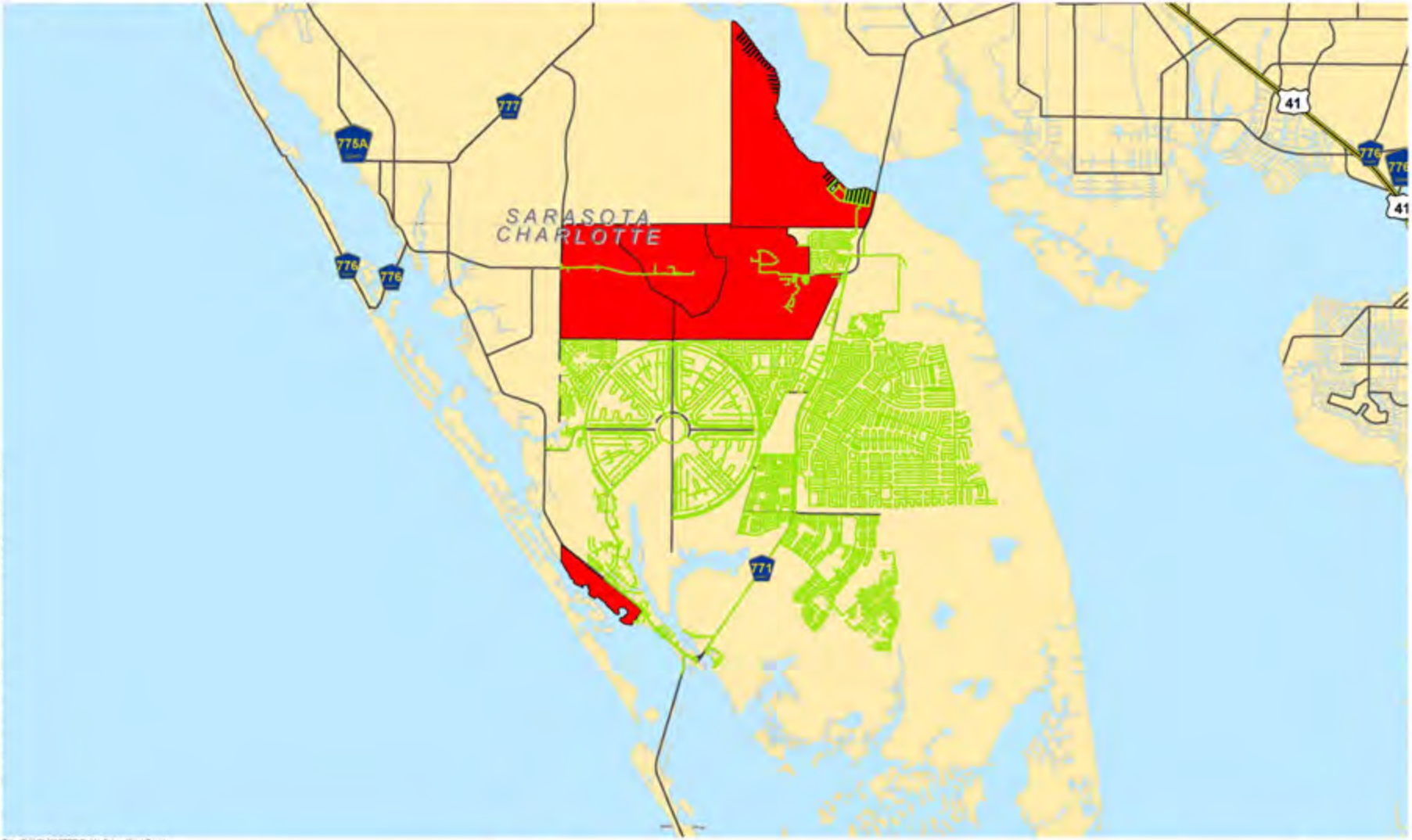
Charlotte Harbor Water Quality Initiative 2026



Charlotte County Government

CHARLOTTE COUNTY

West County-Charlotte Harbor Water Quality Initiative 2024-2030



Future Expansion Areas

Existing Sanitary Mains

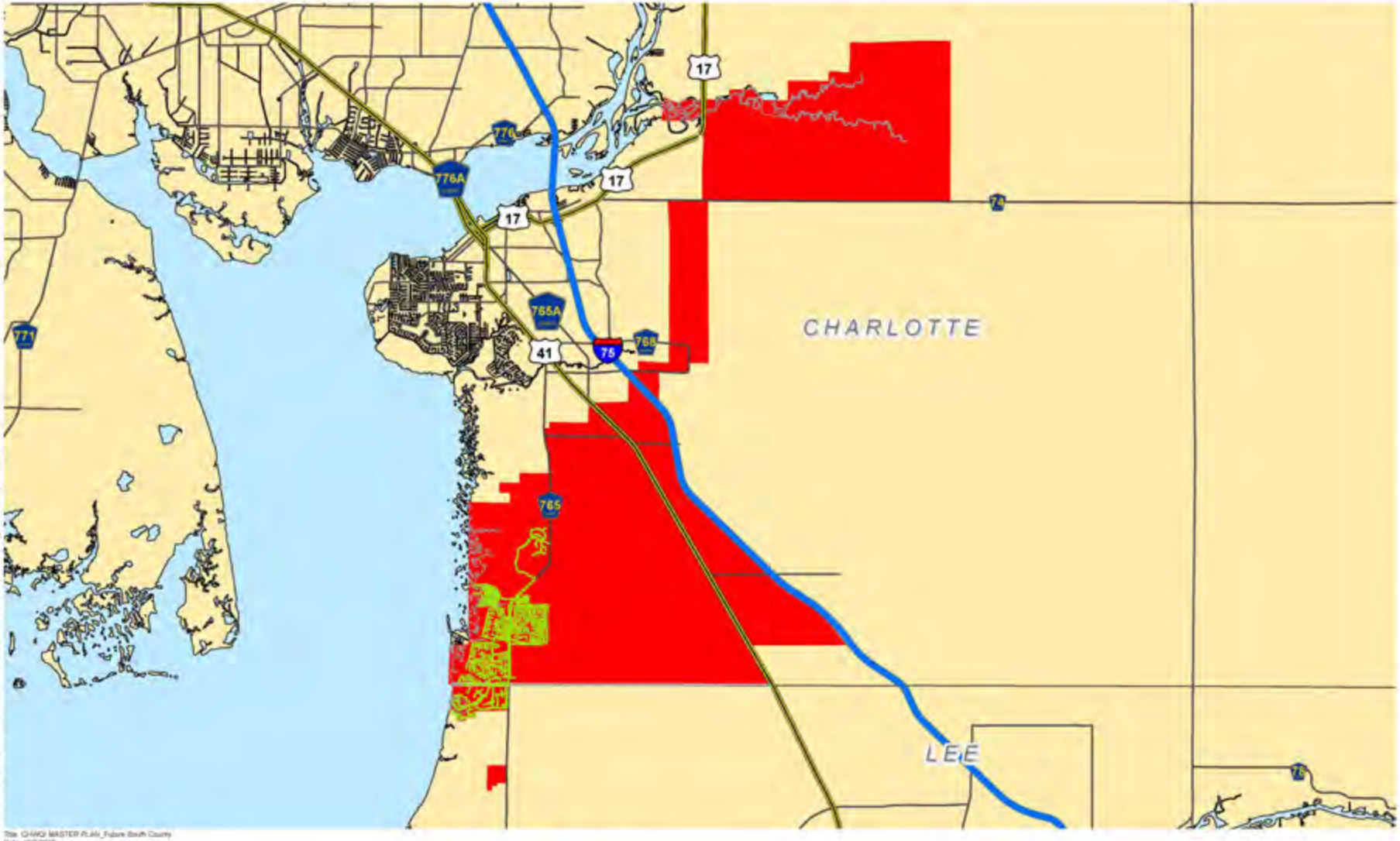
N
W
E
S

Miles

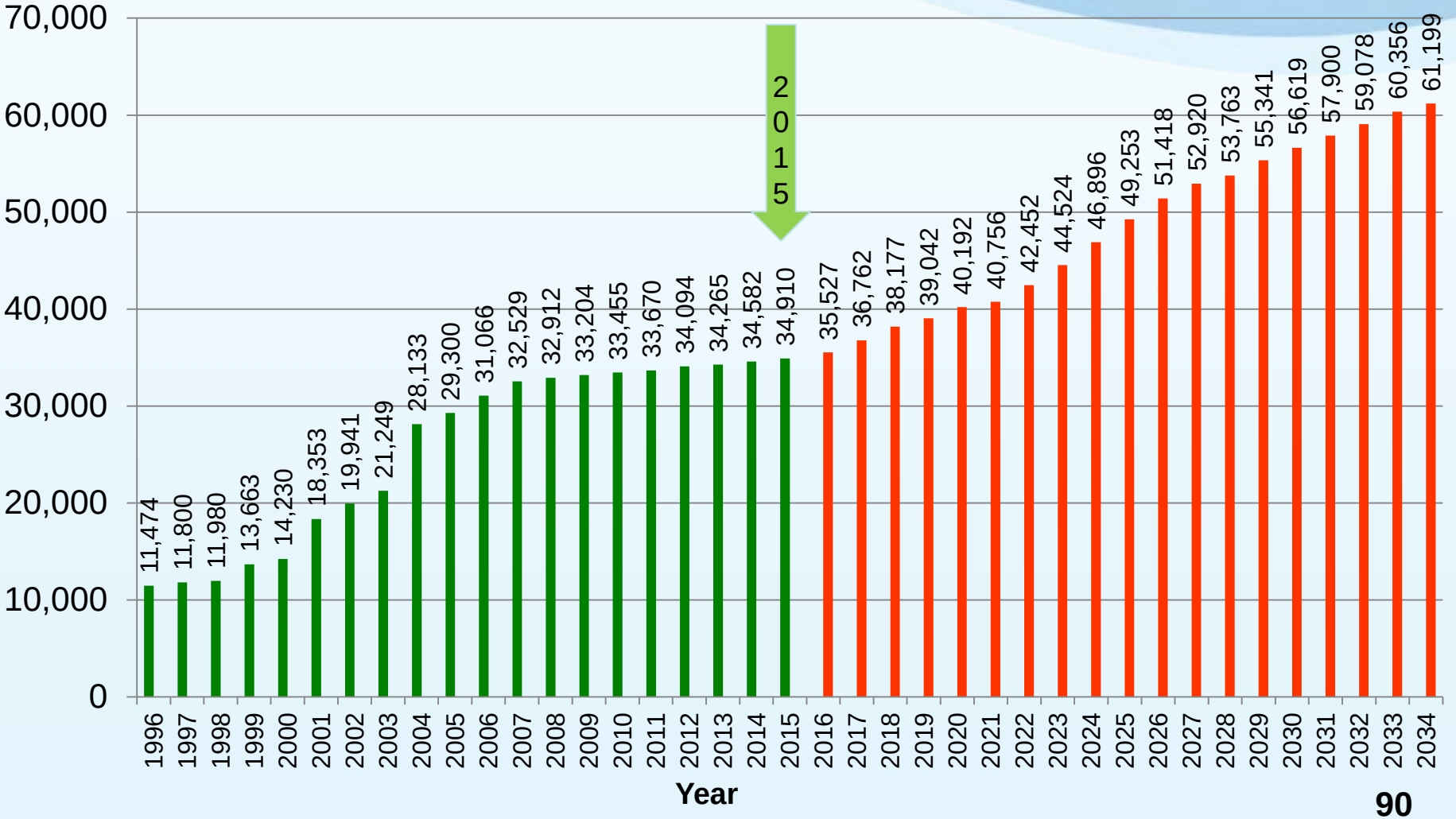
1.5 0.75 0 1.5

CHARLOTTE COUNTY

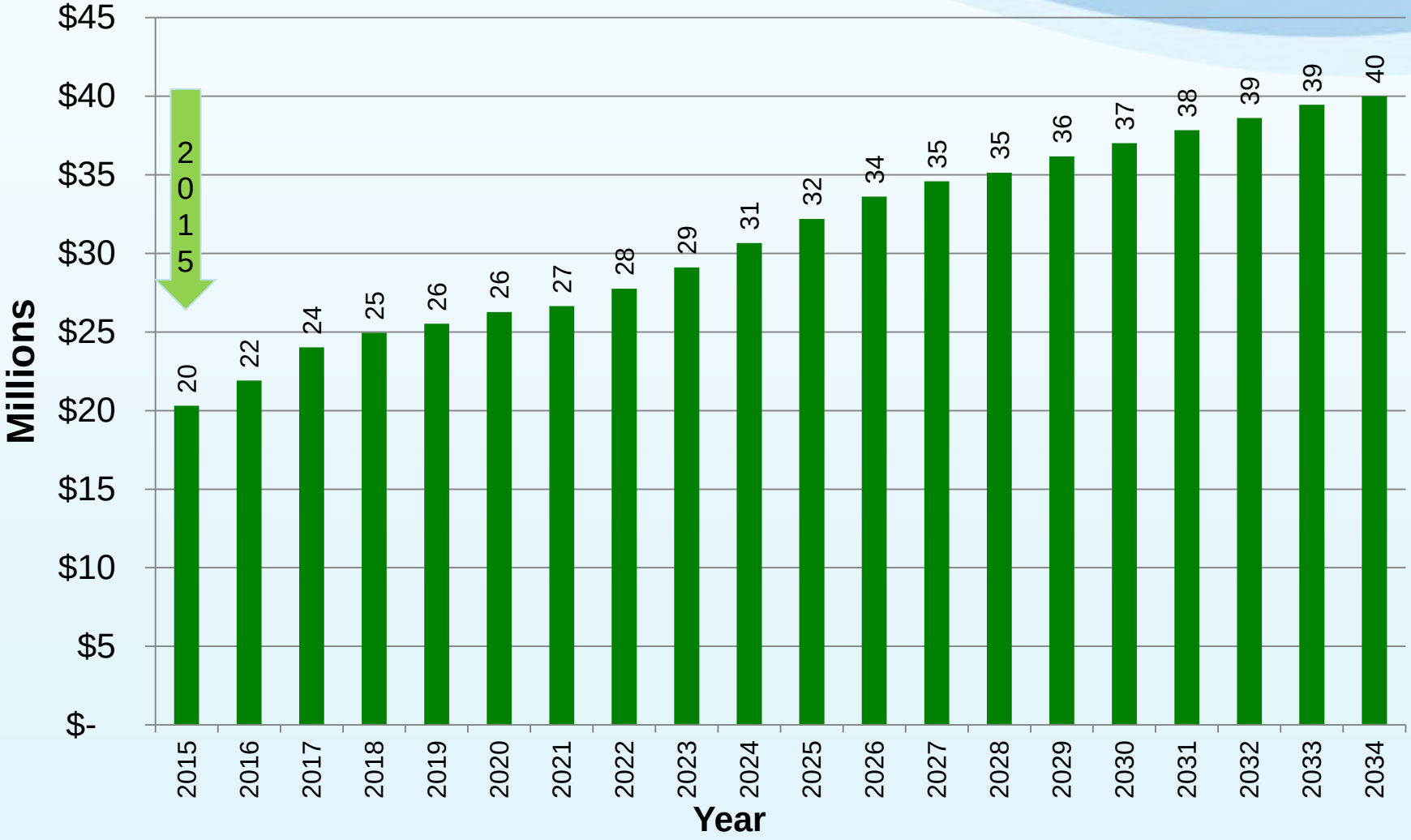
South County-Charlotte Harbor Water Quality Initiative 2025-2035



Sewer Connections 1996 - 2034



Sewer Revenue Projection



Proposed Sewer Expansion Funding

- Phase 2 – Proposed Adoption September 2016
- Estimated Cost per Lot

Construction Cost	$10,270
Connection Fee	$2,251
Assessment	$12,521
On-lot connection	$1,600**
Total	$14,121

**provide payment options in February 2016

Proposed Assessment Timetable

- Phase 2 – Final Approval September 2016
- Future Project Areas Proposed
  - US 41
  - Harborview
  - El Jobean
  - Harbor Heights
  - West Mid County
  - East Mid County

Future BCC Approval and Next Steps

- Approve the implementation of the Mid-County sewer expansion program
- Amend CIP for Phase 2 construction
- Authorize proceeding with design for US 41 and El Jobean
- Authorize proceeding with Assessment implementation
- Authorize pursuit of funding sources such as SRF/USDA Loans, Amendment 1 and other grants

Questions?