CHARLOTTE COUNTY SEWER MASTER PLAN UPDATE

Charlotte County Utilities Department | 2024

CHARLOTTE COUNTY
FLORIDA

JonesEdmunds

CHARLOTTE COUNTY
SEWER MASTER PLAN UPDATE
Certification and Signature Page

Thomas W. Friedrich, PE, BCEE
Florida PE No.: 61281
324 S. Hyde Park Ave
Suite 250
Tampa, FL 33606

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ABBREVIATIONS AND ACRONYMS

AADF	Annual Average Daily Flow
AB	Automatic Backwash
ADF	Average Daily Flow
AWT	Advanced Water Treatment
BEBR	Bureau of Economic and Business Research
BFP	Belt Filter Press
BMAP	Basin Management Action Plan
BNR	Biological Nutrient Removal
BCC	Board of County Commissioners
BOD	Biological Chemical Demand
CAAP	Capacity Assessment and Assurance Program
CAN	Capital Needs Assessment
CAP	Capacity Analysis Program
CAR	Capacity Analysis Report
CBOD	Carbonaceous Biological Oxygen Demand
CBOD5	5-Day Carbonaceous Biological Demand
CCBRC	Charlotte County Bio-Recycling Center
CCMP	Comprehensive Conservation and Management Plan
CCTV	Closed-Circuit Television
CCU	Charlotte County Utilities Department
CDD	Community Development District
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CHNEP	Charlotte Harbor National Estuary Program
CIP	Capital Improvement Plan
CIPP	Cured-In-Place Pipe
CMAR	Construction Manager at Risk
CMOM	Capacity, Management, Operations, and Maintenance
CMP	Capital Maintenance Program
CPI	Consumer Price Index
CSWR	Central States Water Resources
DIP	Ductile Iron Pipe
DIW	Deep Injection Well
DMR	Discharge Monitoring Report
EPA	US Environmental Protection Agency
EPLAB	East Port Laboratory
EQ	Equalization
ERC	Equivalent Residential Connection
EWD	Englewood Water District

FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FLWMI	Florida Water Management Inventory
fps	Feet per Second
FS	Florida Statute
GDC	General Development Corporation
GDU	General Development Utilities
GIS	Geographic Information System
GMLS	Grand Master Lift Station
gpd	Gallons per day
gpd/IDM	Gallons per Day per Inch-Diameter-Mile
GSAPF	Geospatial Small-area Population Forecasting
GWE	Giffels-Webster Engineers, Inc.
HB	House Bill
HDPE	High-Density Polyethylene
HSP	High-Service Pump
HSPS	High-Service Pump Station
I&I	Infiltration and Inflow
IR	Internal Recycle
ISD	Independent Special District
KIU	Knight Island Utilities
LF	Linear Foot
LPS	Low-Pressure Sewer
LS	Lift Station
MADF	Monthly Average Daily Flow
MBR	Membrane Bioreactor
MDF	Maximum Daily Flow
MG	Million Gallons
mg/L	Milligrams per Liter
MGD	Million Gallons per Day
MHI	Median Household Income
MLE	Modified Ludzack-Ettinger
MLS	Master Lift Station
MLSS	Mixed Liquor Suspended Solids
MMADF	Maximum Monthly Average Daily Flow
MRS	Master Reuse System
MSBU	Municipal Service Benefit Units
MTMADF	Maximum 3-Month Average Daily Flow
MWBLRP	Manchester Waterway Boat Lock Removal Plan
NELAP	National Environmental Laboratory Accreditation Program

NEXRAD	Net Generation Weather Radar
NNC	Numeric Nutrient Criteria
O&M	Operation and Maintenance
OSTDS	On-Site Wastewater Treatment and Disposal System
PER	Preliminary Engineering Report
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PHF	Peak Hourly Flow
ppd	Pounds per Day
PSC	Public Service Commission
psig	pounds per square inch gauge
PVC	Polyvinyl Chloride
R&R	Renewal and Replacement
RAP	Reasonable Assurance Plan
RAS	Return-Activated Sludge
RESTORE	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act
RIB	Rapid Infiltration Basin
RMF	Residuals Management Facility
RO	Reverse Osmosis
S2S	Septic-to-Sewer
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SMP	Sewer Master Plan
SOUR	Specific Oxygen Uptake Rate
SR	State Road
SRF	State Revolving Fund
SSO	Sanitary Sewer Overflow
STEP	Septic Tank Effluent Pumping
STP	Sewage Treatment Plant
SWFRERP	Southwest Florida Regional Ecosystem Restoration Plan
SWFWMD	Southwest Florida Water Management District
SWIM	Surface Water Improvement Management
TM	Technical Memorandum
TMADF	3-Month Average Daily Flow
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
µg/L	Micrograms per Liter

UIC	Underground injection Control
US 41	US Highway 41
USACE	US Army Corps of Engineers
UV	Ultraviolet
VAR	Vector-Attraction Reduction
VCP	Vitrified Clay Pipe
VFD	Variable-Frequency Drive
VSR	Volatile Solids Reduction
WAS	Waste-Activated Sludge
WBID	Water Body Identification
WIFIA	Water Infrastructure Finance and Innovation Act of 2014
WQI	Water Quality Improvement
WRF	Water Reclamation Facility
WTP	Water Treatment Plant
WWCS	Wastewater Collection System
WWTP	Wastewater Treatment Plants

EXECUTIVE SUMMARY

The Charlotte County 2024 Sewer Master Plan (SMP) Update serves as a comprehensive document that guides the Charlotte County Utilities Department (CCU) in providing safe, adequate, and reliable wastewater service to existing and future customers. This SMP updates the previous 2017 plan and incorporates recommendations from the Capacity, Management, Operations, and Maintenance (CMOM) evaluation.

PURPOSE AND GUIDING PRINCIPLES

The SMP's primary purpose is to present a reliable and efficient wastewater system for Charlotte County that addresses the needs of existing customers while providing for the long-term replacement of on-site wastewater treatment and disposal systems (OSTDS or septic systems) with centralized sewer in high-priority areas. The plan is guided by four key principles:

- **Affordability**: Developing cost-effective solutions for residents and business owners.
- **Sustainability**: Prioritizing septic system replacements to maximize environmental benefits.
- **Efficiency**: Using existing infrastructure and implementing efficient construction methods.
- **Reliability**: Identifying infrastructure components requiring updates to ensure reliable service.

ONE CHARLOTTE, ONE WATER INITIATIVE

Central to the County's approach is the "One Charlotte, One Water" initiative, which treats all water – harbor, rivers, bays, canals, creeks, potable water, wastewater, stormwater, and reclaimed water – as one interconnected resource. This holistic approach aims to ensure policies and practices contribute to the long-term health and availability of water resources. As part of this initiative, Charlotte County implemented an Ambient Surface Water Monitoring Program in 2022 to collect data on water quality within the County.

REGULATORY ENVIRONMENT

Several recent regulatory updates have significant implications for CCU:

- **Section 62-600.705(2), FAC** (effective June 28, 2023)**:** Requires development of a 5-year wastewater collection system action plan and annual reporting.
- **SB 712/Clean Waterways Act (2020):** Requires submission of septic system and wastewater system plans to reduce nutrient output.
- **HB 1379/Environmental Protection Bill (2023):** Increases water quality protection requirements and expands funding eligibility.

CURRENT SYSTEM OVERVIEW

The CCU wastewater service areas cover nearly 45 square miles and include a network serving nearly 49,000 customers. The system is divided geographically into three service areas:

- **Mid County**: Between the Peace and Myakka Rivers.
- **West County**: West of the Myakka River.
- **South County**: Southeast of the Peace River.

The wastewater systems consist of:

- Four Water Reclamation Facilities (WRFs): East Port, West Port, Rotonda, and Burnt Store.
- 384 miles of low-pressure sewer (LPS) mains.
- 206 miles of force main.
- 395 miles of gravity sewer mains.
- 310 County-owned lift stations.
- 38 miles of vacuum mains.
- Four vacuum lift stations.
- 11,800 septic tank effluent pumping (STEP)/LPS pumps.

SEPTIC-TO-SEWER (S2S) CONVERSION PROGRAM

A key focus of the SMP is the conversion of septic systems to centralized sewer to improve water quality in Charlotte Harbor. The 2017 SMP established a goal of converting approximately 1,000 homes per year from septic to sewer. However, due to various challenges including limited state appropriations, labor shortages, and increased construction costs, the actual conversion rate has been approximately 330 per year.

Current status:

- Approximately 2,330 septic-to-sewer conversions completed since 2017.
- Approximately 7,000 new septic systems permitted and constructed in unserved areas.
- The net total septic systems in CCU service area has increased to approximately 32,000.

Completed and ongoing S2S projects include:

- East/West Spring Lake (completed 2018): 1,558 connections.
- El Jobean East (completed 2022): 278 connections.
- Ackerman (in construction): 1,386 connections.
- Lakeview Midway (in design): 2,500 conversions planned.

Environmental Assessment and Project Prioritization

To prioritize areas for septic-to-sewer conversion, the SMP used three environmental assessment criteria:

- **Proximity to waterways:** Areas closer to surface water bodies that connect to Charlotte Harbor received higher scores.
- **Age of septic systems:** Older systems (particularly pre-1983 systems that do not meet current standards) received higher scores.
- **Density of septic systems:** Areas with higher concentrations of septic systems received higher scores.

These criteria were used to calculate an average impact score for each potential project area. Areas with higher scores were generally prioritized for earlier implementation to maximize environmental benefits.

Collection System Alternatives

Three sewer collection system types were evaluated for implementation:

- Grinder Pump Low-Pressure Sewer (LPS) System:
    - Total project cost per connection: $30,600–$31,600
    - Annual O&M cost: $870–$980
    - 40-year present worth: $45,450–$48,400
- Gravity Collection System:
    - Total project cost per connection: $47,800–$57,800
    - Annual O&M cost: $350–$500
    - 40-year present worth: $53,800–$66,300
- Vacuum Collection System:
    - Total project cost per connection: $25,400–$27,600
    - Annual O&M cost: $420–$540
    - 40-year present worth: $32,600–$36,900

Based on evaluation, cost comparison, and consultation with CCU, vacuum collection systems were determined to be the most feasible alternative for most County project areas.

Improvement Plans

The SMP outlines phased improvement plans based on a target conversion rate of approximately 1,000 S2S conversions per year:

5-Year Improvement Plan

- 15 project areas in Mid County.
- 5,298 septic systems to be converted.

- Areas identified in Compliance Monitoring Reports were prioritized to meet regulatory requirements.

10-Year Improvement Plan

- 12 project areas (six in Mid County, six in West County).
- 4,005 septic systems to be converted.
- Prioritized based on higher environmental impact scores and strategic proximity to past project areas.

15-Year Improvement Plan

- 15 project areas (10 in Mid County, five in West County).
- 4,597 septic systems to be converted.

Buildout Improvement Plan

- 127 remaining project areas after completion of 5-, 10-, and 15-year plans.

Water Reclamation Facilities

The County operates four WRFs, each serving different geographical areas:

- East Port WRF (Mid County):
  - Current permitted capacity: 6.00 MGD.
  - Current AADF: 5.62 MGD.
  - Expansion to 9.0 MGD to be completed by end of 2026.
- West Port WRF (West County):
  - Current permitted capacity: 1.20 MGD.
  - Current AADF: 0.77 MGD.
- Rotonda WRF (West County):
  - Current permitted capacity: 2.00 MGD.
  - Current AADF: 1.46 MGD.
- Burnt Store WRF (South County):
  - Current permitted capacity: 0.50 MGD.
  - Current AADF: 0.39 MGD.

The County has committed to upgrading all WRFs to advanced water treatment (AWT) standards, which will improve the quality of reclaimed water and reduce nitrogen loading to the environment.

Connections to Public and Community Utilities

The SMP also considers the potential connection of independent utility systems to the CCU wastewater system. Five systems were evaluated for potential future connection. The prioritization of these connections will depend on factors including the desire of utility owners to connect, associated costs, and detailed engineering evaluations. However, at this time CCU is not focused on acquiring any other utilities.

Capacity Analysis Program

The 2024 Charlotte County SMP Update outlines a comprehensive Capacity Analysis Program aimed at ensuring the CCU collection systems have adequate capacity to meet both current and future demands. The report emphasizes the importance of ongoing assessment, maintenance, and improvement of sewer infrastructure, particularly focusing on reducing inflow and infiltration (I&I) within the wastewater collection system.

The program includes regular inspections of sewer assets, systematic use of data analytics to track performance, and implementation of strategies to mitigate odor and corrosion issues. Additionally, the report highlights the necessity of using advanced technologies and methodologies such as runtime analysis of lift stations to identify and prioritize areas needing attention. Recommendations for capital maintenance projects and rehabilitation techniques are provided to address identified issues, thereby ensuring the long-term functionality and reliability of the sewer systems in Charlotte County.

Conclusion

The 2024 Charlotte County SMP Update provides a comprehensive roadmap for improving and expanding the County's wastewater system over the next 20+ years. By prioritizing S2S conversions in environmentally sensitive areas and committing to AWT standards at all WRFs, the plan aims to significantly improve water quality in Charlotte Harbor while providing reliable and efficient wastewater service to County residents and businesses.

Implementing this plan will require substantial investment and coordination with various stakeholders, but it represents a critical step toward achieving the County's *One Charlotte, One Water* vision of protecting and enhancing water resources for current and future generations.

1 INTRODUCTION

OVERVIEW

Chapter 1 defines the purpose and objectives of Charlotte County's Sewer Master Plan (SMP). Creating an affordable, reliable, and efficient wastewater collection and treatment system is key to sustainable population growth, economic development, and the health of the County's natural resources and landscape.

Charlotte Harbor's rich historical and natural beauty features have been key to attracting businesses and residents to the area. Population surges and steady growth continue to impact our water quality. This SMP is a local and regional collaborative effort to improve and protect the region's water quality in an affordable, sustainable, efficient, and reliable manner.

1.1 PURPOSE

The Charlotte County Utilities Department (CCU) maintains the Charlotte County Sewer Master Plan (SMP), an all-inclusive document that provides historical information on the sewer collection and wastewater treatment systems, 20-year population growth and expansion planning needs, and recommended capital improvement plan (CIP) development necessary for CCU to provide safe, adequate, and reliable service to its existing and future customers. CCU recently completed a Capacity, Management, Operations, and Maintenance (CMOM) evaluation of the sewer collection and transmission system and identified a need to complete an update to the 2017 SMP. This document will serve as an update to Charlotte County's previous 2017 SMP and be referred to as the Charlotte County 2024 SMP. Moving forward, CCU is committed to updating the SMP on a recurring 5-year basis.

The SMP's purpose is to present to the public a reliable and efficient wastewater system for Charlotte County. It addresses the needs of existing customers while providing for the long-term replacement of on-site wastewater treatment and disposal systems (OSTDS) with centralized sewer in the areas of highest concern and priority. The SMP identifies wastewater improvements and expansions as CIP projects that will be required to provide reliable wastewater service for full system buildout and develops a flexible plan that can be phased over time to allow the County to address variable population growth and obtain additional funding as needed to complete projects. It evaluates available revenues and funding sources to assist the County with completing recommended CIP projects.

This 2024 SMP draws on previously completed documentation compiled in the 2017 SMP and provides additional information as necessary to satisfy CMOM requirements such as:

- The ongoing Capacity Analysis Program (CAP).
- Level-of-service requirements to bring the existing sewer collection and transmission system up to current engineering and regulatory standards.
- Infiltration and inflow (I&I) reduction priority focus areas for future study.

- Capital Maintenance Program (CMP) recommendations to identify major components of the wastewater collection system that need rehabilitation or replacement.
- Report information compiled in a format to assist the County with State Revolving Fund (SRF) loan applications and funding approvals as well as to populate the wastewater needs analysis for House Bill (HB) 53 compliance submittals.

Appendix A provides a list of all references used to prepare this SMP.

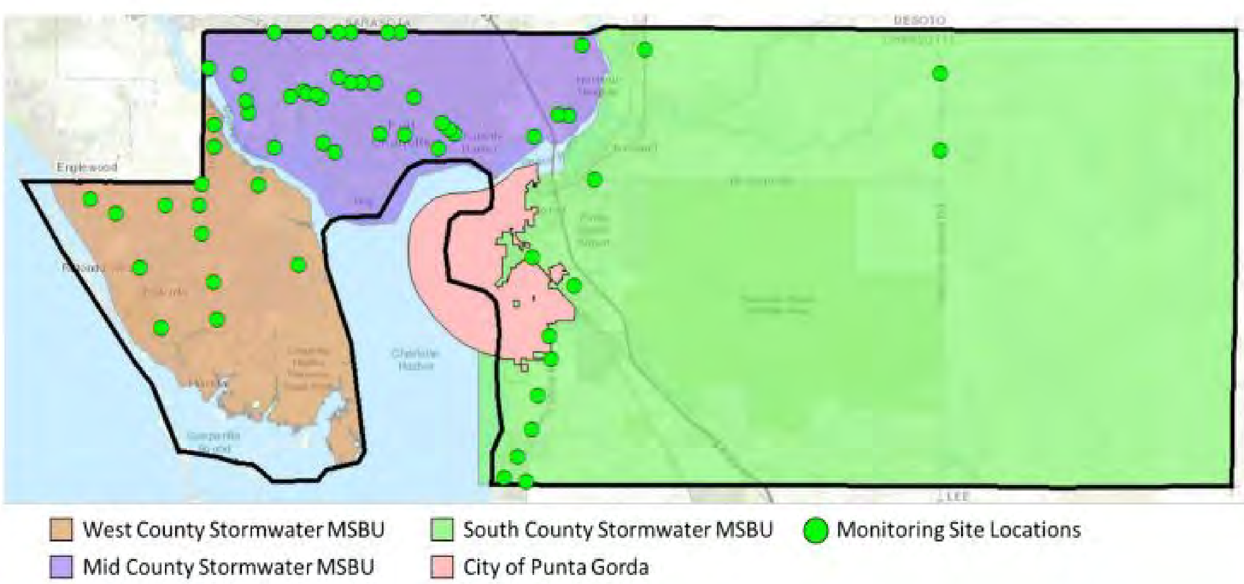
1.2 ONE CHARLOTTE, ONE WATER

The water quality in the Charlotte Harbor Estuary, Peace River, and the Myakka River has a significant impact on our community. A regional and state-wide legislative effort is underway to improve and protect these crucial natural water resources, which impact our ecosystems, fisheries, marine and wildlife habitats, beaches, coastal wetlands, tourism industry, home values, and overall quality of life.

One Charlotte, One Water is the holistic approach to water quality that Charlotte County takes to ensure its policies and practices contribute to the long-term health, enjoyment, and availability of our water. It treats all water – our harbor, rivers, bays, canals, creeks, potable water, wastewater, stormwater, and reclaimed water – as one water.

One Charlotte, One Water

As part of *One Charlotte, One Water* initiated at the direction of the Board of County Commissioners (BCC) and as described in the 2022–2023 Strategic Plan, Charlotte County implemented the first phase of its County-wide *Project Plan for Ambient Surface Water Monitoring Program* in June 2022 (Appendix B). The goal of this water quality monitoring program is to obtain information and surface water quality data for water flowing within Charlotte County.



The data collected are intended to be used for the following objectives:

- Identify long-term trends and ambient water quality conditions in Charlotte County waters.
- Inform potential needs for source tracking and opportunities for water quality improvement.
- Submit data to the Florida Department of Environmental Protection (FDEP) for assessing Charlotte County Water Body Identifications (WBIDs) according to Chapters 62-302, 62-303, and 62-304, Florida Administrative Code (FAC).
- Present sample results to the public in a manner that clearly describes water-quality trends regarding applicable water quality criteria and classifications.

1.3 Sewer System – Capacity, Management, Operation and Maintenance (CMOM)

CCU entered into a Consent Order (OGC File No. 18-0036) with FDEP that identified corrective actions to improve the wastewater collection system. In response, the County contracted Kimley-Horn to prepare a CMOM Program report. The report identified 89 sanitary sewer overflows (SSOs) in 2019 and 2020, largely resulting from force main failures. The CMOM report also reviewed the existing Capacity Assessment and Assurance Program (CAAP) and recommended that a new gravity sewer renewal and repair program be implemented that defines risk and investment needs to better guide repairs.

In addition to the improvements recommended in the CMOM and CAAP, new FDEP rules and regulations have implications for the County's sewer system. The 2020 Clean Waterways Act stipulates that utilities in nutrient basin management action plan (BMAP) areas must submit OSTDS (or septic system) and wastewater plans to reduce nutrient output. The 2020 Clean Waterways Act requires subsequent rulemaking that impacts sewer collection systems, which is covered later in this Section.

In accordance with the *One Charlotte, One Water* approach, CCU contracted Jones Edmunds to update the 2017 SMP to comply with the changing regulatory environment and address the recommendations identified in the CMOM and CAAP.

1.4 2017 SMP Key Objectives

The previous 2017 SMP efforts collaborated with key stakeholders in the community to identify critical success factors. Improving water quality in Charlotte Harbor was the main driver and overall goal. The primary objective for accomplishing this goal was reducing nutrient loading (i.e., nitrogen) to Charlotte Harbor through conversion of existing septic systems to a centralized sewer system.

Most Charlotte County OSTDSs were installed in the 1970s and 1980s. Charlotte County has developed a septic-to-sewer (S2S) conversion program as part of the 2017 SMP and has since converted approximately 2,000 septic systems to centralized sewer (a rate of 300 conversions per year). The 2017 SMP estimated approximately 27,000 septic systems within the CCU service area and over 45,000 septic systems countywide (CCU, 2010). Recent past and ongoing S2S projects within the CCU service area include the following:

- East and West Spring Lake Wastewater Expansion
- Ackerman Wastewater Expansion
- El Jobean Wastewater Expansion
- Lakeview Midway Wastewater Expansion

The 2017 SMP highlighted that increasing levels of nitrogen, chlorophyll-*a*, and fecal coliform in Charlotte Harbor were attributed to inadequate treatment provided by septic systems. The combination of unsuitable soils, seasonally high groundwater tables, and aging septic systems allows minimally treated sewage to percolate through the soil and enter the groundwater where it is conveyed to canals, rivers, creeks, and estuarine shorelines. This continues to be an issue despite the completion of various S2S initiatives over the last 5 years. *Septic System Background and Impacts on Water Quality* details information on the environmental benefits of septic system Replacement (Appendix C). Table 1-1 lists the numeric nutrient criteria (NNC) for the Upper Charlotte Harbor and the contributing rivers that continue to guide the County's remediation efforts.

Table 1-1 NNC for Charlotte Harbor, Peace River, and Myakka River

Nutrient	Charlotte Harbor Proper	Tidal Peace River	Tidal Myakka River
Total Nitrogen (TN) (ppm)	0.67	1.08	1.02
Total Phosphorus (TP) (ppm)	0.19	0.50	0.31
Chlorophyll-*a* (ppm)	0.0061	0.0126	0.0117

Note: ppm =parts per million.
Data specified in Section 62-302.530(47)(b), FAC.

1.5 Regulatory Updates and Impacts

The adoption of Section 62-600.705(2), FAC, Senate Bill (SB) 712/Clean Waterways Act, and HB 1379/Environmental Protection Bill are expected to have significant impacts on the CCU service area for compliance and funding opportunities. These rules and regulations were implemented to protect public health and increase the quality of water bodies in the United States. Compliance with the regulations is necessary and aligns with CCU's goals of improving the long-term health of Charlotte Harbor in an economically sustainable manner.

1.5.1 Section 62-600.705(2), FAC

This Section of Rule 62-600.705 became effective on June 28, 2023, and requires all domestic wastewater facility permittees to develop a 5-year wastewater collection system (WWCS) action plan and submit annual reports accordingly. Its primary goal is to reduce the number and frequency of SSOs and leakages in the sewer collection system to preserve public health.

FDEP has defined the minimum requirements for the WWCS plans including:

- Set goals for evaluating the WWCS, which assesses 25 percent of the system every 5 years.
- Be based on I&I studies, leakage surveys, and relevant sanitary sewer evaluation surveys.
- Develop and maintain a computerized Geographic Information System (GIS) map and inventory of the system including pipes, manholes, pump stations, climatic information, industries served, and relevant historical data (flows, SSOs, odor complaints, I&I analyses, etc.).
- Include adaptive maintenance plans for repairs and protocols for maintenance, cleaning, and emergency repairs.
- Describe measures taken to protect the health of the sewer collection system from external contaminants (fats, oil, grease, sand, etc.), minimize I&I locally, and increase resiliency for sea-level rise and flooding.
- Identify all satellite WWCSs connected to the facility connection system after December 21, 2025.
- Provide contact information and recordkeeping procedures.

The resulting annual report must be submitted by June 30 of the year following the fiscal year covered by the report. It must summarize the assessments conducted, results, and percentage assessed and highlight significant events. A fiscal summary must also be included to quantify the expenditures for implementing the plan.

This 2024 SMP identifies and meets the requirements for this Rule by identifying CIP projects specific to the WWCS on a 5-year horizon.

1.5.2 SB 712/Clean Waterways Act

The Clean Waterways Act requires the submittal of septic system and wastewater system draft plans to reduce nutrient output by February 1, 2024, and final plans by August 1, 2024. Septic system plans must include:

- An inventory of the septic system in the utility's jurisdiction.
- Plans to address the system in the future.
- Maps and prioritization of areas targeted for conversion to sewer and/or septic system enhancements.
- A list of facilities and capacity analyses that can accept additional influent for areas to be sewered.
- A list of projects including timelines, milestones, and funding estimates.
- Future growth considerations.

Similarly, the wastewater system plans must include:

- An inventory of water reclamation facilities (WRFs), including their permitted capacity, average discharge, nutrient limits, average nutrient concentration, and average nutrient load.
- A summary of capacity analysis including future growth.

- A ranking list of facility upgrades needed.
- A list of projects, including timelines, milestones, and funding estimates.

The 2017 SMP contained information required by the Clean Waterways Act septic system and wastewater system plans. This 2024 SMP will build on the previous work completed, including aggregation of septic system information, CIP development, and addressing regulatory requirements.

1.5.3 HB 1379/Environmental Protection Bill

The Environmental Protection Bill will, among many other items, increase BMAP and Reasonable Assurance Plan (RAP) requirements and water-quality protection, require additional local government planning under certain conditions, and expand eligibility for funding. Charlotte County is not currently in a BMAP area and is evaluating the benefits and reviewing the feasibility of completing a RAP, so these elements of the Environmental Protection Bill do not currently impact the County. However, that will likely change in the future as BMAPs and/or RAPs are developed within the County. One part of the Environmental Protection Bill that is applicable is that the County's Comprehensive Plan "must contain a capital improvements element designed to consider the need for and the location of public facilities in order to encourage the efficient use of such facilities…"

1.6 Guiding Principles

The SMP was developed as a collaborative effort to meet the common goals of the local and regional community to incorporate the guiding principles of affordability, sustainability, efficiency, and reliability:

- ***Affordability –*** Each project identified in the SMP focuses on developing affordable solutions for residents and business owners.
- ***Sustainability –*** The SMP incorporates a balanced approach to prioritize septic system replacements to maximize environmental benefits and provide long-term reductions in nutrient loadings in a manner that is affordable to residents and business owners.
- ***Efficiency –*** The SMP considers existing utility infrastructure and implements efficient construction methods to decrease costs on road trenching and repair.
- ***Reliability –*** The SMP considers existing wastewater treatment and conveyance infrastructure and identifies which components will require updating to provide a reliable product to the County's residences and businesses.

1.7 OBJECTIVES


Port Charlotte, Florida

Developing and implementing the SMP is a joint effort of Charlotte County residents, key stakeholders, the BCC, and CCU. This effort provides an update to the 2017 SMP and incorporates the recommendations outlined in the CMOM and CAAP reports to improve the County's overall approach to asset management and repair. The 2024 SMP also offers an opportunity to meet the requirements of the changing regulatory landscape and to acquire additional funding. These objectives support providing an affordable community solution that addresses the common goals of improving and restoring water quality in the Charlotte Harbor Estuary, enhancing the community's quality of life, and adopting the *One Charlotte, One Water* approach. The following SMP objectives support these goals:

- Define a renewal and replacement strategy that defines risk and investment needs for the collection and transmission system.
- Review and compile historical sewer system, WRF, and flows and loads data in accordance with the Clean Waterways Act requirements.
- Provide an update on the status of the private sewer utilities and recommendations for acquisition and consolidation.
- Model and estimate system growth due to S2S conversion and infill.
- Develop detailed consumer and wastewater flow estimates through buildout.
- Review existing wastewater collection and transmission systems and offer assessments to comply with Section 62-600.705(2), FAC.
- Review existing WRFs and prepare an infrastructure assessment including a ranking of the necessary improvements.
- Develop CIP project recommendations based on existing infrastructure needs and guiding principles.
- Perform financial analyses and develop funding programs and options for the County to implement the recommended CIP projects.

Sewer Master Plan –

An affordable community solution that addresses the common goal of improving water quality in the Charlotte Harbor, restoring the Charlotte Harbor Estuary, and enhancing the community's quality of life.

1.8 Partners and Related Plans

Preparing the SMP fulfills the wastewater component of the *One Charlotte, One Water* approach and is aligned with existing local, regional, and non-profit cooperating partner goals and objectives. The list of partners and related plans include:

- The Charlotte County Sewer Master Plan (Jones Edmunds, 2017)
- The *One Charlotte, One Water* Initiative
- The Charlotte County Utilities Capacity, Management, Operations, and Maintenance (CMOM) Program (Kimley-Horn and Associates, Inc., 2021)
- The Charlotte County Utilities Strategic Plan (Revised 2021)
- The County's Smart Charlotte 2050 Comprehensive Plan (Charlotte County BCC, 2010)
- The Priority Actions of the Charlotte Harbor National Estuary Program (CHNEP) Comprehensive Conservation and Management Plan (CCMP) (CHNEP, 2019)
- The Joint Florida Gulf National Estuary Programs Southwest Florida Regional Ecosystem Restoration Plan (SWFRERP, 2013)
- Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) Council Initial Comprehensive Plan (Updated 2022)
- Area 1 Preliminary Engineering Report, Charlotte County Utilities (March 2010)
- The Charlotte Harbor Environmental Center
- Manchester Waterway Boat Lock Removal Plan Net Ecosystem Benefits by FDEP and US Army Corps of Engineers (USACE) Permit Compliance Report
- The Southwest Florida Water Management District (SWFWMD) Charlotte Harbor Surface Water Improvement Management (SWIM) Plan (2000)
- Charlotte County Ambient Surface Water Quality Monitoring Program (June 2022)

CCU has also completed a number of reports and studies relevant to the wastewater systems and treatment facilities including:

- CCU Annual Report 2017–2023 – Report includes an annual condition assessment of wastewater collection and transmission systems, lift stations, vacuum stations, and wastewater treatment facilities. The report includes recommendations for planning, maintenance, and capital improvements of these facilities.

- Hurricane Irma Assessments (2022) – CCU completed field inspections following Hurricane Irma to assess the condition of CCU's 310 wastewater lift stations and treatment facilities.

- CMOM Report – This report establishes a framework to guide support CCU's goals of providing reliable utility services through management, operation, and maintenance of the system.

- CAAP and Flow Monitoring Program – The report details the framework to develop a CAAP program for the WWCS, SSO management, and hydraulic modeling.

- Hydraulic modeling to evaluate current and future infrastructure impacts due to new development connections and system expansions:

  - Edgewater Drive/Flamingo Boulevard New Force Main Sizing
  - SR 776 New Force Main Sizing Evaluation (West County)
  - Harbor Village Development Review (West County)
  - Starling Development Review (South County)
  - Simple Life Development Review (South County)
  - Tuckers Pointe Development Review (South County)

2 PAST & PRESENT – DEVELOPMENT OF A SEWER UTILITY

OVERVIEW

This chapter provides a brief historical perspective of the development of the Charlotte County sewer system and the formation of the CCU, including the initial wastewater asset purchases and subsequent wastewater franchise acquisitions, and a summary of the present-day sewer system.

This chapter also reviews the County's ongoing wastewater projects currently in the planning, design, and construction phases.

2.1 SEWER SYSTEM DEVELOPMENT

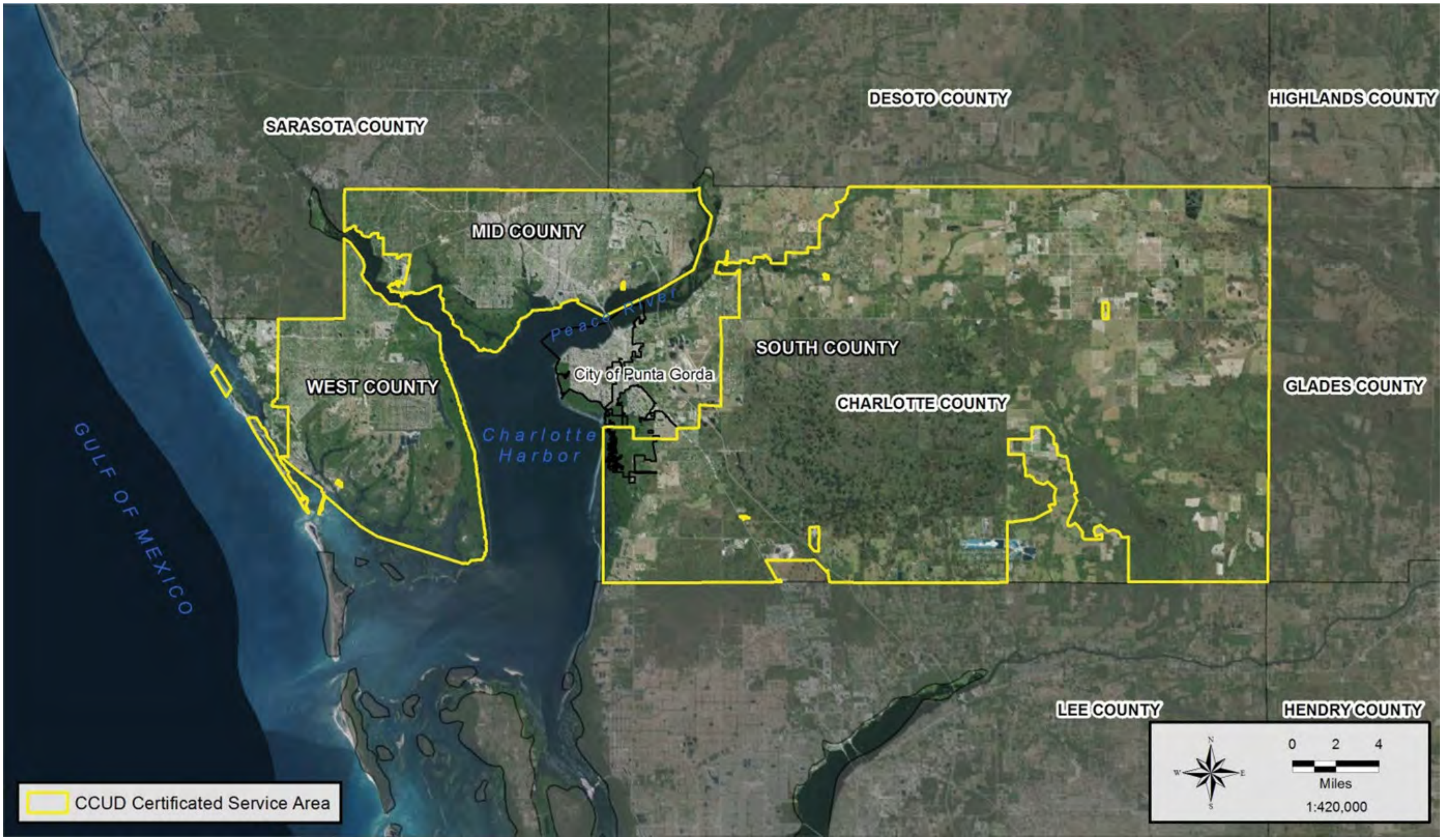
Charlotte County is trisected by the Peace River and the Myakka River into three primary land masses. The central land mass between the two rivers is referred to as "Mid County." The Myakka River separates Mid County from the west coastal peninsula or "West County," and the Peace River forms the barrier between Mid County and the southeast areas known as "South County" (see Figure 2-1).

Most of Charlotte County remained virtually undeveloped for the first half of the 20th Century, consisting mostly of cattle rangelands, timberlands, groves, and a few homesteads. Lands that were subdivided or platted consisted primarily of the Englewood/ Grove City area in West County, El Jobean and Charlotte Harbor areas in Mid County, and the City of Punta Gorda in South County. With the exception of small, platted areas that used package treatment units, wastewater treatment was rudimentary OSTDSs of varying degrees of quality or built before any regulations started in the 1970s. Figure 2-1 shows the locations of the three service areas within Charlotte County.

In the mid-1950s, the Mackle brothers of Miami, Florida, began to purchase large tracts of land in the Mid and West County areas. The Mackle brothers, later known as the General Development Corporation (GDC), platted the area for residential development communities, generally quarter-acre residential lots with some commercial areas along main corridors such as US Highway 41 (US 41). Most residential lots were served by septic systems, resulting in approximately 20,000 septic systems in the County before 1980. From 1980 to 1990, septic system growth averaged over 1,200 per year.

A small portion of the GDC development included central sewer collection and wastewater treatment plants (WWTPs), which were officially managed by GDC's subsidiary General Development Utilities (GDU). Mid County included two WWTPs – South Port WWTP with a capacity of 1.0 million gallons per day (MGD) and East Port WWTP with a permitted capacity of 3.0 MGD – along with associated transmission mains and sewer collection systems. In West County, GDC owned land known as Gulf Cove and South Gulf Cove; only portions of those areas had central sewer that were treated at the West Port WWTP, which had an original design capacity of 0.32 MGD.

Figure 2-1 Charlotte County Geographic Area



West County also included a relatively large sewer system built as part of the Rotonda development in the 1970s with a separate sewer certificated area. Parts of the East Englewood area had gravity sewer systems in the former West Charlotte Utilities-certificated area, which included treatment plants and WWCSs on Manasota Key and Knight Island. A central sewer system also existed in portions of South County, specifically in the incorporated City of Punta Gorda and the Burnt Store WRF area bordering Lee County.

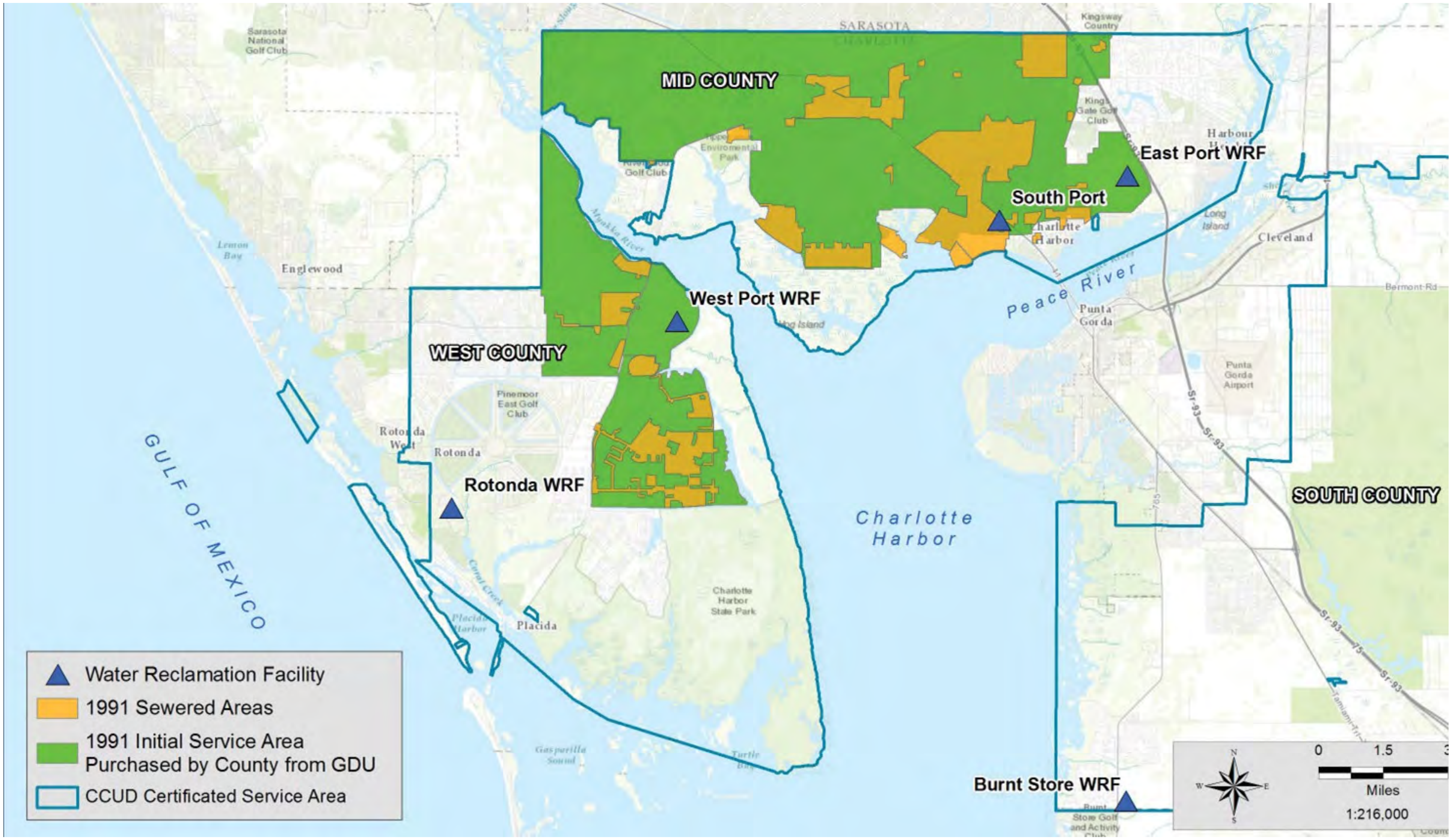
Many smaller package treatment plants and associated sewer collection systems were built throughout the County from the 1960s to 1990s, serving smaller subdivisions, apartments, condominiums, mobile home parks, and commercial areas not in the GDU service area. Chapter 4 discusses these systems in more detail.

2.2 Formation of Charlotte County Utility Department

In 1991, Charlotte County purchased the GDU assets, forming the initial core of the Charlotte County utility system in Mid County and in the Gulf Cove and South Gulf Cove areas of West County. The purchase included three WWTPs – South Port WWTP and East Port WWTP in Mid County and West Port WWTP in West County – and associated transmission lines and sewer collection systems consisting of 56 lift stations, 140 miles of gravity and low-pressure mains, and 61 miles of force mains serving approximately 11,000 sewer connections.

Figure 2-2 shows the sewered areas that were purchased in 1991 from GDU and the history of WWTPs owned and operated by CCU. The WWTPs were upgraded to WRFs, which treat water to reclaimed standards, and two new WRFs were constructed – the Rotonda WRF and the Burnt Store WRF. The South Port WWTP was demolished and converted to a master pump station (currently designated as Lift Station [LS]-65) that now transfers wastewater to the East Port WRF.

Figure 2-2 Initial County Purchases from GDU in 1991



Charlotte County continued to expand its certificated service area beyond the 1991 acquisitions in the following decades through subsequent purchases of other utility franchises. Figure 2-3 shows these purchases, which include the following:

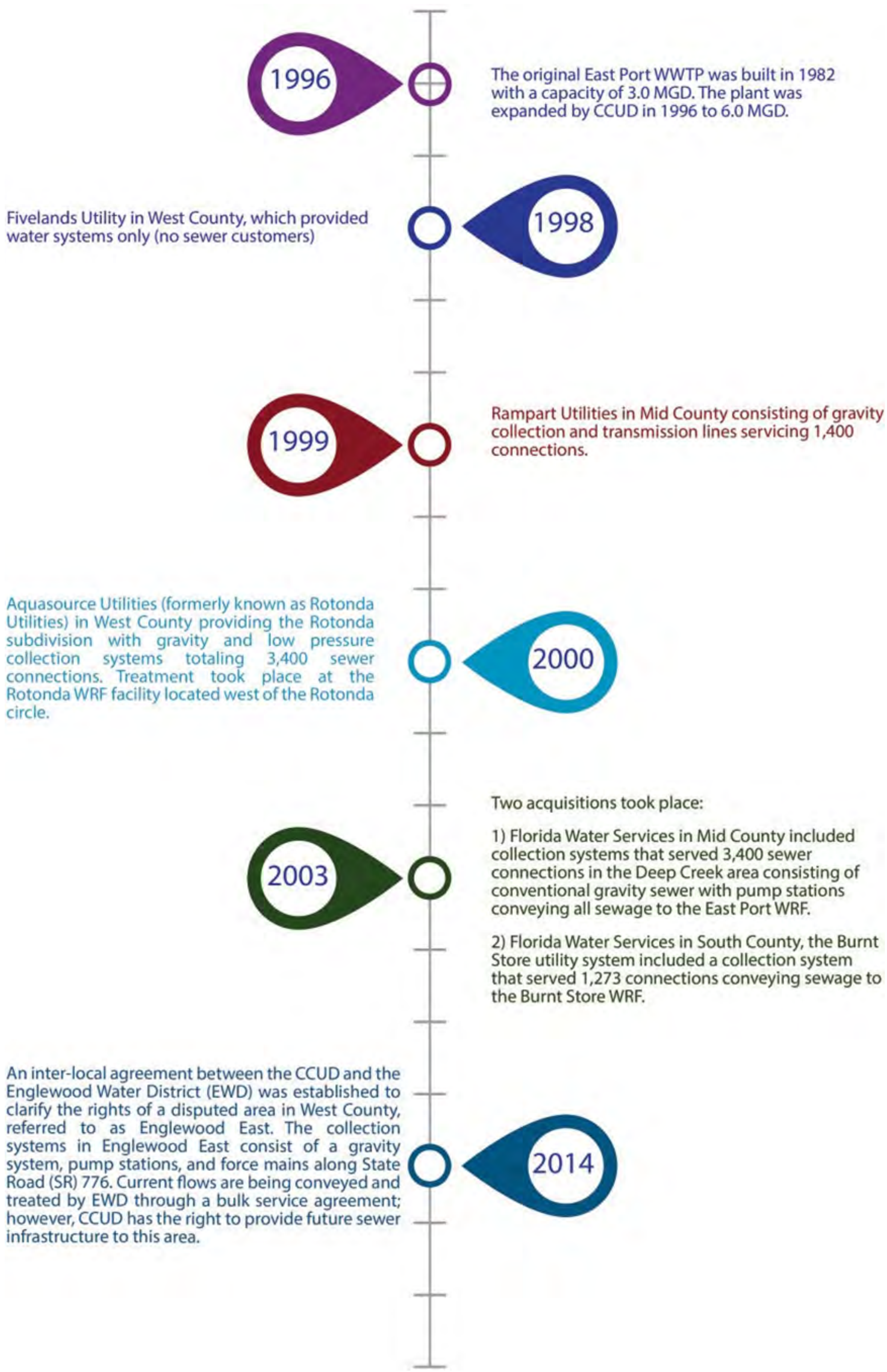
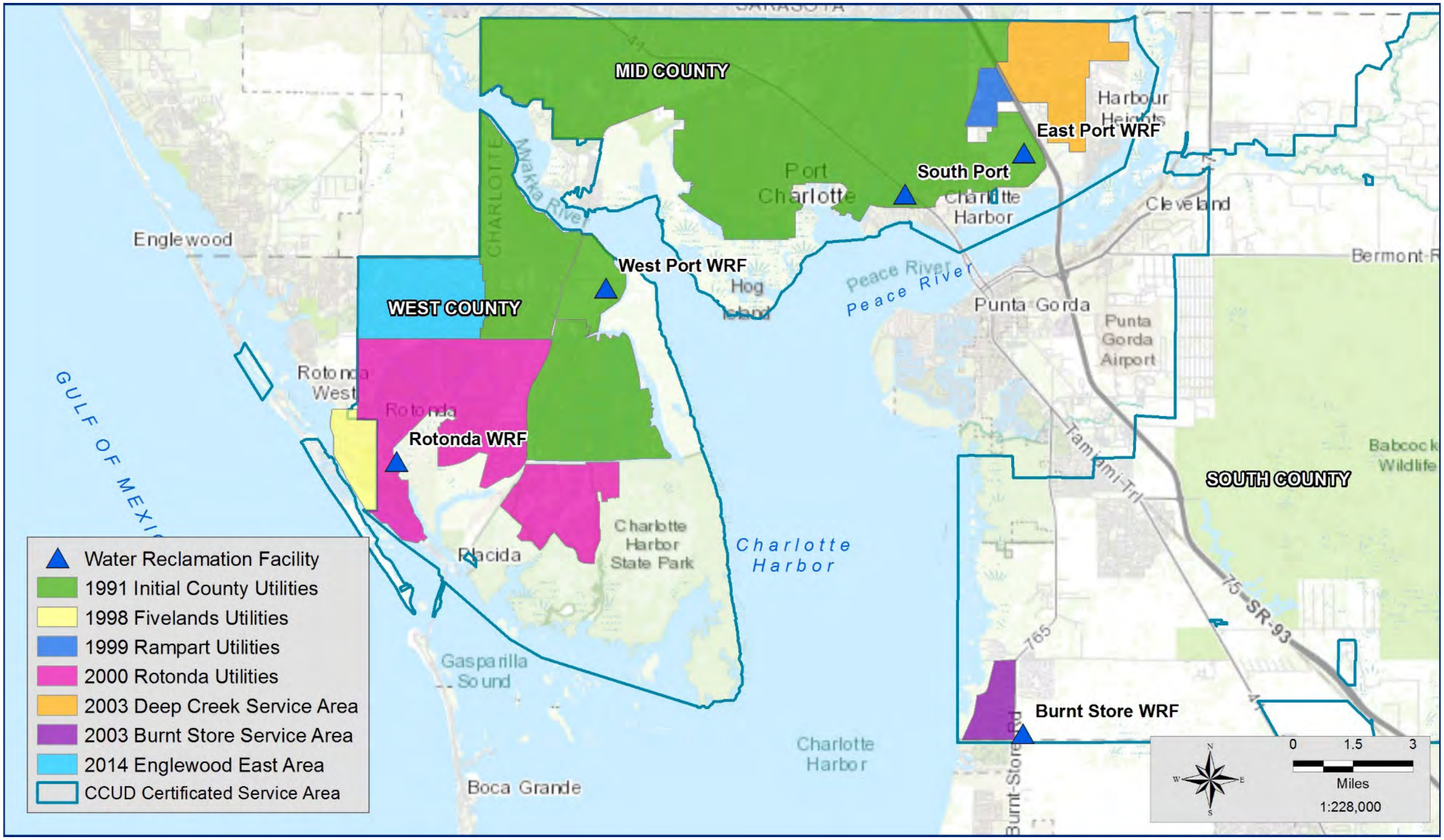


Figure 2-3 Expansion of the County Sewer Areas



2.3 PRESENT-DAY SEWER SYSTEM

The CCU wastewater service areas cover nearly 45 square miles and include a network of pipes, lift stations, and WRFs serving nearly 49,000 customers. The primary sewer facilities within CCU's boundaries consist of the following:

- Four WRFs (East Port, West Port, Rotonda, and Burnt Store).
- 384 miles of low-pressure sewer (LPS) mains.
- 206 miles of force main.
- 395 miles of gravity sewer mains.
- 310 county owned lift stations.
- 38 miles of vacuum mains.
- Four vacuum lift stations.
- 11,800 septic tank effluent pumping (STEP)/LPS pumps.

FDEP regulates WRFs through the issuance of Operating and Construction Permits. Table 2-1 provides the permit reference information for each WRF within CCU's service areas and the current annual average daily flow (AADF) for December 2024.

Table 2-1 WRF Permit Information

Facility	Service Area	Permitted Capacity (MGD)	AADF (MGD)	FDEP Operating Permit No.
East Port WRF	Mid County	6.00[1]	5.62	FL0040291
West Port WRF	West County	1.20	0.77	FLA014048
Rotonda WRF	West County	2.00	1.46	FLA014098
Burnt Store WRF	South County	0.50	0.39	FLA014083

[1] Expansion to 9.0 MGD to be complete by end of 2026.

Each WRF is permitted to dispose of its reclaimed water effluent using two or more methods including underground injection control (UIC) wells, sprayfields, percolation ponds, or reclaimed water distribution to unrestricted public-access reuse. The Rotonda WRF does not have its own UIC well and instead transfers a portion of its effluent to West Port WRF for deep well injection.

In 2014, the three Mid-County WRFs (East Port, West Port, and Rotonda) were permitted under a master reuse system (MRS) permit that allows reclaimed water mains and customers to be connected under an MRS to improve the supply of reclaimed water to PAR customers. The East Port WRF is required to report the sum of all reclaimed water discharged to the MRS from each WRF monthly with a maximum permitted daily flow of 8.792 MGD AADF. Table 2-2 summarizes the reclaimed water effluent flow permit capacities and requirements for each WRF.

Table 2-2 WRF Effluent Permitting Capacities

Water Reclamation Facility	Disposal Method and Permit Capacity (AADF)			
	Underground Injection Control (MGD)	Spray Field (MGD)	Percolation Ponds (MGD)	Reclaimed (MGD)
East Port WRF	9.60	1.45	N/A	Report[3]
West Port WRF	4.75[1]	N/A	N/A	Report[3]
Rotonda WRF	4.75[1]	N/A	N/A	Report[3]
Burnt Store WRF	3.44[2]	N/A	0.25	0.50[4]

[1] Combined effluent flow from both WRFs must not exceed 4.75 MGD maximum daily flow (MDF).

[2] Based on monthly average flow.

[3] CCU is required to report the quantity as part of the MRS permit requirements. Total combined WRF flows must not exceed 10.233 MGD AADF (FDEP, 2014).

[4] May be permitted for 2.50 MGD once high-level disinfection can be achieved.

2.4 Summary of Completed and Ongoing Projects

This section summarizes CCU's completed and ongoing projects for the wastewater collection and transmission systems and wastewater treatment plants since the 2017 SMP.

The primary focus of the 2017 SMP was to prioritize and establish an S2S program for areas in critical areas adjacent to and impacting the Charlotte Harbor Estuary. The S2S projects entail removing existing septic systems, connecting those homes to centralized sewer, and providing future connections for vacant lots. The following S2S projects have been completed or are ongoing since the 2017 SMP:

- East/West Spring Lake S2S – This project was completed in 2018 and included construction of the new Skylark Vacuum Station and vacuum sewer for 1,558 existing connections.
- El Jobean East S2S – This project was completed in 2022 and included construction of the new El Jobean Vacuum Station and vacuum sewer for 278 existing connections.
- Ackerman S2S – This project included construction of the new Ackerman Vacuum Station and vacuum sewer for 1,386 existing connections. Construction of Zones 1, 2, and the vacuum station are complete. Zones 3, 4, and LPS are expected to be complete by 2027.

- Lakeview Midway S2S – This project is under design by Giffels-Webster. The design project is expected to be complete in by end of 2025. The start date for construction is unknown. The work includes approximately 2,500 conversions and three new vacuum stations.
- Cape Haze S2S – This project was partially designed but was postponed until further notice due to a conflict with a public works project. As a result, this project area has been shifted to a later time frame in the S2S CIP plan.

The 2024 SMP builds on this program and is further described in Chapter 4. Figure 4-1 provides a map of the completed and ongoing S2S projects in Charlotte County.

In addition to the S2S projects, as part of the County's One Charlotte, One Water objective, CCU is also upgrading or planning for upgrades and expansions to their wastewater plants, including evaluating the feasibility of improving all plants to AWT. See Chapter 6 for a more detailed discussion on this topic.

Additional wastewater infrastructure projects that have been completed since the 2017 SMP or are ongoing include:

- US 41 Utility Improvements – The project includes extending sewer lines to provide service to certain developed properties within five project areas along the improved US 41 corridor. All affected businesses along the project route have been contacted. The project will start with Area 4. Area 4 is in final design and easements are being acquired. Preliminary studies for Areas 1 and 2 are complete, and CCU is coordinating with the developers. Area 5 is complete.

- SR 776 Wastewater Force Main Replacement – This project involves upsizing the existing 6-inch sewer lines to 12-inch and 16-inch lines along SR 776 from Biscayne Drive to the Charlotte Sports Park. This is an in-kind project for the FDEP Consent Order and was completed in 2024.

- Deep Creek Sewer Force Main – This project included replacement and upsizing of force mains in the Deep Creek community primarily from LS-321 Angol along Rio de Janeiro Avenue to the East Port WRF gravity interceptor. The project was completed in March 2023.

- Loveland Grand Master Lift Station (GMLS) and 48-inch Gravity Interceptor Project – This project constructed a 40-MGD MLS and approximately 10,000 linear feet (LF) of 48-inch wastewater gravity interceptor to transfer wastewater to the East Port WRF. This GMLS project improved the operation and efficiency of a substantial number of lift stations in the Mid County area. In addition, the GMLS is operated and controlled by the East Port WRF plant operations team, which allows equalization of flow into the WRF. This project was completed in Spring 2022.

- The Quesada Force Main Replacement Project – Design was completed in February 2021 for replacing approximately 780 LF of 12-inch and 1,841 LF of 20-inch wastewater force main along Quesada Boulevard on the discharge side of the MLS. Construction was completed in July 2022.

- Easy Street Force Main – Completed in November 2021 to replace approximately 1,980 feet of 6-inch wastewater force main along Easy Street from US 41 to Orange Street. The final project close-out was completed in January 2022.
- Cape Haze Drive Wastewater Force Main – This project involves upsizing the 6-inch sewer lines to 12 inches along Cape Haze Drive between Kendall Road and Arlington Drive and adding new 16-inch reclaimed water lines for future customers. The project was completed in July 2021.
- Lift Station No. 2 Rehabilitation – This project, completed in December 2021, including replacing 6-inch force main and 8-inch water main along Conway Boulevard.

3 CONNECTIONS TO PUBLIC AND COMMUNITY UTILITIES

OVERVIEW

This chapter reviews the existing public and community wastewater utilities independent of the County's certificated sewer service area and identifies which utilities are being considered for connection to the CCU wastewater systems. The intent is to work cooperatively with the utilities and generally provide sewer service through bulk service agreements. The regionalization options for potential connection are also presented, including potential connection routes and cost estimates for each connection.

3.1 Impacts of Future Regulations on Utilities

Wastewater facilities are primarily regulated by FDEP. Each facility must meet minimum water quality standards to comply with its operating license. The general trend of recent and future regulations consist of increasing reporting and operation and maintenance (O&M) requirements and improving water quality standards. Table 3-1 highlights the major new regulations implemented in Florida since 2017.

Table 3-1 Major New Regulations Since 2017

Year	Regulation	General Description
2020	SB 712 (Clean Waterways Act)	▪ Regulates OSTDSs transferred from the Florida Department of Health (FDOH) to FDEP. ▪ Requires local governments to create septic remediation plans for certain BMAPs. ▪ Allows FDEP to provide grants for projects within BMAPs, alternative restoration plans, or rural areas of opportunity that will reduce excess nutrient pollution.
2021	SB 64 (Non-Beneficial Surface Water Discharge)	▪ Requires domestic wastewater utilities that dispose of effluent, reclaimed water, or reuse water by surface water discharge to do the following: ▪ Submit a plan to FDEP to eliminate non-beneficial surface water discharges by November 1, 2021, and: ▪ Eliminate discharges by January 1, 2028, if no plan is timely submitted and approved. ▪ Fully implement the plan to eliminate discharges by January 1, 2032.

Year	Regulation	General Description
2023	HB 1379	▪ Requires wastewater treatment facilities to provide AWT before discharging reclaimed water into certain impaired waters by January 1, 2033. ▪ Requires WWTFs to provide AWT within 10 years of designation for waters that become impaired after July 1, 2023. ▪ Requires local governments to consider the feasibility of providing sanitary sewer services for developments of more than 50 residential lots that have more than one OSTDS per acre within a 10-year planning horizon
2023	Rule 62-600.705, FAC (Collection System)	▪ Requires all domestic wastewater facility permittees to develop a sewer collection system assessment, repair, and replacement action plan.

New regulations typically require utilities to secure additional funding and personnel to meet the new rules. Utilities must adjust O&M of wastewater facilities and collection and transmission systems and fund the capital improvements as needed to comply with the regulations.

Typically, WRFs have efficiencies of scale; that is, a smaller WRF has fewer customers to share the operating, renewal, and replacement costs and therefore a higher cost per customer is the result. However, when the customer base expands and a significant plant expansion is required, the larger plant may have a lower cost per customer.

Owners of smaller treatment plants often face significant expenditures to upgrade their plant to stay in compliance, and the cost per customer to operate and maintain the system becomes excessive. Rather than upgrading, WRF owners decommission the treatment plant by converting it to a lift station and conveying the wastewater through transmission mains to a larger adjacent facility. For example, this has been the case in Englewood where, as part of the Englewood Water District (EWD) Master Plan, smaller treatment plants have been connected to the larger EWD central plant through a network of transmission mains.

3.2 Overview of Existing Utilities

As Charlotte County began to develop in the 1950s, the need for wastewater treatment grew – especially for areas of high density such as mobile home parks, campgrounds, condominiums, and institutions like hospitals where large on-site septic systems were impractical. In these locations, community wastewater treatment systems that used a common collection and central treatment system were implemented. Often, as population increases and more community systems are developed within an area, a public system is established. Public systems serve multiple properties with differing ownerships within their certificated areas. In many cases, to increase efficiency and decrease treatment costs, community systems within the boundary of a public system are connected to the nearest public system, if economically and logistically feasible.

Table 3-2 lists the 22 domestic wastewater utility systems in Charlotte County that are not currently connected to the CCU system. The table divides the systems into community and public throughout the four geographic regions of Charlotte County.

Table 3-2 Domestic Wastewater Utility Systems

Service Area	Public Systems	Community Systems
Mid County	CSWR – Florida[1] Riverwood CDD[2]	Harborview Mobile Home Park
West County	EWD Gasparilla Island Water Association Knight Island Utilities (KIU) Utilities, Inc. of Florida (Sandalhaven)	Gasparilla Mobile Estates Hideaway Bay Beach Club Condo Association, Inc.
South County	City of Punta Gorda	Bay Palms Mobile Home Park Charlotte Correctional Institute Gateway Management Home Owners of Alligator Park, Inc. Palms and Pines, Inc. Pelican Harbor Civic Association, Inc. River Forest Village, Inc. Sun-N-Shade Family Campground, Inc. Villas Del Sol
East County	Babcock Ranch Community ISD[3] were implemented	Paradise Park Condominium Association Sun Mouse Mountain RV[4], LLC

Note: [1] CSWR = Central States Water Resources.
[2] CDD = Community Development District.
[3] ISD = Independent Special District.
[4] RV = Recreational Vehicles.

3.3 SERVICE AGREEMENT CONSIDERATIONS

Due to several large developments being introduced in Charlotte County, the high cost to increase wastewater treatment capacity, and CCU's commitment to upgrade all WRFs to meet AWT requirements, most of the public and community systems presented in Table 3-2 are not being considered to receive future sewer service from CCU. Only the following public utilities with established boundaries, existing customer base, published rules and regulations, and infrastructure are being considered for future incorporation into the CCU sewer system:

- KIU
- Utilities, Inc. of Florida

If community systems that lie within the certificated boundaries of the above-listed public systems are decommissioned and consolidated, they will presumably connect to the public system where they are geographically located. For example, seven of the smaller systems (Home Owners of Alligator Park, Inc., Bay Palms Mobile Home Park, Gateway Management, Palms and Pines, Inc., Pelican Harbor Civic Assoc., River Forest Village, Inc., and Villas Del Sol) all lie within the boundaries of the City of Punta Gorda public system. These systems most likely will connect to the City of Punta Gorda infrastructure and are not considered as potential acquisitions by CCU.

Three of the community utilities listed in Table 3-2 are being considered for connection to the CCU system in the future:

- Harborview Mobile Home Park
- Hideaway Bay Beach Club Condo Association, Inc.
- Sun-N-Shade Family Campground, Inc.

Figure 3-1 shows the community and public domestic wastewater utility systems within Charlotte County with indications as to which areas are and are not being considered for potential future connections to the CCU system.

3.3.1 Regulatory Issues

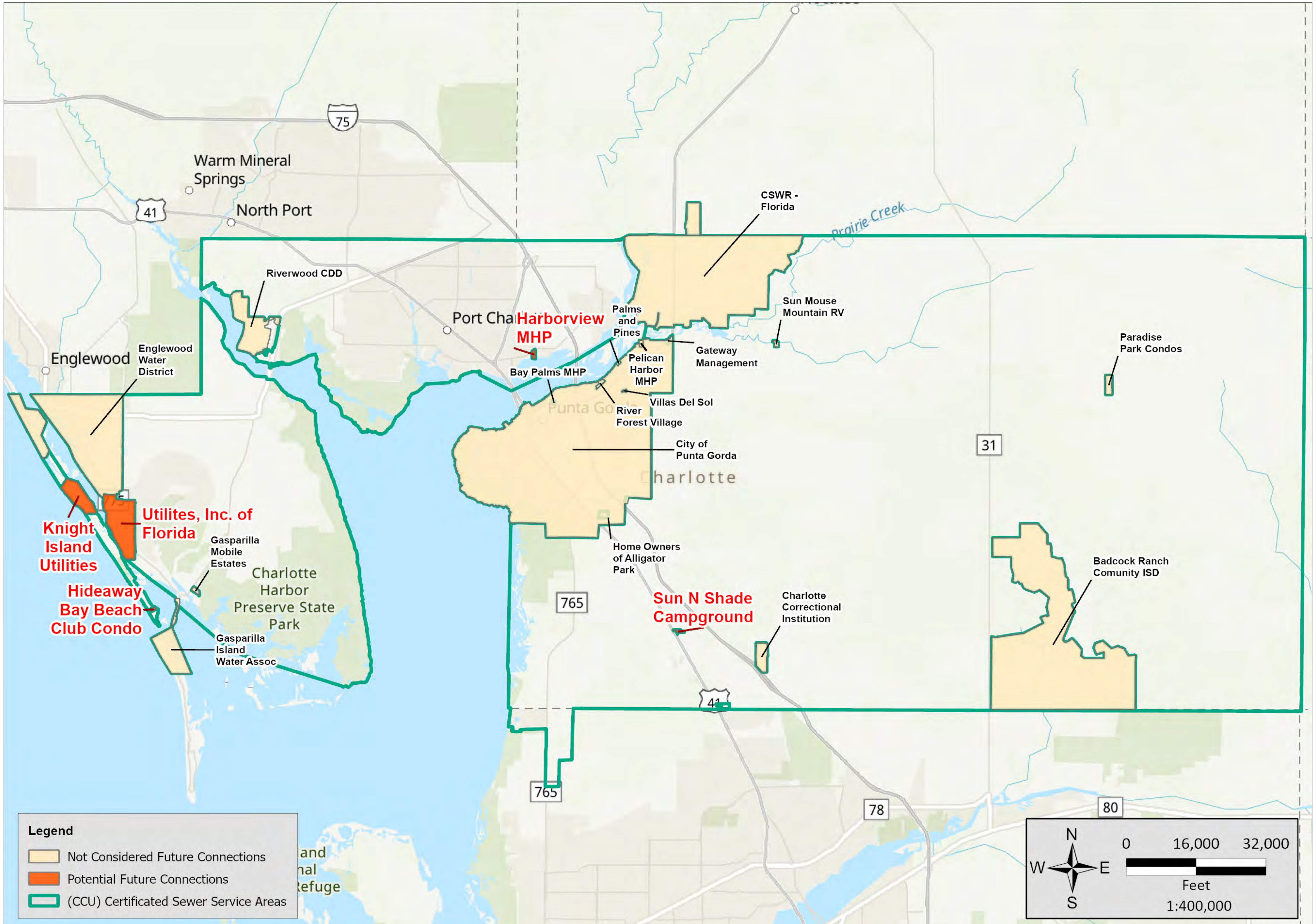
Table 3-3 summarizes the FDEP permits of the utility systems being considered for consolidation and their current statuses. According to FDEP (South District Office – Fort Myers), the Harbor View Mobile Home Park WWTP has received significant out of compliance notices regarding overall facility compliance. The WWTP operating permits are currently active except for Sandalhaven WWTP, which has been decommissioned and its flows diverted to EWD.

Table 3-3 FDEP Permits and Their Status

Facility Name	Facility Owner	Address	Permitted Capacity (MGD)	FDEP WWTP ID	Expiration
Harborview Mobile Home Park WWTP	Harborview Mobile Home Park	24325 Harborview Road, Lot 1-A	0.024	FLA014116	08/26/2024
Hideaway Bay Beach Club Condo WWTP	Hideaway Bay Beach Club Condo Association, Inc.	12000 Placida Road	0.021	FLA014078	09/20/2027
KIU WWTP	KIU	7092 Placida Road	0.055	FLA014095	05/18/2027
Sandalhaven WWTP[1]	Utilities, Inc. of Florida	6811 Placida Road	0.099	FLA014053	02/14/2017
Sun-N-Shade Family Campground STP[2]	Sun-N-Shade Campground Inc.	14880 Tamiami Trail	0.020	FL A014120	12/03/2025

Notes: [1] Sandalhaven WWTP has been decommissioned and its flows have been diverted to EWD.
[2] STP = sewage treatment plant.

Figure 3-1 Domestic Wastewater Utility Systems within Charlotte County



For Informational Purposes Only Document Path: J:\project_Data\03405_Charlotte\053-01_Sewer_Master_Plan_Update\pro\Current_Domestic_Wastewater_Systems_Within_Charlotte_County\Current_Domestic_Wastewater_Systems_Within_Charlotte_County.aprx

Note: According to FDEP, the Gasparilla Mobile Home Estates community has been vacated as of April 30, 2024; the WWTP will be decommissioned in the near future.

3.3.2 Financial Strength

The Public Service Commission (PSC) was contacted to determine the financial health of facility operations. The PSC has information for 165 water, electric, and wastewater utilities throughout the state. Of the five utilities considered for connection to the CCU system, only Utilities, Inc. of Florida (PSC # SU959) is regulated by PSC. No earnings surveillance reports are available, and thus their financial information is unknown. Because the other four utilities are not regulated by PSC, their financial information is also unknown.

3.4 Bulk Service Connection Options

Each sewer utility identified for bulk service would generally connect to a CCU gravity or pressure main via a new transmission system. Typically, transmission system mains are sized for the buildout flow and tied into existing CCU networks that will convey the flow to the appropriate CCU WRF. Ideally, as the transmission infrastructures are expanded, the sequencing of the facility connection occurs in series with the closest facility connected first. However, the timing of connections can frequently depend more on other issues such as expiring permits, failing WWTPs, available funds, or the cost-benefit of constructing new transmission systems.

Approximate costs to install the force main infrastructure from the existing treatment plant to an existing CCU facility using the schematic layouts have been developed. The costs are approximated for the construction of the transmission system and conversion of the WWTP to a pump station only and do not include any WWCS improvements since only the provision of bulk service is expected to be provided by CCU.

3.4.1 MID COUNTY

3.4.1.1 Harborview Mobile Home Park

Charlotte County has recently proposed plans to connect this system as part of a future Harborview Road roadway and wastewater infrastructure construction project. According to the Florida Department of Transportation, the design phase for the project is currently expected to be complete in 2027/2028. CCU Engineering staff are planning to coordinate the wastewater infrastructure and connection to CCU as part of the project.

The facility is an extended-aeration activated-sludge domestic WWTP. In general, the current status of this system is as follows:

- The plant contains five 5,000-gallon aeration tanks, one 5,200-gallon clarifier, one 805-gallon chlorine contact tank, one 952-gallon chlorine contact tank, and one 2,270-gallon sludge-holding tank.
- Disinfection is provided by sodium hypochlorite, and effluent disposal takes place through two rapid infiltration basins (RIBs).

Table 3-4 provides the general background of this WWTP.

Table 3-4 Harbor View Mobile Home Park WWTP

Year Established[1]	Design Capacity (MGD)	Current Capacity (MGD)	General Condition	Regulatory Compliance History
1999	0.024 TMADF[2]	0.024 TMADF[2]	Poor	Poor

[1] Year established is based on the earliest recorded FDEP document.

[2] TMADF = 3-month average daily flow.

CCU is completing a study for installing a new force main as part of the FDOT road widening project along Harbor View Road. The new force main would service the Harbor View Mobile Home Park community and the WWTP would be decommissioned. CCU's evaluation will include determining the required force main size and evaluating the different collection system types. Also, the Mary Lou lift station in the adjacent neighborhood would be taken out of service and the wastewater flows combined and conveyed using the new Harbor View Mobile Home Park system. The preliminary design and opinions of cost will be determined as part of the study.

3.4.2 West County

3.4.2.1 Hideaway Bay Beach Club Condo

Hideaway Bay Beach Club has a small treatment plant on Little Gasparilla Island. Because this is a bridgeless island, any extension of a force main must cross the Intracoastal Waterway. Due to the high capital cost for this subaqueous force man, most likely this project would not be considered for construction unless additional areas on the island were also provided wastewater service. Therefore, the cost per gallon for acquisition of this utility is not considered to be economically feasible at this time.

In general, the current status of this system is as follows:

- The plant consists of a flow splitter box with an influent bar screen, one 8,000-gallon surge tank, four 6,000-gallon aeration tanks, one 6,500-gallon clarifier tank, two sand filters, one 3,000-gallon mud well, one 2,000-gallon chlorine contact tank, and two digesters (one 3,000-gallon and one 5,000-gallon).

Table 3-5 provides the general background of the WWTP.

Table 3-5 Hideaway Bay Beach Club Condo WWTP

Year Established[1]	Design Capacity (MGD)	Current Capacity (MGD)	General Condition	Regulatory Compliance History
1998	0.021 AADF	0.021 AADF	Poor	Poor

[1] Year established is based on earliest recorded FDEP document.

Figure 3-2 shows the proposed connection, and Table 3-6 provides the cost estimate for this option.

Figure 3-2 Hideaway Bay Beach Club Connection Route

Table 3-6 Hideaway Bay Beach Club Connection Opinion of Cost[1]

Description	Quantity	Unit Cost	Extension
6-inch PVC Open Cut	1,130	$200	$230,000
8-inch HDPE Directional Drill	5,150	$350	$1,800,000
WWTP Decommission	1	$100,000	$100,000
WWTP Demolition (if needed)	1	$200,000	$200,000
New Lift Station	1	$750,000	$750,000
Subtotal	—	—	**$3,080,000**
Mobilization and Contingency	—	—	$1,000,000
Engineering Design Services (15%)	—	—	$450,000
Total (Rounded)	—	—	**$4,600,000**

Note: — = Not Applicable; HDPE = high-density polyethylene.

[1] Opinion of cost is Class 5 with typical accuracy range of -50 to +100 percent.

3.4.2.2 Knight Island Utilities

KIU operates a WWTP primarily for its resort on this bridgeless island. The unused 6-inch directionally drilled main at the end of Panama Boulevard and the ferry landing could be extended to the existing KIU treatment plant. Similar to Hideaway Bay Beach Condo, connection of KIU will be more economically feasible for financially responsible parties if additional connections can be made in the area. However, that may require an upsize to the existing 6-inch directionally drilled main. Once to the mainland, a somewhat direct force main running east toward Rotonda WRF seems to be a reasonable option.

In general, the current status of this system is as follows:

- The plant consists of a bar screen, two aeration tanks with a total volume of 54,700 gallons, one 30,600-gallon final settling tank, one 15,000-gallon aerobic sludge digester, two multi-media tertiary filters with a total filter area of 52 square feet, one 5,000-gallon backwash holding tank, one 5,000-gallon mud well, one 4,000-gallon dosing chamber, and one 4,000-gallon chlorine contact chamber.
- Disinfection is provided by liquid sodium hypochlorite.

Table 3-7 provides the general background of the WWTP.

Table 3-7 KIU WWTP

Year Established[1]	Design Capacity (MGD)	Current Capacity (MGD)	General Condition	Regulatory Compliance History
1994	0.055 AADF	0.055 AADF	Fair	Fair

[1] Year established is based on the earliest recorded FDEP document.

Figure 3-3 shows the proposed connection, and Table 3-8 provides the cost estimate for this option.

Figure 3-3 KIU Connection Route

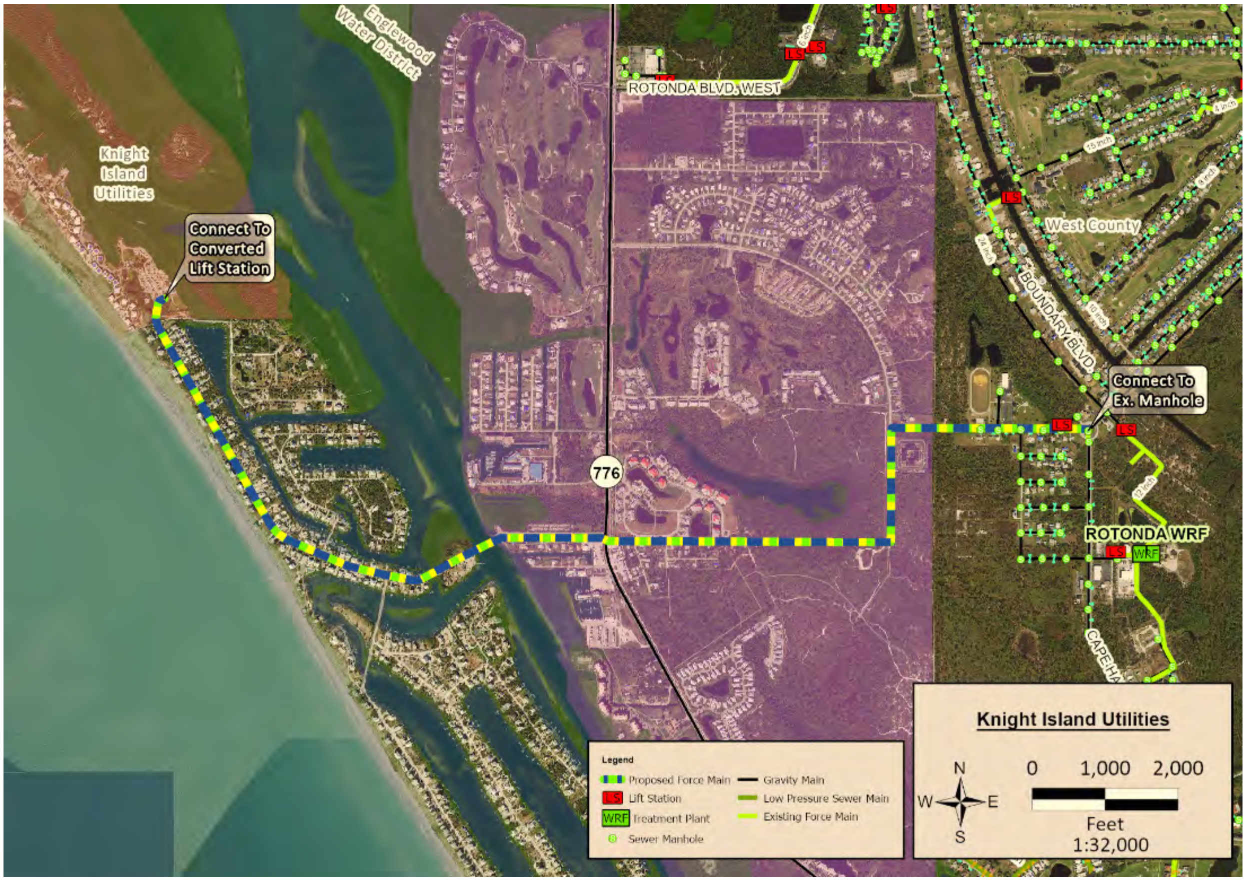


Table 3-8 KIU Connection Opinion of Cost[1]

Description	Quantity	Unit Cost	Extension
6-inch PVC Open Cut	10,350	$200	$2,070,000
8-inch HDPE Directional Drill	2,400	$300	$720,000
8-inch HDPE Directional Drill	1,725	$350	$600,000
WWTP Decommission	1	$100,000	$100,000
WWTP Demolition (if needed)	1	$450,000	$450,000
New Lift Station	1	$1,000,000	$1,000,000
Subtotal	—	—	**$4,940,000**
Mobilization and Contingency	—	—	$1,000,000
Engineering Design Services (15%)	—	—	$750,000
Total (Rounded)	—	—	**$6,700,000**

Note: — = Not Applicable.

[1] Opinion of cost is Class 5 with typical accuracy range of -50 to +100 percent.

3.4.2.3 Utilities, Inc. of Florida (Sandalhaven)

Because the Sandalhaven WWTP has been decommissioned, CCU has indicated that future connection to the CCU sewer system rather than the current connection to the EWD system is a possibility.

Figure 3-4 displays a potential layout for this connection, and Table 3-9 provides a cost estimate for the connection.

Figure 3-4 Utilities, Inc. of Florida Connection Route

Table 3-9 Utilities, Inc. of Florida Connection Opinion of Cost[1]

Description	Quantity	Unit Cost	Extension
12-inch PVC Open Cut	4,190 LF	$400	$1,700,000
Mobilization and Contingency (20%)	—	—	$340,000
Engineering Design Services (15%)	—	—	$260,000
Total (Rounded)	—	—	**$2,300,000**

Note: — = Not Applicable.

[1] Opinion of Cost is Class 5 with typical accuracy range of -50 to +100 percent.

3.4.3 SOUTH COUNTY

3.4.3.1 Sun-N-Shade Family Campground

This campground is not near any existing CCU transmission lines and would require a significant length of force main to connect to the nearest existing transmission line. Most likely this sewer connection will be made once new developments are constructed in the vicinity. Figure 3-5 shows this proposed connection.

The system is an extended-aeration WWTP. In general, the current status of this system is as follows:

- The plant consists of one 5,000-gallon surge tank, four 5,000-gallon aeration tanks, one clarifier with a surface area of 75 square feet, one 2,900-gallon chlorine contact tank, and two 4,000-gallon aerobic digesters.
- Disinfection is provided by liquid sodium hypochlorite.

Table 3-10 provides the general background of the WWTP.

Table 3-10 Sun-N-Shade Family Campground WWTP

Year Established[1]	Design Capacity (MGD)	Current Capacity (MGD)	General Condition	Regulatory Compliance History
1999	0.020 AADF	0.020 AADF	Poor	Poor

[1] Year established is based on the earliest recorded FDEP document.

Figure 3-5 Sun-N-Shade Family Campground Connection Route

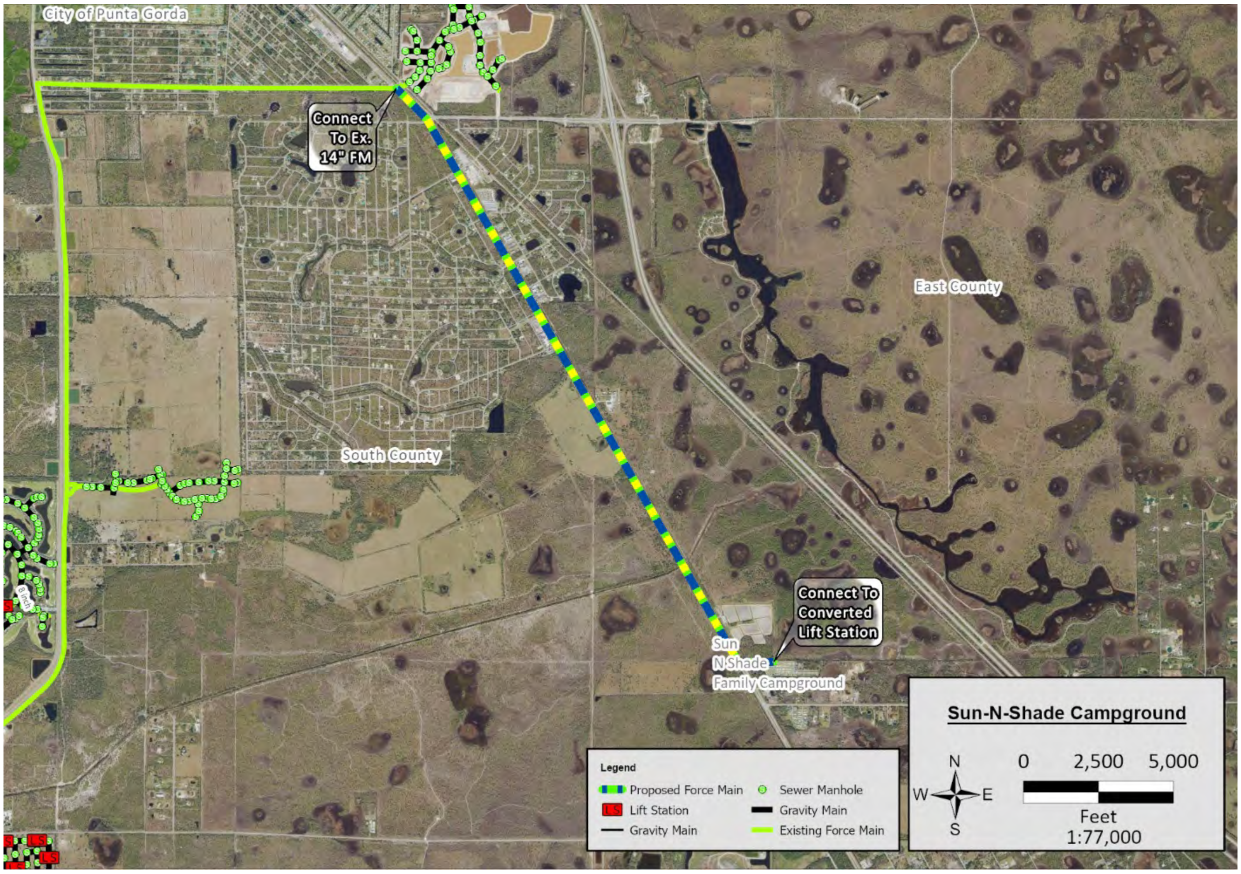


Table 3-11 provides the cost estimate for the primary option along Zemel Road.

Table 3-11 Sun-N-Shade Family Campground Connection Opinion of Cost[1]

Description	Quantity	Unit Cost	Extension
4-inch PVC Open Cut	980	$100	$100,000
8-inch PVC Open Cut	22,310	$200	$4,500,000
WWTP Decommission	1	$100,000	$100,000
WWTP Demolition (if needed)	1	$450,000	$450,000
New Lift Station	1	$750,000	$750,000
Subtotal	—	—	**$5,900,000**
Mobilization and Contingency (20%)	—	—	$1,200,000
Engineering Design Services (15%)	—	—	$900,000
Total (Rounded)	—	—	**$8,000,000**

Note: — = Not Applicable.

[1] Opinion of cost is Class 5 with typical accuracy range of -50 to +100 percent.

3.5 PRIORITIZATIONS

The priority and sequencing of connecting utilities to the CCU sewer systems depend on the desire of the utility owner and CCU to connect their systems and the cost associated with connecting the systems. Table 3-12 summarizes CCU's feasible consolidation options and the associated costs. The cost and the permitted capacity were used to determine the cost benefit of each connection based on the cost per gallon to connect. The sequencing for connecting the utilities is discussed in Chapter 7.

Table 3-12 Connection Options Summary

Utility	Cost to Connect	Capacity (gpd)	Approximate Cost/Gallon
Hideaway Bay Beach Club Condo	$4,600,000	21,000	$243
Knight Island Utilities	$6,700,000	55,000	$111
Utilities, Inc. of Florida	$2,300,000	99,000	$17
Sun-N-Shade Family Campground	$8,000,000	20,000	$800

Note: gpd = gallons per day.

Harborview Mobile Home Park opinion of cost not included. The County is currently completing a study to determine details to decommission the plant and tie-in a new collection system and lift station into the proposed lift station along the Harbor View Road.

The cost to install some of the transmission systems should not be wholly attributed to the utility being connected because some of the transmission piping is sized to accommodate other future connections adjacent to the transmission line. For example, the Sun-N-Shade Family Campground 12-inch transmission line proposed along Zemel Road is sized to serve future connections. Consequently, the cost per gallon is skewed higher for that facility. Sun-N-Shade Family Campground is a good example where an existing WWTP may not be economically feasible to connect until a later time when additional developments or connections (from S2S project) are available in the vicinity.

Lastly, cost calculations consider the permitted capacity of each WWTP rather than actual flows, which could significantly alter the true cost per gallon. Therefore, the ranking and prioritization of each connection will be determined in detailed preliminary engineering reports, which will consider all possible options for connection and determine the most feasible solution.

4 SEWER IMPROVEMENT AND INFILL

OVERVIEW

This chapter reviews the history of S2S conversions in Charlotte County and presents the CCU sewersheds and methodology used to identify project areas for economical sewer improvements and sustainable infill. Environmental scoring criteria were developed to identify project areas that maximize environmental benefits and provide long-term reductions in nutrient loading to Charlotte Harbor.

4.1 WATER QUALITY IMPROVEMENTS (S2S CONVERSIONS)

As Chapter 1 discusses, studies have shown that septic systems can negatively impact water quality due to aging systems and inadequate effluent treatment, posing environmental concerns and health risks. Inadequate effluent treatment by septic systems is common in Florida due to a high groundwater table and porous soils and bedrock. To improve water quality, Charlotte County has committed to identifying priority areas in which to eliminate aging and inadequate septic systems by installing new sewer collection systems. Properties in these areas are then connected to a centralized sewer system, which sends the wastewater to one of CCU's four WRFs for treatment and nutrient removal. The result is an overall improvement to water quality in Charlotte Harbor and its connecting surface water bodies (i.e., Peace and Myakka Rivers). The Florida Legislature passed HB 1379 in 2023, which ultimately limits areas where septic systems are allowed and requires utilities within certain regions to convert properties from septic systems to sanitary sewer systems.

With the 2017 SMP, Charlotte County adopted a focus on water quality improvement (WQI) opportunities, primarily through S2S conversion projects. Since that time, additional WQI opportunities have been added, including a commitment to upgrade each WRF to meet AWT treatment standards. CCU has planned and is actively pursuing AWT projects at the WRFs to aid in WQI while maintaining a commitment to S2S conversion projects that are a great way for community residents to make a direct impact for improving water quality in Charlotte County. Key points include:

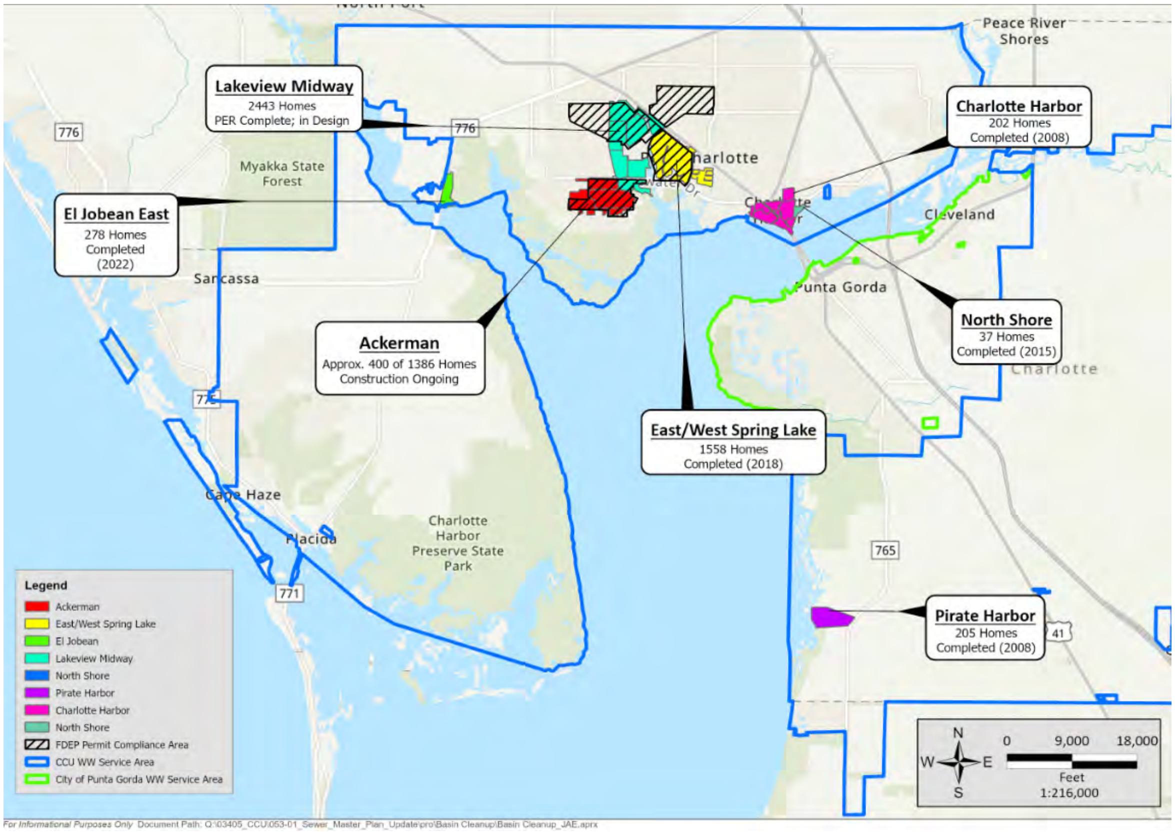
- **One Charlotte, One Water Initiative:** This is a holistic approach to water quality in which all water – harbor, rivers, bays, canals, creeks, potable water, wastewater, stormwater, and reclaimed water – is treated as one water. Thus, improving overall water quality is a key objective. Part of this initiative includes water quality monitoring.
- **Water Quality Monitoring Program:** Charlotte County implemented the first phase of its Ambient Surface Water Quality Monitoring Program in 2022. Since 2009, South Gulf Cove has also funded the collection of quarterly water quality samples at five locations in their area.
- **AWT Plants:** In accordance with SB 64 (passed in 2021), the BCC approved a motion to improve all Charlotte County WRFs to AWT standards, improving the quality of reclaimed water and reuse opportunities. The SB 64 legislation requires the East Port WRF to upgrade to AWT standards, but the County has proactively committed to meet AWT

standards at all its WRFs. The County continues to explore economically feasible opportunities to achieve AWT standards. Achieving these standards will reduce nitrogen loading to the environment. Chapter 6 further discusses the AWT plans for each WRF.

- **Septic System Removal:** CCU wastewater service area currently includes an estimated 32,000 septic systems, many of which are aging and do not meet current standards (pre-1983 construction). Charlotte County developed the 2017 SMP to include a comprehensive S2S program with the objective of converting approximately 1,000 homes per year from S2S. Due to limited state appropriations, unexpected delays, labor shortages, escalated construction costs, etc., approximately 330 conversions per year have been achieved since 2017. Figure 4-1 highlights the County's complete S2S projects to date. The key to advancing the S2S projects is further development of the County's *One Charlotte, One Water* and the Water Quality Monitoring programs and the RAP to gain opportunities for state appropriations and make S2S projects more economically feasible.
- **Reasonable Assurance Plan (RAP):** The best economic approach for the County to progress their objective of eliminating septic systems is to develop an RAP or alternative restoration plan for Charlotte Harbor and tributary waters which will provide the County an advantage for state grants and funding opportunities. The RAP will establish nutrient impacts to the local waterbodies and define nutrient loading limitations through real water quality monitoring data. Once a RAP is established, then applicable WRFs will be required to meet AWT standards within 10 years, according to Florida Statute (FS) 403.086.
- **Compliance Monitoring Program:** FDEP Permit No. 08-0210682-001 was established in 2007 with USACE under the *Manchester Boat Lock Removal Plan*. Special Condition No. 18 outlined priority areas for sewer expansion that included portions of the Little Alligator drainage basin that have been identified as having on-site disposal systems that do not treat wastewater to current standards (i.e., those on-site disposal systems were built before 1983). Figure 4-1 outlines the priority areas. The County must submit annual Compliance Monitoring Reports to update FDEP on the progress of S2S conversions in these priority areas. Appendix D contains the *2023 Compliance Monitoring Report*. Although this action has no set completion timeframe requirement, the BCC has committed to prioritizing these areas under the 2024 SMP S2S CIP plan.

In line with the focus on WQI, the 2017 SMP recommended 44 S2S conversion project areas that featured eliminating septic systems and connecting approximately 15,000 septic systems over 15 years, or a rate of approximately 1,000 per year. The number of septic systems within the CCU service area totaled approximately 27,000 in 2017, but since then CCU has completed approximately 2,330 S2S conversions, equal to a rate of 330 conversions per year. However, approximately 7,000 new septic systems have been permitted and constructed for new single-family residential homes in unserved areas, or a rate of approximately 1,000 new septic systems per year. Therefore, the net total of septic systems in the CCU service area has increased to approximately 32,000 septic systems. At the current rate of conversion, 32,000 S2S conversions would result in a timeframe of close to 95 years for the County to eliminate septic systems within its service area. Improving water quality is a high priority for the County; thus, updating the SMP and re-establishing the plan for S2S conversion areas is prudent. The project prioritizations in this 2024 SMP Update were planned based on a target conversion rate of approximately 1,000 S2S conversions per year.

Figure 4-1 Charlotte County Existing S2S Conversions



In addition to the areas converted as part of the CIP projects, Charlotte County has continued to improve water quality in the environment by engaging in several additional S2S conversion project areas. Table 4-1 shows the project areas in Charlotte County where CCU has completed installation of centralized sewer systems and eliminated septic systems, as well as areas that are in progress. Table 4-1 summarizes these areas including the project area name, project status, year, and number of conversions required and completed.

Table 4-1 Project Areas with Conversions Completed or in Progress

Project Area Name	Year	Project Status	# of Conversions Total Required	# of Conversions Completed
Ackerman	2021	In Construction	1386	~500
Charlotte Harbor	2008	Completed	202	202
East/West Spring Lake	2018	Completed	1,558	1,558
El Jobean East	2022	Completed	278	278
Lakeview Midway[1]	2023	In Design[1]	2,443	0
North Shore	2015	Completed	37	37
Pirate Harbor	2008	Completed	205	205
Cape Haze	2024	Postponed	0	0
Totals			**6,331**	**2,680**

[1] Construction not yet started; currently in design stage.

4.2 EXISTING SEWERSHEDS

Sewersheds refer to the geographic basin in which the wastewater flows are conveyed to each lift station or pump station. Figure 4-2 shows CCU's wastewater service area and the sewersheds currently being served by CCU (total of 269 sewersheds). Mid County contains 174 sewersheds that serve approximately 17,400 acres, or 45 percent of the Mid County buildout area. West County contains 89 sewersheds representing approximately 56 percent of the West County buildout area. South County contains six sewersheds representing approximately 34 percent of the South County buildout areas. East County does not contain any CCU wastewater infrastructure.

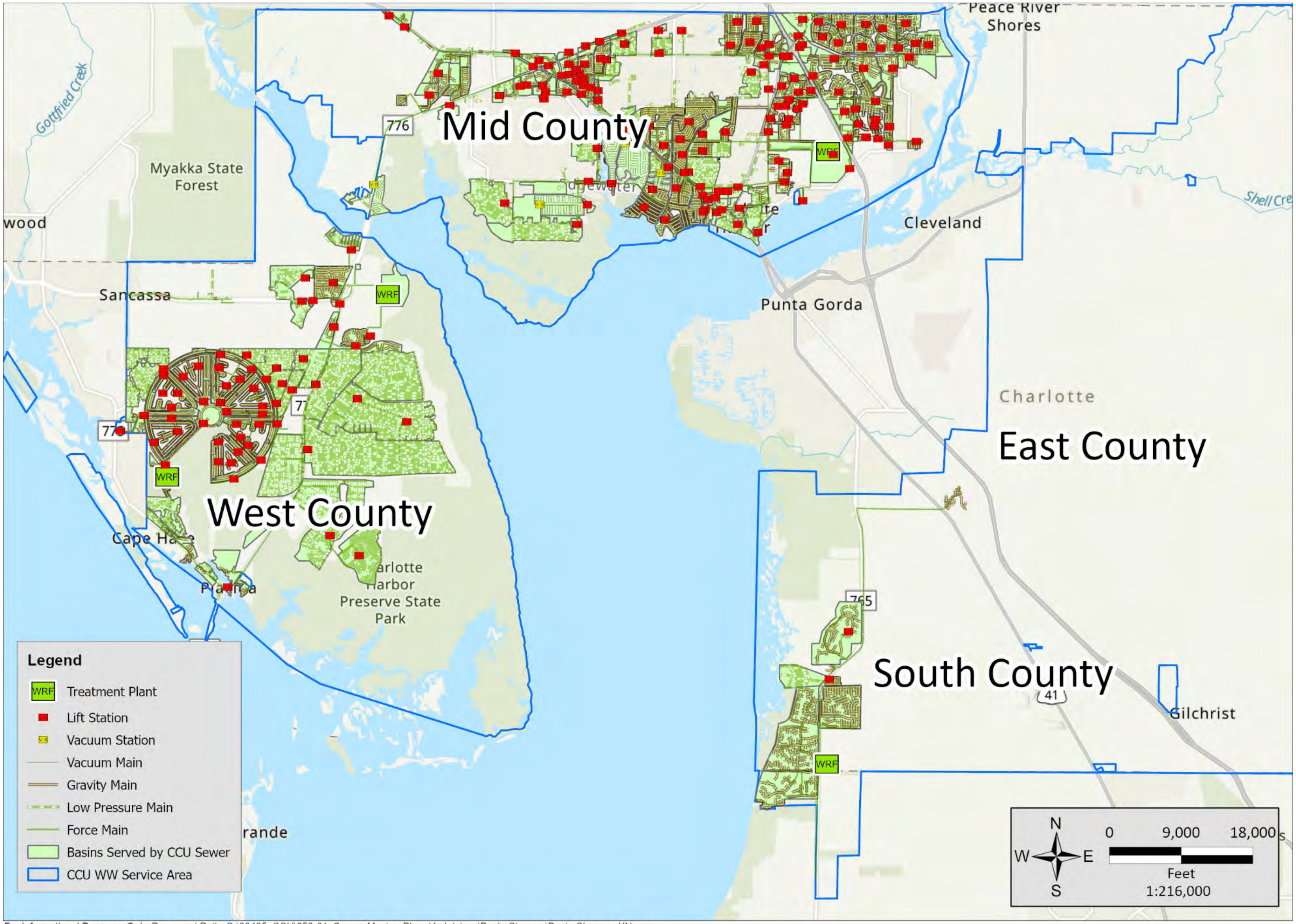

Port Charlotte, Florida

4.3 PROJECT AREA DEVELOPMENT

Project areas for future sewersheds were delineated by performing a geospatial analysis by simultaneously considering the following items:

- CCU certificated service area boundaries.
- Other certificated service area boundaries.
- Current sewer system infrastructure.
- Topography.
- Dwelling unit density.
- Lift or pump station capacity.
- Information gathered in CCU workshops.
- Flow projections.
- Geospatial barriers such as major roadways and waterways.
- Site planning of ongoing developments.

Figure 4-2 Existing Sewersheds



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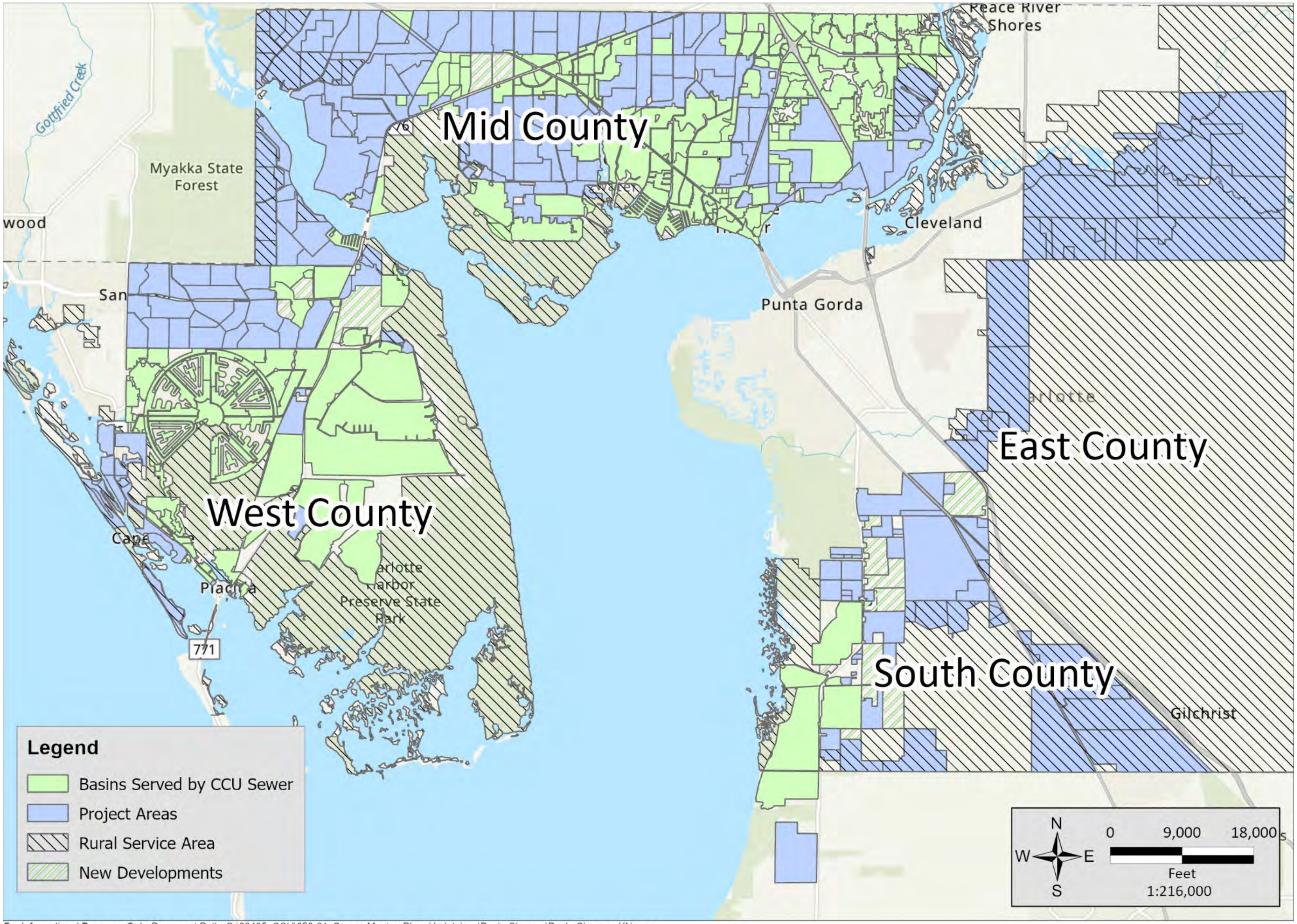
Project areas were reevaluated and refined as part of the 2024 SMP Update. A screening process was conducted to exclude economically unfeasible sewersheds within rural service areas, which are typical of agricultural, vacant, and/or scarcely populated lands that are distant from CCU infrastructure. This screening process primarily eliminated sewersheds in East County and some in South County. Additionally, new developments in progress were not considered as potential project areas because they are assumed to be connecting directly to CCU sewer service upon completion.

Figure 4-3 shows the existing sewersheds, new developments, rural service areas, and the proposed project areas within the County service areas. A total of 245 project areas were identified within the CCU certificated service area boundaries before the screening process. After screening, 169 project areas remain for prioritization consideration.

Bayshore Live Oak Park, Florida

Figure 4-3 Charlotte County Existing Sewersheds and Project Areas for Future Sewersheds



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4.4 Environmental Assessments

Environmental scoring criteria were then developed to prioritize the level of importance of converting septic systems to CCU sewer for each project area. The criteria included three criterion within each project area:

- Proximity to waterways.
- Age of septic systems.
- Density of septic systems.

Figures were developed to display the impact factors of the environmental scoring criteria for each project area.

Environmental assessments were reevaluated as part of this 2024 SMP Update. As part of the reevaluation, the proximity to waterways dataset was refined to include only those waterways that discharge into Charlotte Harbor, whether directly or via another connecting waterway. Additionally, the nitrogen-loading criterion from the 2017 SMP was changed to focus on the density of septic systems to better align with HB 1379 and to highlight the correlation of septic tank density with nitrogen loading. The criterion for the age of septic systems remained unchanged.

4.4.1 Criteria 1: Proximity to Waterways

Numerous studies have indicated that nutrients from septic system effluents enter the groundwater if conditions are not sufficient for septic system effluent treatment. As Chapter 1 explains, the groundwater throughout Charlotte County flows to Charlotte Harbor through surficial aquifers and/or contributing streams, canals, and rivers. Therefore, project areas were ranked from 1 to 5 based on the distance from the project area to these surface water bodies. A score of 5 represents project areas less than 100 feet from surface water bodies that are hydraulicly connected to Charlotte Harbor. The lowest score of 1 represents areas greater than 800 feet from a connecting surface water body. Figure 4-4 outlines the results of this study, showing that approximately 78 percent of the project areas received a score of 5.

Figure 4-4 Current Priority Map – Proximity to Surface Water

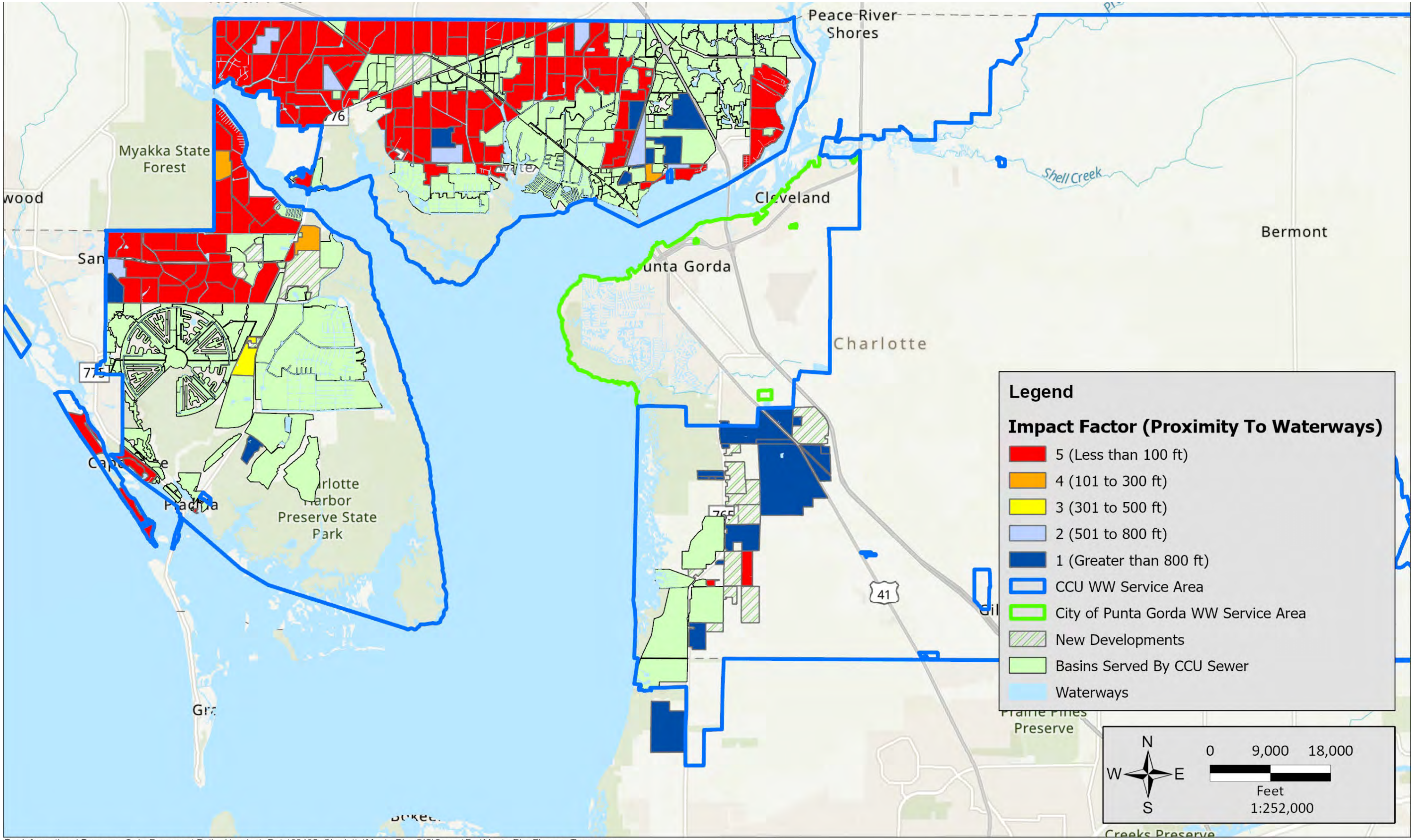

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Figure 4-4 is an impact map depicting the project area proximities to surface waters throughout the County service areas. Most of the project areas within the County service area are less than 100 feet from a surface water body that leads to Charlotte Harbor and therefore received a score of 5.

4.4.2 Criteria 2: Age of Septic Systems

The septic system age provides an estimate of its functionality, likelihood of failure, and design criteria. For instance, septic systems built before 1983 did not have to meet the current State requirements regarding groundwater separation and surface water setback distances. The age of the existing septic systems in Charlotte County was estimated using 2023 Florida Water Management Inventory (FLWMI) GIS data and property appraisal data.

The septic system age for each project area was calculated as the average septic system age for lots within the project area. Each project area was assigned a septic system age impact factor between 1 and 5, based on the scoring criteria.

The basis for the scoring criteria was derived from a number of sources. The US Environmental Protection Agency (EPA) reports that the average drainfield life is 15 years with a typical maximum drainfield life of 20 to 25 years (EPA, 1999; 2000). In 1983, regulatory agencies in Florida established an agreement to coordinate the regulation of septic systems. Additional research suggests the maximum life of a septic system is 40 years (NewTechBio, 2012; InspectApedia.com, 2017a and 2017b). Figure 4-5 displays the average septic system age for each project area. Results indicate that approximately 82 percent of the project areas contain septic systems that were installed more than 25 years ago.

El Jobean Boat Ramp, Florida

Figure 4-5 Current Priority Map – Age of Septic Systems

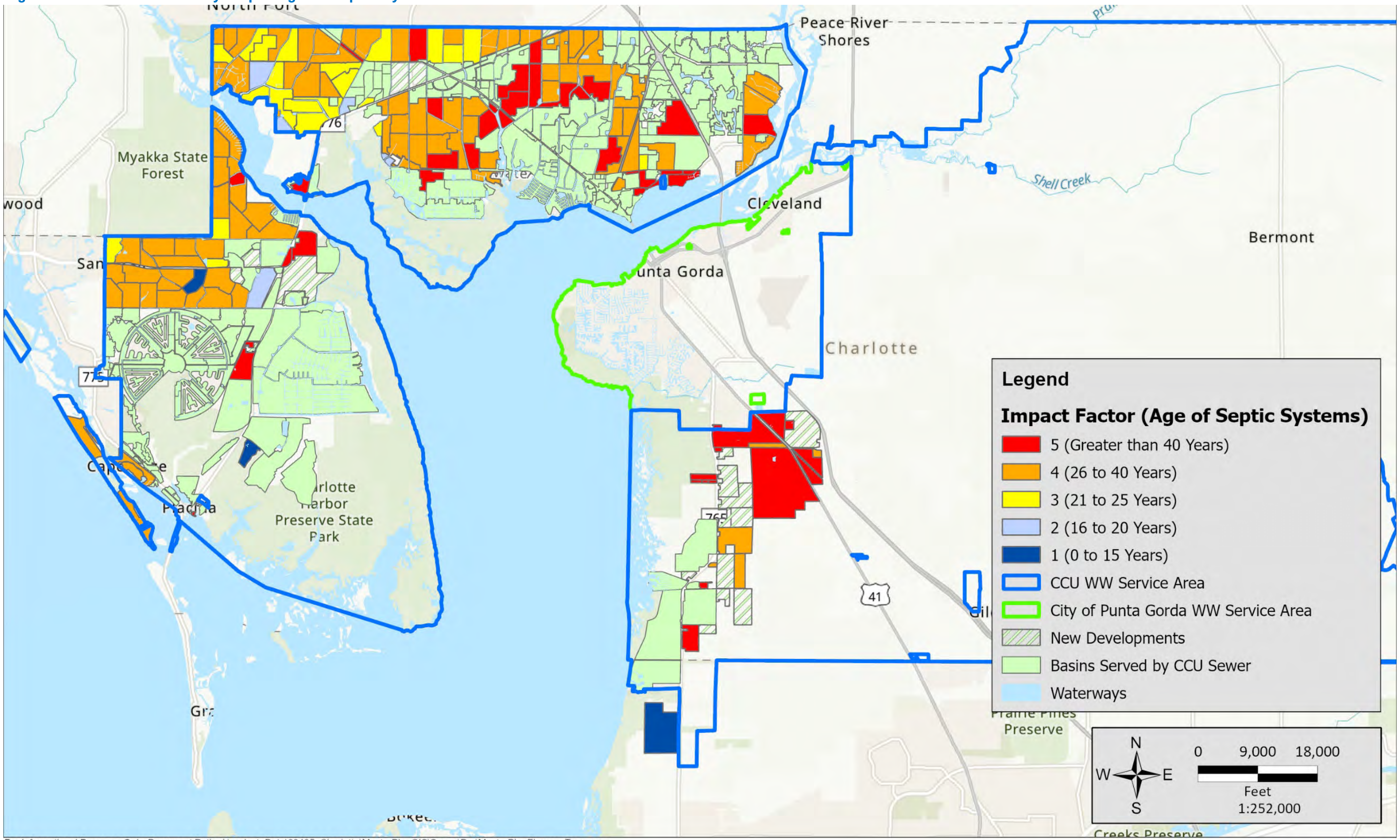

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Figure 4-5 shows the average septic system age per project area in the County. The majority of project areas contained an average septic system age greater than 25 years old, which results in impact scores of 4 to 5. Only three project areas throughout all three regions contained septic systems younger than 16 years old.

4.4.3 Criteria 3: Density of Septic Systems

The density of septic systems in an area directly affects nitrogen loading by influencing the amount of nitrogen released into the environment and the capacity of the soil and water systems to manage and process it. As HB 1379 demonstrates, legislation in Florida continues to prioritize the need for S2S conversions in areas with greater septic system density.

The number of septic systems within the three geographic regions of Charlotte County being considered for S2S prioritization was determined using 2023 FLWMI data provided by FDOH. The existing septic systems by service area are estimated as:

- Mid County – 17,467
- West County – 8,760
- South County – 1,360

Figure 4-6 shows the average density of septic systems for each project area.

4.4.4 Average Impact Score

The three environmental assessment criteria impact scores were averaged for the project areas throughout the County service area. Figure 4-7 displays the average impact score for each project area in Charlotte County; 57 project areas had an average impact score of 4 or greater. Most of the project areas with the highest impact scores were in Mid County. Table 4-2 lists the number of project areas for each impact score category ranking and summarizes the data shown in Figure 4-7.

Table 4-2 Number of Project Areas Per Impact Score Category

Impact Score	Mid County	South County	West County	Total Project Areas
4.0–5.0	39	0	18	57
3.5–3.9	12	1	12	25
3.0–3.4	41	1	10	52
2.5–2.9	9	1	1	11
<2.5	8	15	1	24

Generally, the areas that provided the highest impact scores were placed into 5-, 10-, and 15-year CIP plans as S2S conversion projects (detailed in Sections 4.7 and 4.8). Section 4.5 discusses the different types of WWCSs for S2S conversion to connect to centralized sewer.

Figure 4-6 Current Priority Map – Density of Septic Systems

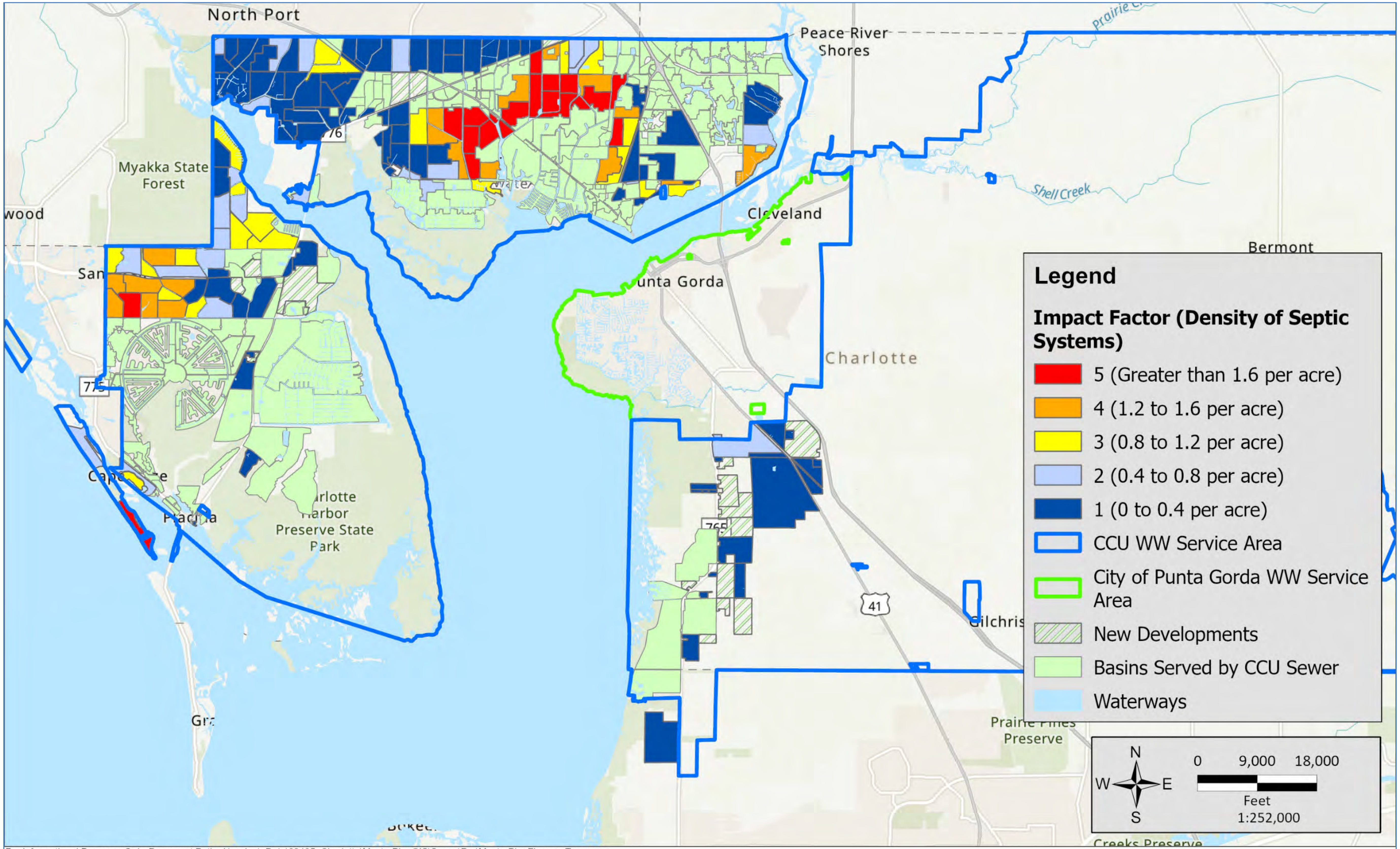

Figure 4-6 shows the density of septic systems within each project area. Mid County has the greatest density of septic systems per project area; South County has the lowest.

Figure 4-7 Current Priority Map – Overall Average Impact Score

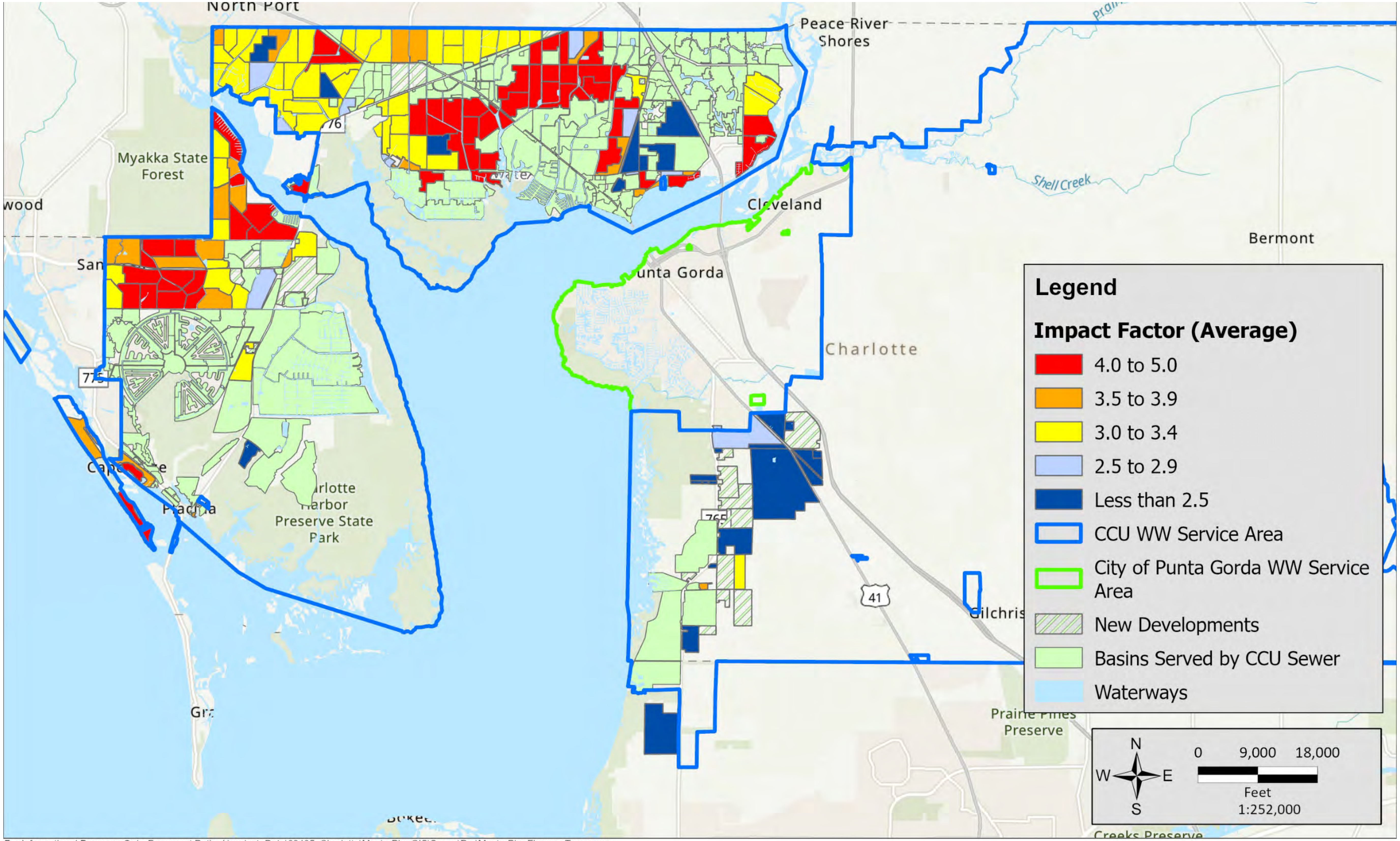

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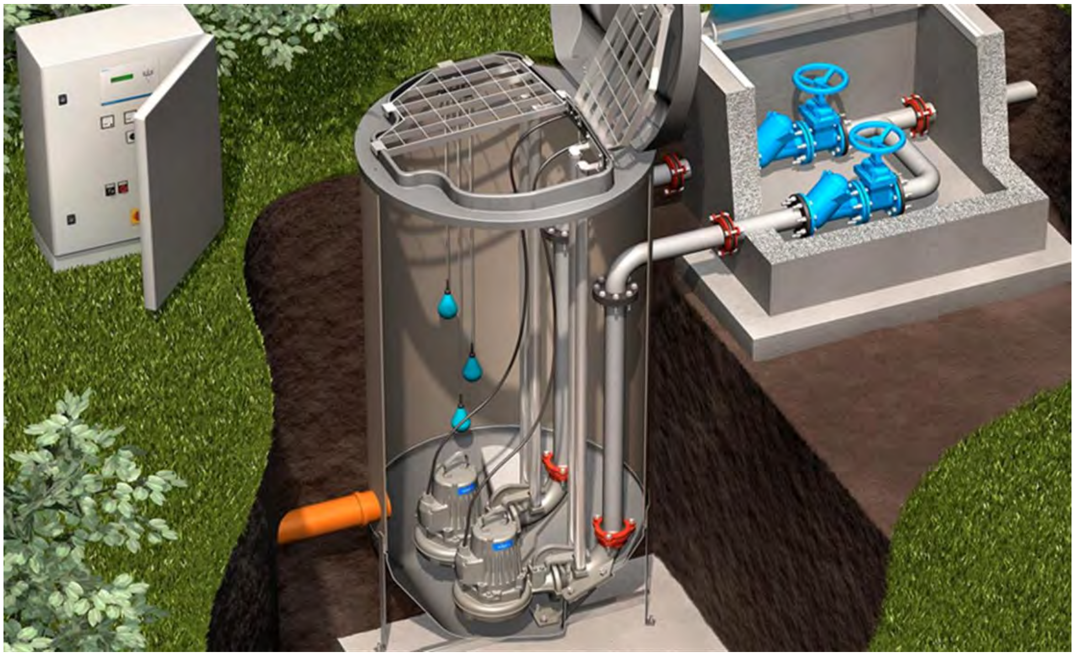
Figure 4-7 displays the average impact score for each project area in Charlotte County. Fifty-seven project areas had overall average impact scores of 4 or greater. All project areas with impact scores of 4 or greater were in Mid County and West County.



(Imaged obtained from Xylem Water Solutions.)

4.5 COLLECTION SYSTEM ALTERNATIVES EVALUATION

Sewer collections systems are generally categorized by their principle of transport, which includes LPS, gravity, and vacuum. The four most common types of sewer collection systems currently implemented in Charlotte County are STEP LPS, grinder pump LPS, gravity collection, and vacuum collection systems. However, Charlotte County has indicated that STEP LPS systems are not a preferred sewer collection system within the County due to high-maintenance labor and replacement of effluent pumps within the County's right-of-way permanent easement/right of entry; therefore, the STEP LPS system will no longer be evaluated as an option, and the term LPS will refer to the grinder LPS system throughout the remainder of this report.

Three preferred sewer collection system types were evaluated to develop an economical centralized sewer collection system for the CCU service areas. The following factors were used to evaluate the sewer collection system alternatives:

- Constructability
- Reliability
- Protection of the Environment
- Ease of Maintenance
- Capital Costs
- O&M Costs

Table 4-3 summarizes the costs per equivalent residential connection (ERC) for the three sewer collection system types evaluated. On-lot and sewer collection system costs comprise total project costs, inclusive of construction and professional services. Annual O&M costs include parts replacement, repairs, labor, and biochemical oxygen demand (BOD) augmentation at the WRFs. The range in sewer collection system costs, including on-lot, demonstrates that the cost can vary within each type of technology depending on project-specific factors such as the availability of nearby infrastructure or a change in topography.

Table 4-3 Cost Comparison Summary Per ERC

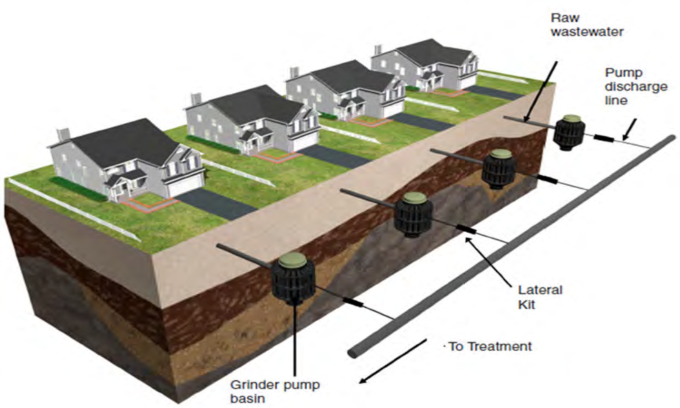
Sewer Collection System Technology	On-Lot	Total Project Including On-Lot	Annual O&M	Approximate 40-Year Present Worth
Grinder Pump LPS	$9,750	$30,600–$31,600	$870-$980	$45,450–$48,400
Gravity Collection	$4,750	$47,800–$57,800	$350–$500	$53,800–$66,300
Vacuum Collection	$4,750	$25,400-$27,600	$420–$540	$32,600–$36,900

Note: Costs updated from 2017 based on recent project costs and information provided by GWE.

Other WWCS technologies are used in the industry, including small-diameter gravity systems. However, for this SMP Update, the County's most common and preferred sewer types were evaluated to determine a feasible County-wide sewer collection system technology. The County is continually evaluating alternative sewer technologies and considers the most current technologies when designing a WWCS for a particular area.

4.5.1 Grinder Pump LPS System

A grinder pump LPS system consists of conventional drain, waste, and vent piping within the residence connected to the packaged grinder pump basin. The grinder pump basin is typically installed outdoors and below grade and usually serves one to several residence/commercial units. Grinder pumps discharge a finely ground slurry into small-diameter pressure piping. In a completely pressurized sewer collection system, all piping downstream from the grinder pump (including laterals and mains) will normally be under low pressure (60 pounds per square inch gauge [psig] or less). The system comprises a grinder pump basin at each home or strategically located common site on private property connected to the sewer collection system by a small (typically 2-inch minimum) pressurized pipe. The grinder pump basins may or may not be owned by the utility; perpetual maintenance and its associated costs impact the utility if the pump is not owned by the property owner. Small-diameter-pipe pressure mains can be laid along existing roadways with minimum disruption to streets, sidewalks, lawns, driveways, and underground utilities. The smaller size of the pipe and grinder pump results in fairly minimal disturbance to the homeowner's or commercial property. The typical shallower excavation requirements usually result in less dewatering, and I&I is less than that of gravity systems.



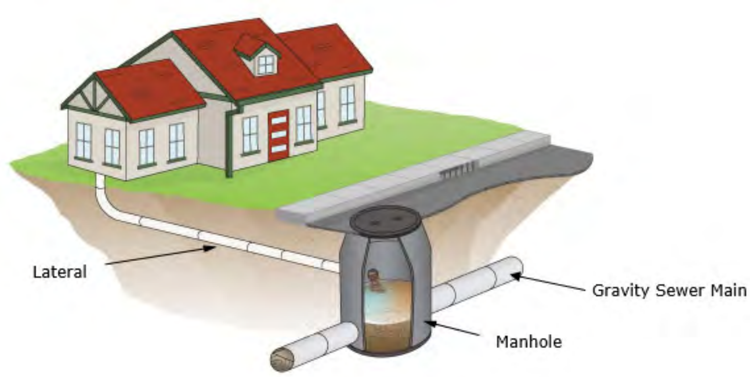
(Schematic from Multi Lake Water and Sewer Authority.)

Surface restoration costs are similarly minimized. However, considerable O&M costs are associated with maintaining the grinder pumps if it is the utility's responsibility.

Grinder Pump Basin Installation

4.5.2 Gravity Collection System

Gravity collection systems are a common and traditional method to collect wastewater for public utilities. Wastewater exits the home through pipes, referred to as laterals, installed at a slope so that the wastewater flows by gravity. These service laterals are used to connect each home to the gravity sewer mains. The gravity system then flows to lift stations in the area. Manholes are typically required approximately every 400 feet or at each bend. The lift stations pump the wastewater into force mains that transport the collected wastewater to other lift stations or to WWTPs or WRFs for treatment. Construction of a gravity system results in a greater disturbance to the developed land (e.g., yards/landscaping, roadway, sidewalks, driveways, other utilities) due to larger pipe sizes and deeper installation. Conflicts with existing utilities are a common issue with gravity systems because of inflexibility in installation depths to maintain adequate slopes. These systems are also somewhat susceptible to I&I, resulting in greater flows to lift stations and WWTPs or WRFs. Due to the high groundwater table in the CCU service areas and the depth of construction associated with gravity systems, a significant amount of dewatering would likely be required.

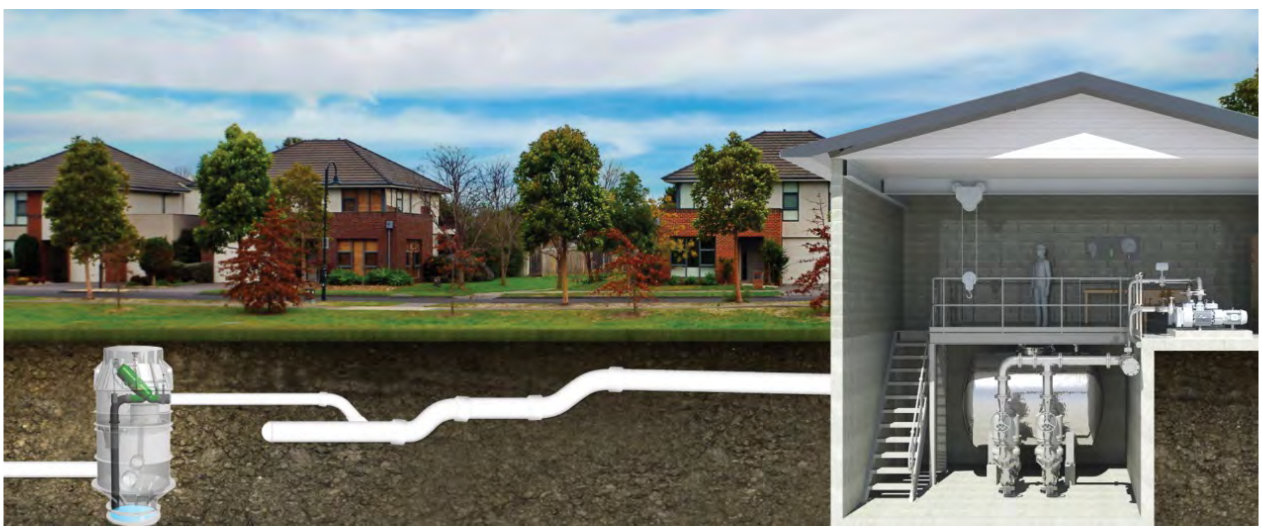


(Schematic from Royal Melbourne Institute of Technology University.)

However, gravity systems are typically more dependable than other systems since the mechanical and electrical components are only at the lift stations. The maintenance of the service lateral on the property to the right-of-way is the property/commercial owner's responsibility, which can reduce the overall maintenance costs for the utility.

4.5.3 Vacuum Collection System

The vacuum sewer system includes a valve pit serving two to four homes, a vacuum collection system, and a vacuum collection station with pumps (vacuum and pressure). In a vacuum system, wastewater flows by gravity from the homes/structures into a valve pit. Small-diameter gravity piping (minimum 4 inches diameter) is installed at relatively shallow depths of 4 to 6 feet at a minimum slope. The valve pits have a pneumatic valve that operates by pressure (no electrical power is required). The valve pit pneumatic valve opens automatically when a given quantity of wastewater accumulates in the valve pit. The vacuum collection system operates under a negative pressure/vacuum. The wastewater is transported by vacuum until it ultimately discharges into a vacuum collection station. The vacuum collection station takes the place of a conventional pump station by collecting, storing, and pumping the wastewater via pressure through a force main to the WWTP or WRF. The disturbance to developed land and homeowners'/commercial properties as a result of construction is less than the disturbance caused by constructing a gravity collection system.



(Schematic from FloVac, Palm Coast, Florida.)

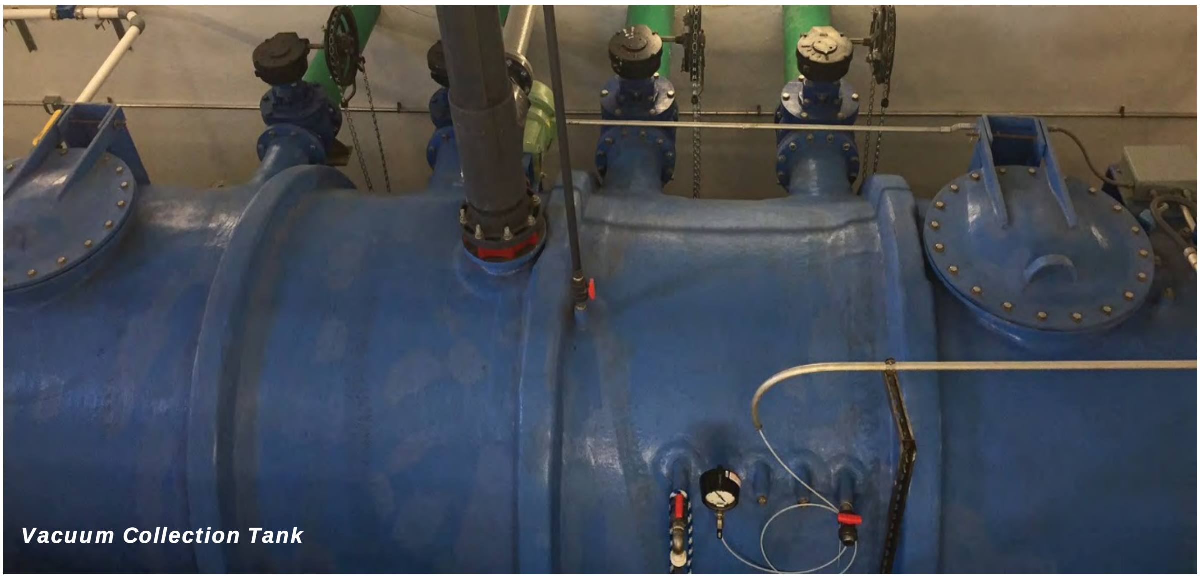
For the project area sizes proposed in this SMP, the capital costs associated with vacuum collection systems are similar to LPS systems, but with slightly less O&M costs over time.

These systems have been proven to be reliable. If a vacuum line breaks, minimal outfall of wastewater occurs. Also, very little I&I occurs compared to gravity and LPS collection systems. The vacuum system requires more O&M than a gravity collection system since the pneumatic valve pits need to be inspected and maintained. However, the capacity of one vacuum station is typically equivalent to the capacity of several lift stations in a gravity collection system. Because of this, vacuum systems are generally more economically feasible as the total number of customer connections increases.

4.6 Sewer System Implementation – Cost Development

4.6.1 Collection Systems

Overall, vacuum collection systems were determined to be the feasible alternative for most County project areas based on the sewer collection system evaluation, cost comparison, and consultation with CCU. Detailed capital and O&M costs were determined for each project area and used to develop the CIP projects provided in Chapter 7. The costs include mobilization and general conditions (8 percent), contingency (20 percent), and professional services (20 percent).



Vacuum Collection Tank

Table 4-4 summarizes the capital costs applied to each project area. The capital cost estimates include planning, survey, design, permitting, and construction.

Table 4-4 Capital Costs for Vacuum Sewer System

Item	Cost
On-lot Connection Cost ($/Connection)	$4,750
Off-lot Connection Cost ($/Buildout ERC)	$3,440
Collection Piping Construction Unit Cost ($/LF)	$58
Vacuum Collection Station Construction Cost (<750 Lots)	$1,500,000
Vacuum Collection Station Construction Cost (>750 Lots)	$2,700,000
Vacuum Collection Station Land Cost (<750 Lots)	$30,000
Vacuum Collection Station Land Cost (>750 Lots)	$60,000

Note: Costs updated from 2017 based on recent project costs and information provided by GWE.

Table 4-5 presents the annual O&M costs for a vacuum sewer system. The O&M costs for the sewer collection system improvements included labor, power, equipment replacement and maintenance, and additional WRF treatment costs.

Table 4-5 O&M Costs for Vacuum Sewer System

Item	Annual Cost
Labor – Vacuum Collection Station	$15,700
Labor – Service Connection/Buildout ERC	$22
Power – Vacuum Collection Station	$1,850
Power – Vacuum Collection Station/ERC	$40
Equipment – Vacuum Collection Station	$6,400
Equipment – Service Connections/Buildout ERC	$5

Note: Costs updated from 2017 SMP, assuming similar cost for O&M, includes inflation. Labor, power, and equipment O&M costs can vary based on vacuum system size and customer usage.

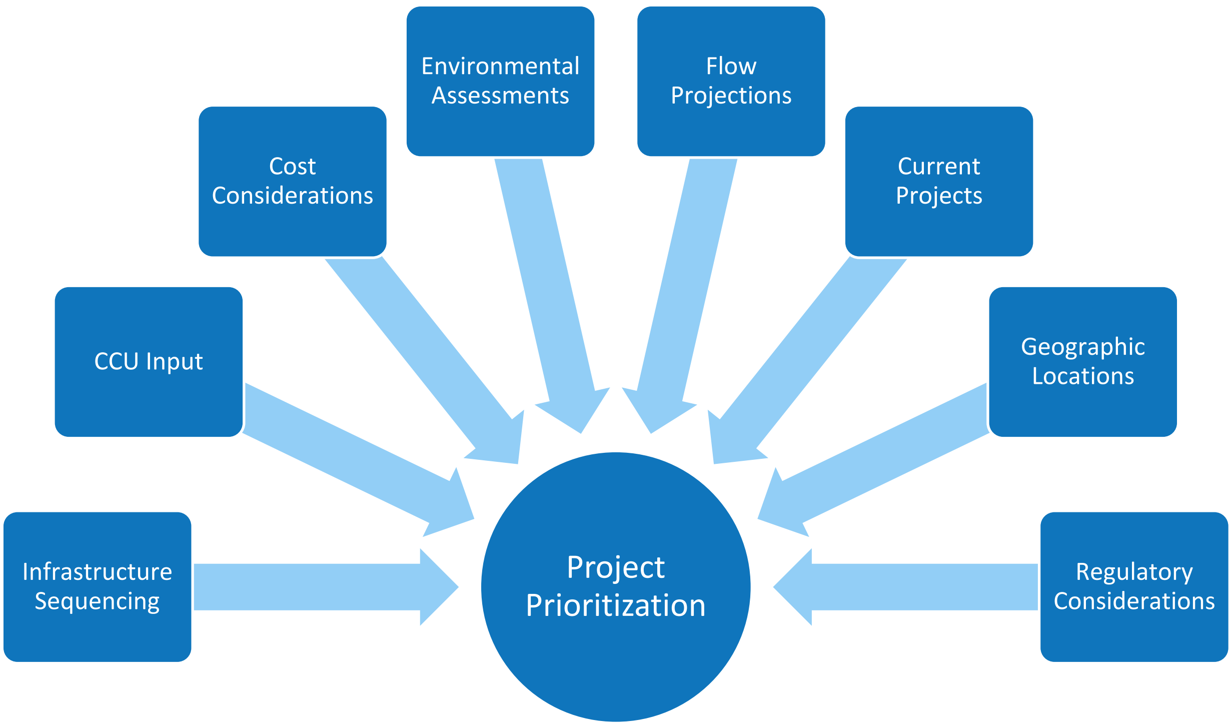
4.6.2 Transmission Mains


HDPE Pipe Used as Transmission Main

Chapter 7 provides capital costs for transmission mains. Costs for constructing the transmission mains include unit costs for the transmission main, valves, installation and restoration, contingency (20 percent), and professional services (20 percent).

4.7 Project Prioritization

Once project areas were identified with the completion of environmental and cost assessments, project areas were prioritized to develop a flexible and practical implementation sequence. The optimum economic sequencing was determined considering the following inputs:



4.8 Improvement Plans

The project prioritizations were used to identify and develop 5-year, 10-year, 15-year, and buildout improvement plans based on a target conversion rate of approximately 1,000 S2S conversions per year. Project areas with higher environmental impact scores, greater septic system density, and better economic feasibility were generally prioritized earlier to maximize environmental benefits. Additionally, areas within the FDEP permit compliance area were prioritized to be completed first. Chapter 5 discusses in detail the specific infrastructure improvements, including sewer collection systems, transmission lines, and lift and/or pump stations for the project areas under each plan. Chapter 7 details the estimated costs for the plans.

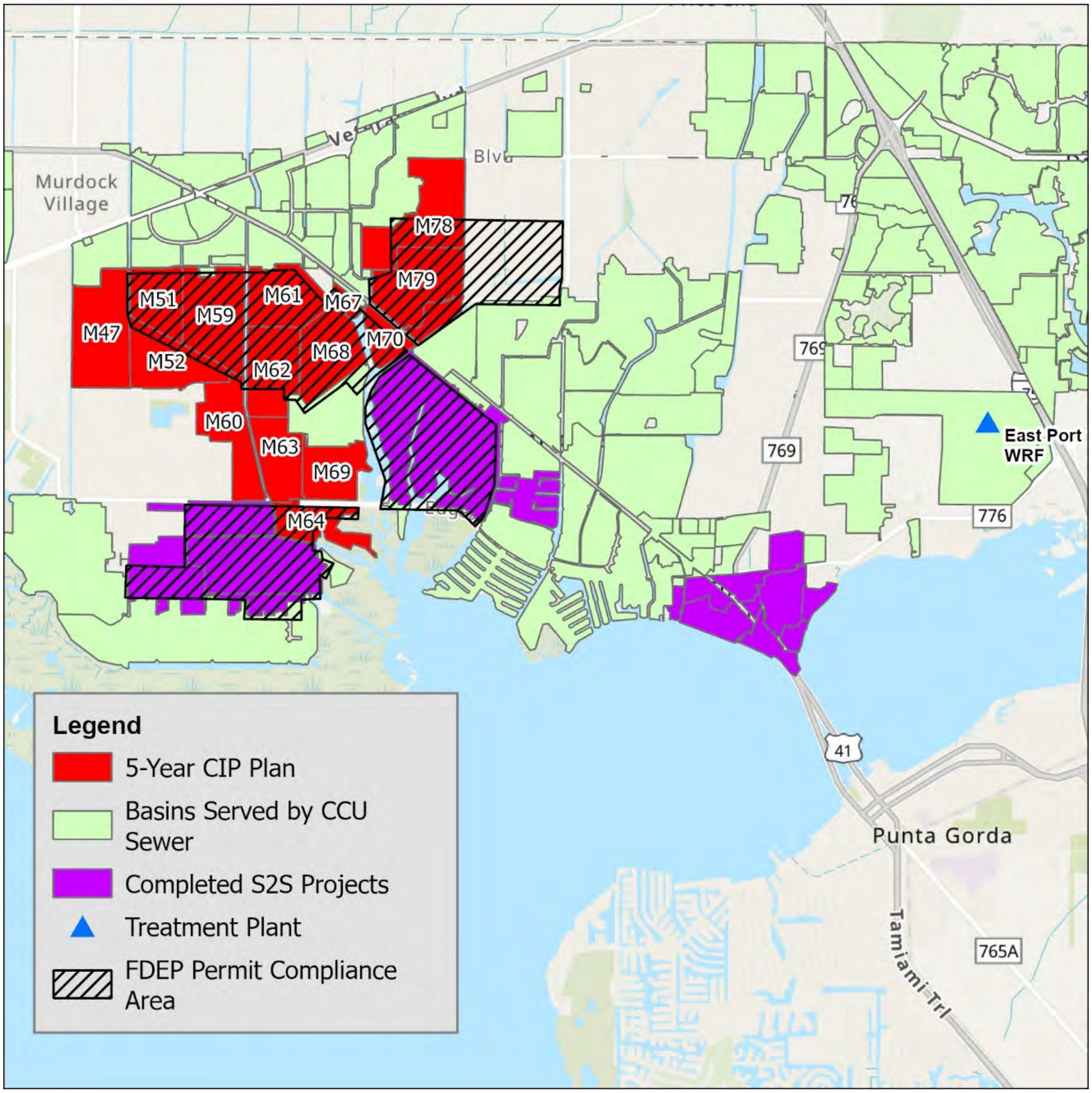
4.8.1 5-Year Improvement Plan

Table 4-6 summarizes the 5-year improvement plan, including the project area name, corresponding identifier, occupied lots using septic systems, and total (including vacant) number of lots. Areas identified in the Compliance Monitoring Reports were prioritized in the 5-year improvement plan to meet regulatory requirements and maintain compliance. Additionally, areas that were part of ongoing CCU S2S projects were prioritized to ensure continuity and efficient resource allocation. The 5-year plan includes converting 5,298 septic systems to sewer in 15 project areas in Mid County. Figure 4-8 graphically depicts the 5-year improvement plan by displaying the location of the project areas.

Table 4-6 5-Year Improvement Plan

Identifier	Name	Occupied Lots	Total Lots
M47	Cedarwood	303	835
M51	Windswept	242	374
M52	Auburn	336	588
M59	Cannolot	538	793
M60	Placid	344	580
M61	Seacrest	440	609
M62	Hurtig	388	598
M63	Beaumont	352	534
M64	Abhenry	136	202
M67	Crestview Circle	75	90
M68	Lakeview Corridor	550	658
M69	Seabold	287	495
M70	Ellicott Circle	215	239
M78	Nimrod	539	765
M79	Blaine	553	764
	Totals	**5,298**	**8,124**

Figure 4-8 5-Year Improvement Plan



4.8.2 10-Year Improvement Plan

Figure 4-9 shows the project areas included in the 10-year improvement plan, and Table 4-7 lists them. Project areas within the 10-year plan were prioritized based on their higher average environmental impact scores and strategic proximity to past project areas and other targeted locations within the 10-year improvement plan. This approach maximizes the overall environmental benefit and economic feasibility by concentrating efforts near areas that are already receiving attention. The 10-year improvement plan includes connecting 4,005 septic systems throughout six project areas in Mid County and six project areas in West County.

Figure 4-9 10-Year Improvement Plan

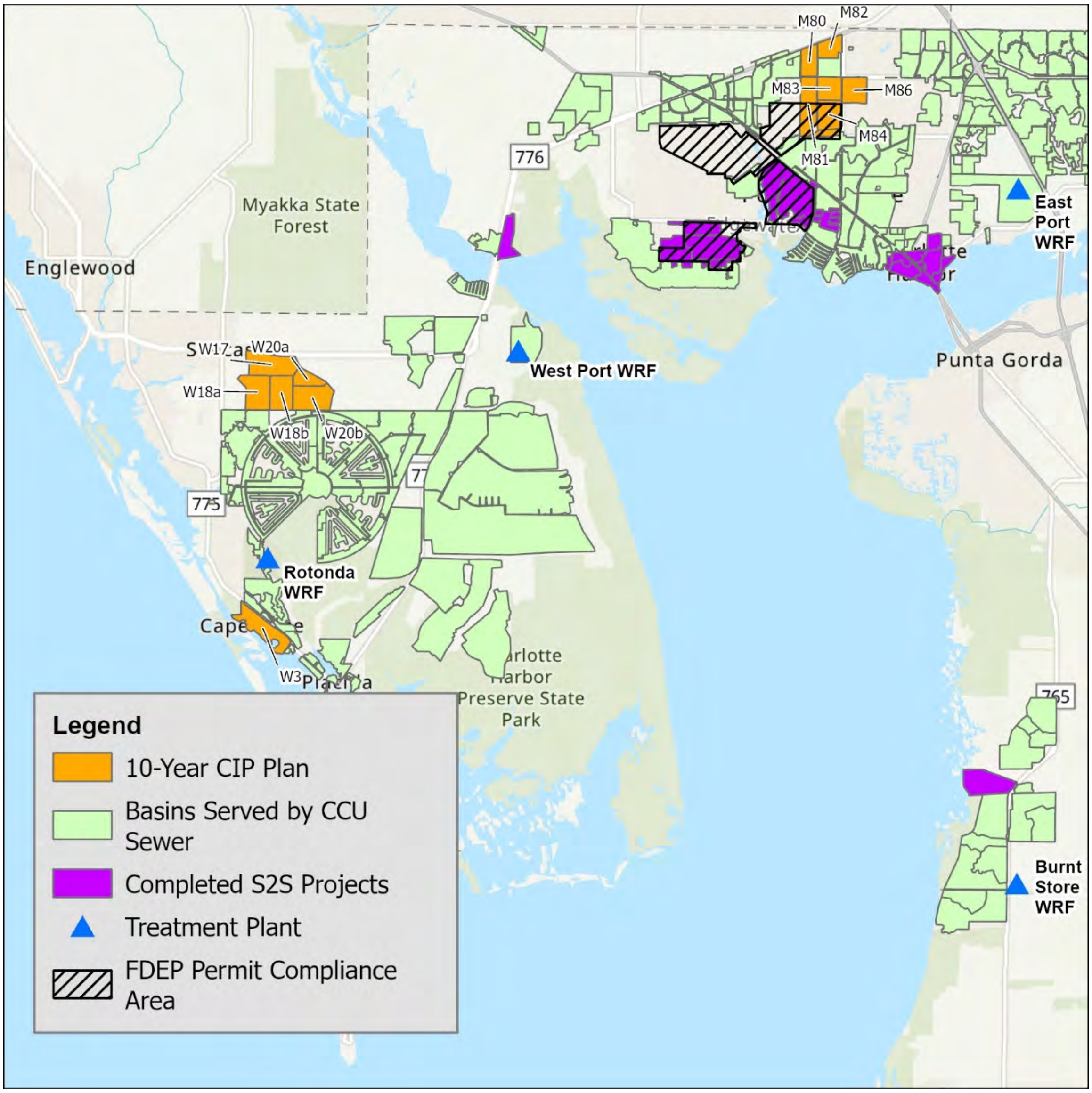


Table 4-7 10-Year Improvement Plan

Identifier	Name	Occupied Lots	Total Lots
W3	Cape Haze	216	277
M80	Yorkshire Phase II	233	391
M81	Yorkshire Phase I	488	625
M82	Danley	170	274
M83	Hayworth	301	405
M84	Kensington	376	480
M86	Birchcrest Phase I	336	499
W17	Gunther	509	847
W18a	Ebro	438	592
W18b	Seabrook	373	584
W20a	Del Ray Phase I	135	278
W20b	Del Ray Phase II	430	713
	Totals	**4,005**	**5,965**

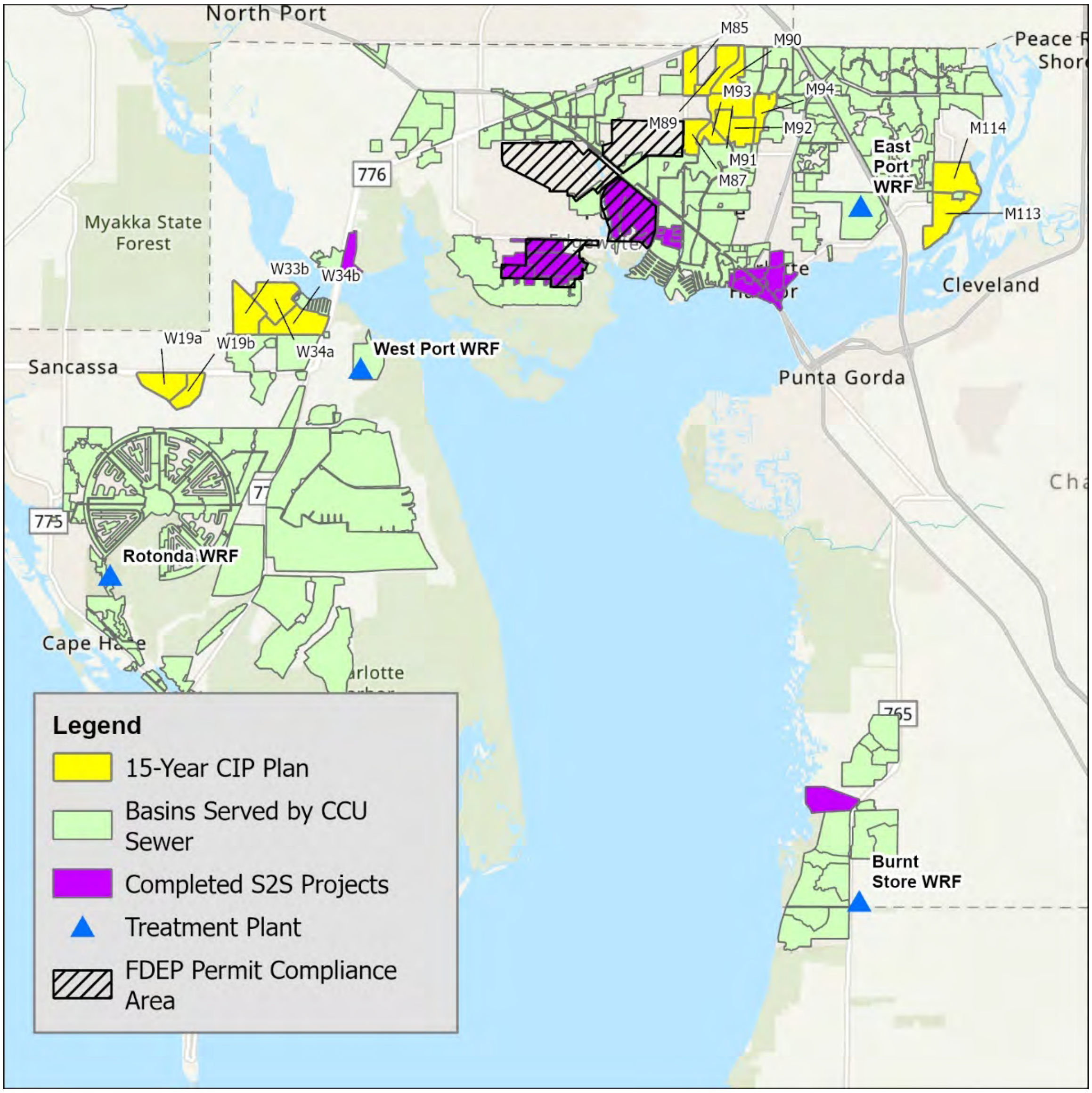
4.8.3 15-Year Improvement Plan

Table 4-8 lists the project areas included in the 15-year improvement plan. The total number of septic systems to be connected during this improvement plan is 4,597 throughout 15 project areas. Figure 4-10 shows that the 15-year plan includes 10 project areas in Mid County and five project areas in West County.

Table 4-8 15-Year Improvement Plan

Identifier	Name	Occupied Lots	Total Lots
M85	Snowden	188	349
M87	Birchcrest Phase II	410	589
M89	Fitzsimmons	153	446
M90	Presque Lake	295	615
M91	State	418	756
M92	Laika	465	724
M93	Tandy	178	239
M94	Ruby	266	427
M113	Dover	483	815
M114	S. Whidden Bay	244	790
W19a	Carnegie	311	670
W19b	Peacock	245	452
W33b	Dayton Pond	267	802
W34a	Venus	301	842
W34b	Ulysses	373	948
	Totals	**4,597**	**9,464**

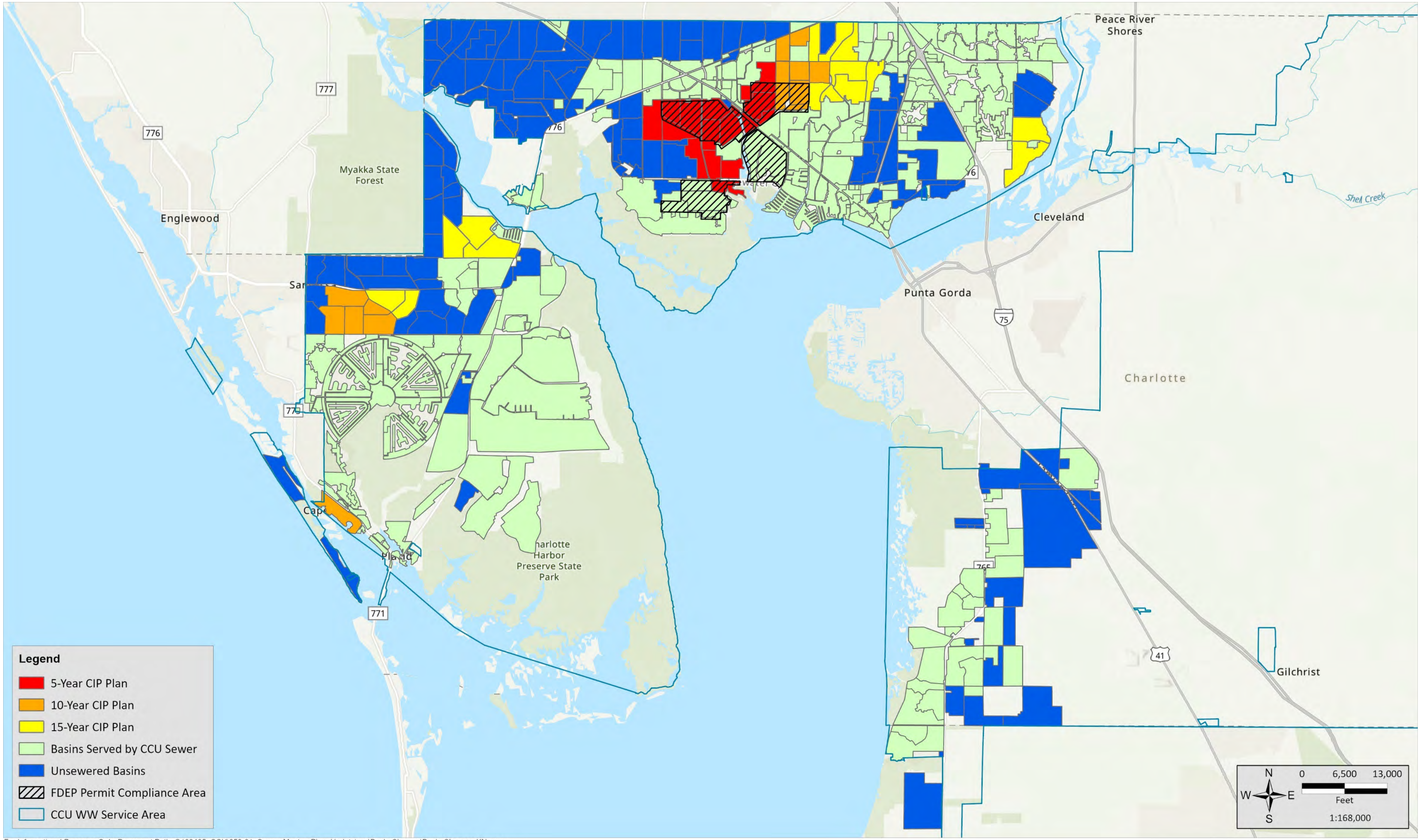
Figure 4-10 15-Year Improvement Plan



4.8.4 Buildout Improvement Plan

Figure 4-11 shows the buildout improvement plan and identifies the 127 project areas that remain after completing the 5-, 10-, and 15-year improvement plans.

Figure 4-11 Buildout Improvement Plan



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5 SEWER COLLECTION SYSTEM, TRANSMISSION MAINS, AND PUMP STATIONS

OVERVIEW

CCU provides wastewater service to over 49,000 customers through a network of collection and transmission systems. This chapter presents an overview of the existing CCU collection and transmission systems, lists the County's ongoing improvements, and details the infrastructure required to convey wastewater flows under the 2030, 2035, 2040, and buildout improvement plans.

As part of the master planning effort, hydraulic models were developed or updated to determine growth and infrastructure needs throughout the County's collection and transmission system. The models incorporate the County's ongoing improvements and the future project areas identified in Chapter 4.

5.1 Existing Sewer Collection and Transmission Systems

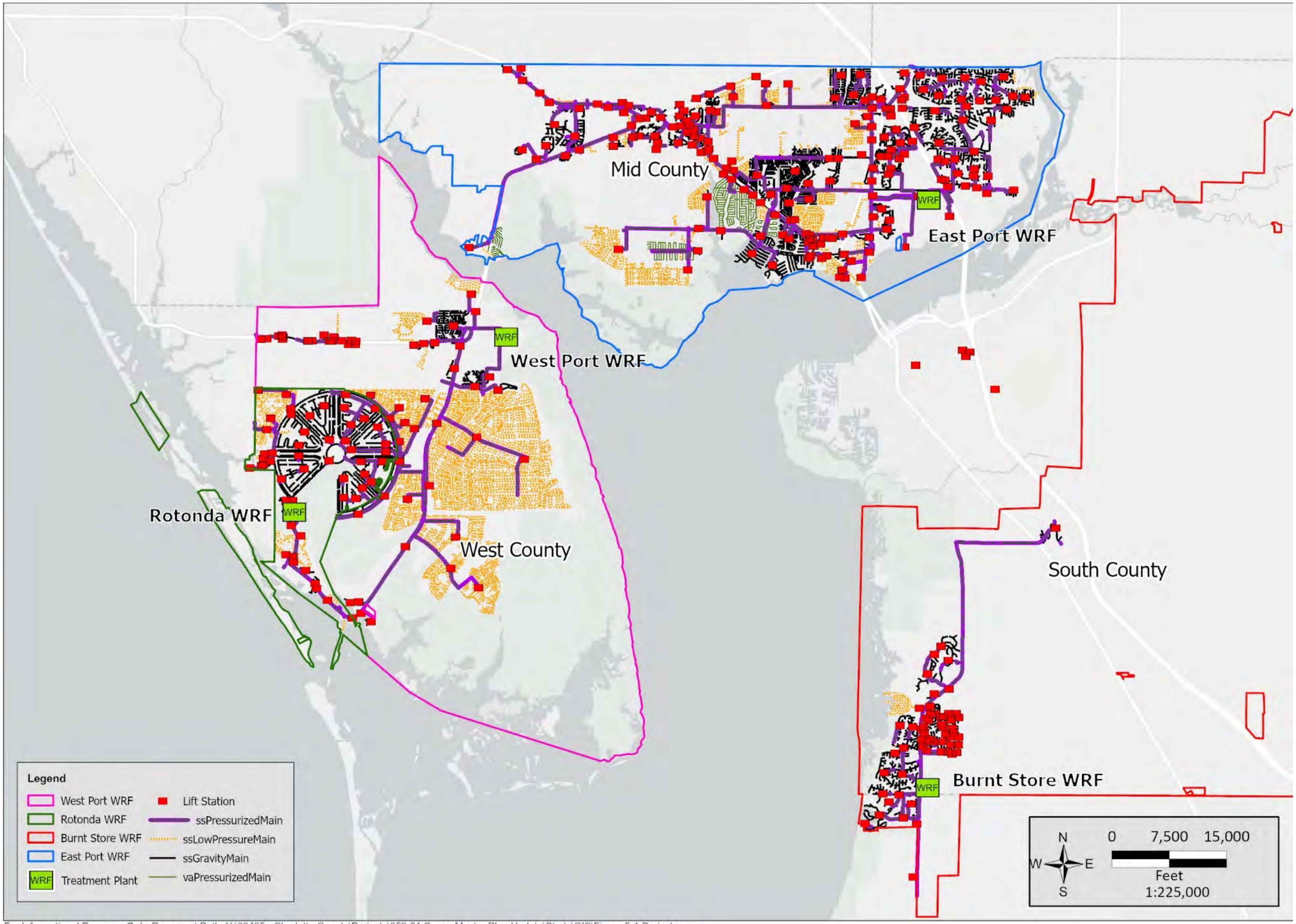
The CCU wastewater collection and transmission systems convey wastewater from homes and businesses to the County's WRFs for treatment. The three distinct types of sewer collection and transmission systems – LPS, gravity sewer, and vacuum sewer – are discussed in greater detail in Chapter 4. The sewer collection system assets include LPS mains, gravity mains, and vacuum mains. The transmission system assets include lift stations, vacuum stations, and force mains. Additionally, many small pumps serve individual property addresses on LPS systems. The County's wastewater systems include a large number of lift stations because of the relatively flat topography and high groundwater table that are typical with coastal communities in Florida.

The asset inventory of the wastewater system components is maintained within the Charlotte County GIS database. Altogether, the CCU wastewater system assets include the following approximate inventory:

- 395 miles of gravity mains.
- 384 miles of LPS mains.
- 38 miles of vacuum mains.
- 206 miles of force mains.
- 310 County-owned lift stations.
- Four vacuum stations.
- 11,800 STEP/LPS pumps.

Figure 5-1 summarizes the overall CCU wastewater system assets within each WRF service area. West County and South County do not contain any vacuum sewer systems.

Figure 5-1 Existing CCU Sewer Collection and Transmission Systems



For Informational Purposes Only Document Path: Y:\03405 - Charlotte County\Projects\053-01 Sewer Master Plan Update\Study\GIS\Figure 5-1 Project.aprx

Figure 5-1 shows that the sewer collection and transmission systems are divided into four distinct service areas:

- East Port WRF – Serves Mid County
- West Port WRF – Serves part of West County
- Rotonda WRF – Serves part of West County
- Burnt Store WRF – Serves South County

5.1.1 East Port WRF Service Area (Mid County)

The East Port WRF collection and transmission system is in Mid County, where it is the only service area that uses LPS, gravity, and vacuum collection systems. This service area generally includes Deep Creek, Port Charlotte, Charlotte Harbor, Murdock Circle, and El Jobean. Table 5-1 presents an estimated tabulation of the existing collection and transmission system assets in the East Port WRF service area.

Table 5-1 Collection and Transmission System Assets Serving East Port WRF

Asset	Value	Units	Diameter of Pipe
Gravity Mains	240	miles	6- to 48-inch
LPS Mains	97	miles	1.5- to 16-inch
Vacuum Mains	38	miles	1.5- to 10-inch
Force Mains	114	miles	2- to 36-inch
Lift Stations	169	stations	N/A
Vacuum Stations	4	stations	N/A

Note: N/A = Not applicable.

5.1.2 West Port WRF Service Area (West County)

The West Port WRF service area is one of two service areas in West County. It mainly serves the South Gulf Cove district and the SR 776 and Gasparilla Road corridors. Table 5-2 estimates the inventory of the collection and transmission assets in the West Port WRF service area.

Table 5-2 Collection and Transmission System Assets Serving West Port WRF

Asset	Value	Units	Diameter of Pipe
Gravity Mains	27	miles	8- to 12-inch
LPS Mains	258	miles	1.5- to 12-inch
Force Mains	44	miles	2- to 24-inch
Lift Stations	36	stations	N/A

5.1.3 Rotonda WRF Service Area (West County)

The Rotonda WRF service area is in West County, which serves the Rotonda Circle golf communities, such as Long Meadow and White Marsh, and communities along Cape Haze Drive down to Placida. Table 5-3 summarizes the approximated existing assets in the Rotonda WRF service area.

Table 5-3 Estimation of Rotonda Collection and Transmission System Assets

Asset	Value	Units	Diameter of Pipe
Gravity Mains	74	miles	6- to 36-inch
LPS Mains	24	miles	1.5- to 6-inch
Force Mains	22	miles	2- to 14-inch
Lift Stations	51	stations	N/A

5.1.4 Burnt Store WRF Service Area (South County)

The Burnt Store WRF service area is in South County and uses gravity and LPS mains for collection. Table 5-4 summarizes the collection and transmission system assets for the Burnt Store WRF.

Table 5-4 Estimation of Burnt Store Collection and Transmission System Assets

Asset	Value	Units	Diameter of Pipe
Gravity Mains	54	miles	8- to 10-inch
LPS Mains	5	miles	2- to 6-inch
Force Mains	26	miles	2- to 20-inch
Lift Stations	54	stations	N/A

5.2 Summary of Rotonda WRF Evaluation

The County conducted a future use evaluation for the Rotonda WRF as part of the West Port WRF expansion design project. Results are briefly summarized as they relate to County master planning.

The Rotonda WRF has been historically effective for the County. However, process equipment is nearing the end of its useful life and improvements will be required to maintain the facility. This evaluation was performed to help the County evaluate two major options for the future use of the Rotonda WRF:

- Option 1 – Keep and Expand the Rotonda WRF:
  - Upgrade existing headworks and biological nutrient removal (BNR) membranes in the near term.
  - Expand the Rotonda WRF to meet future flows including AWT.
  - Install the first deep injection well at the Rotonda WRF.
- Option 2 – Eliminate the Rotonda WRF and Convert to an MLS:
  - Expand the West Port WRF with AWT to also treat existing and future flows from the Rotonda WRF service area.
  - Convert the Rotonda WRF to an MLS with a new force main to convey flows from the Rotonda WRF to the West Port WRF.
  - Install a second deep injection well at the West Port WRF.

Since the Rotonda and West Port WRFs serve the West County service area, future use of the West Port WRF was also considered. To help the County determine the preferred option, a condition assessment and decision matrix assessment were completed in conjunction with reviewing current and future flow projections for the West County region, where flows are split between Rotonda WRF and West Port WRF.

5.2.1 Condition Assessment

On June 21, 2023, the Rotonda WRF was assessed to determine the overall physical condition of the current unit processes and equipment. Overall, the Rotonda WRF is in satisfactory condition, which was a better result than expected based on County feedback and data collected before the condition assessment. Due to the exemplary maintenance and upkeep efforts by the Operations staff, CCU has been able to maximize the useful life of most equipment. Process upgrades are required in the near term such as the ongoing projects to replace the membrane bioreactor (MBR) membranes and improve the headworks. Overall, several processes at the Rotonda WRF were determined to be oversized with respect the permitted capacity of 2.0 MGD AADF, such that a future increase in treatment capacity could be realized with feasible improvements and a capacity re-rate to 2.25 or 2.5 MGD with the option to include AWT.

Appendix E, *West Port Water Reclamation Facility Expansion, Condition Assessment of Rotonda and West Port WRFs* Technical Memorandum (TM) (HDR Engineering, Inc.; 2023), provides additional details.

5.2.2 Decision Matrix Assessment

A multi-criteria decision matrix was developed collaboratively with CCU staff through meetings and workshops to determine and rank major decision criteria for the options to keep and later expand or eliminate the Rotonda WRF.

The assessment criteria for this evaluation included:

- Maintain reduced staffing hours.
- Reduce impacts on residents.
- Ease the implementation of permits.
- Standardize equipment.
- Simplify process operation.
- Increase operational flexibility.

The decision criteria matrix ranked Option 1, to keep and expand Rotonda WRF, as the better option.

Additionally, an engineering estimate of probable construction cost was completed for each option, demonstrating that Option 1, keeping and expanding the Rotonda WRF, would be more economically feasible than Option 2, eliminating the Rotonda WRF.

Appendix F, *West Port Water Reclamation Facility Expansion Project*, *Rotonda WRF Multi-Decision Criteria Evaluation* TM (HDR, 2023), provides additional information.

5.2.3 West County Flow Shifting

Flow shifting is when specific valves within the wastewater transmission system are opened and/or closed to switch flow from the Rotonda WRF to the West Port WRF or vice versa. Flow shifting allows for additional capacity at the expense of the other WRF taking on the shifted flows. LS-841 through LS-847 in the current West Port WRF service area can also shift flow to the Rotonda WRF, referred to as the *current swing zone*. Due to the expeditious nature of projected future flows at West Port WRF, a test was done to determine the viability of shift flows between WRFs. From April to August 2023, CCU shifted approximately 0.12 MGD from the West Port WRF to the Rotonda WRF using the current swing zone. Shifting flows can benefit the timing of future plant expansions by reducing the flow contributions to West Port WRF. Appendix G, *West Port Water Reclamation Facility Expansion, Design Flows and Loads* TM (HDR and Jones Edmunds, 2023), provides additional details. Chapter 6 includes flow projections for the West Port and Rotonda WRFs. Also refer to the most recent completed TMs in Appendix E, F, and G as part of the West Port WRF design project. Figure 5-2 is a graphical illustration of the current and the future swing zones within the West Port and Rotonda WRF service areas.

The current swing zone was originally designed to also include LS-852, LS-853, and LS-858, but transmission system restrictions currently prevent flow shifting (capped force mains, untraceable closed valves, etc.). System maintenance and/or minor improvements could be made to include LS-852, LS-853, and LS-858 in the future swing zone.

5.2.4 Results

Ultimately, the County decided to keep and expand the Rotonda WRF with AWT and expand the West Port WRF with AWT. Since the Rotonda WRF will be kept, the future treatment capacity at West Port WRF will be designed to serve only the West Port WRF service area.

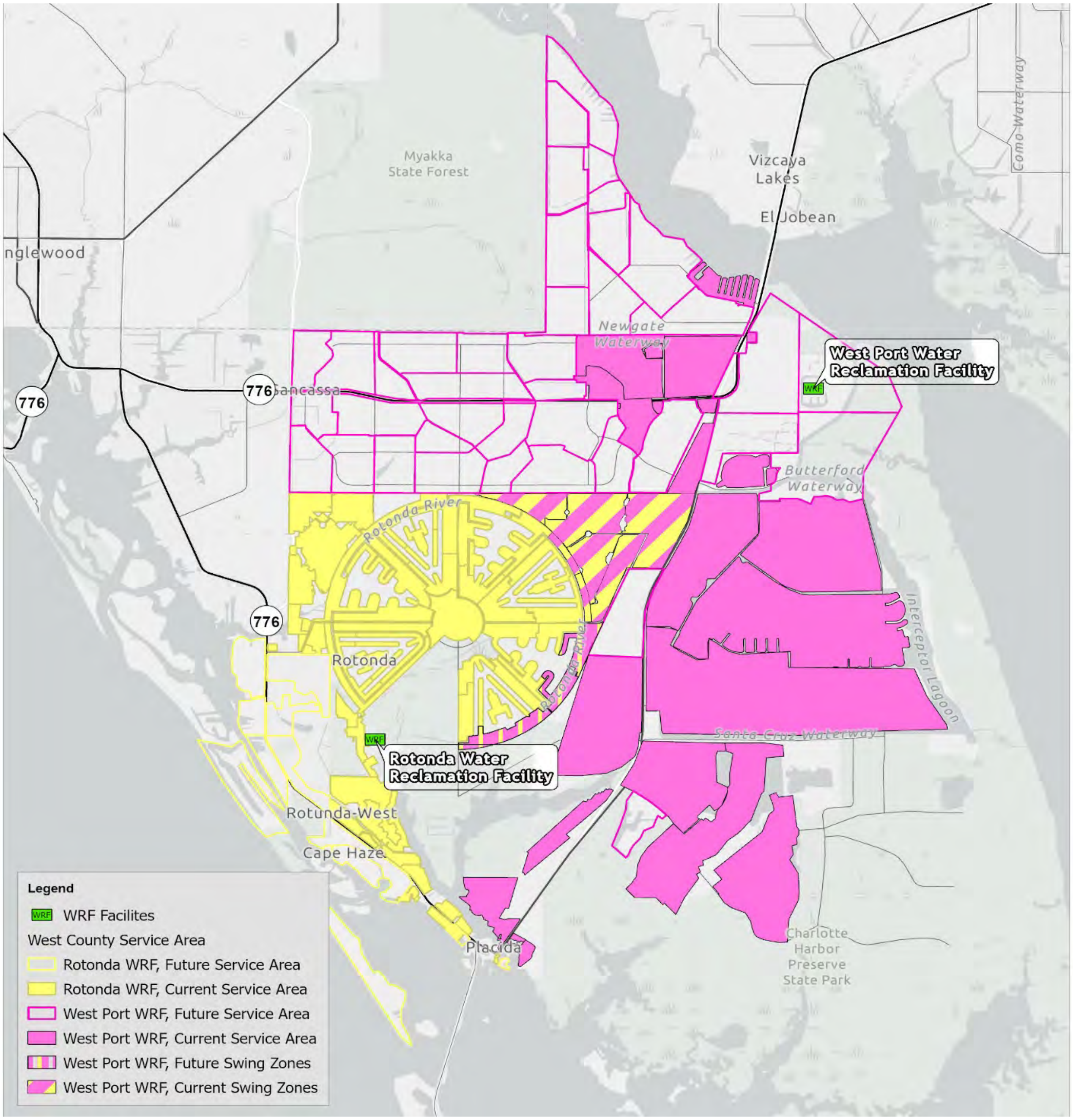
5.3 Hydraulic Models

Wastewater system hydraulic models typically comprise a detailed network that includes pump stations, force mains, and gravity mains to simulate flow conveyance throughout the collection and transmission system. These types of models can be used for various purposes depending on the level of correlation to actual field monitoring data, also known as supervisory control and data acquisition (SCADA) data.

CCU regularly uses wastewater system hydraulic models to identify areas where additional capacity is needed to convey projected long-term flows to the CCU WRFs. The hydraulic models were updated to include ongoing improvements consisting of projects in the planning, design, and construction phases.

Model simulations were conducted using 2024 wastewater flows to identify areas requiring improvements for the current system. Modeling simulations were also conducted using flow conditions for the 5-year, 10-year, 15-year, and buildout scenarios to determine infrastructure improvements for each scenario.

Figure 5-2 West County Swing Zone Service Areas



5.3.1 Model Validation

As part of the 2024 SMP Update, the CCU models were validated against recent lift station runtime, flow, and pressure SCADA data to account for system changes, recent construction projects, lift station modifications that have occurred since 2017, and current wastewater flow distribution. For master planning purposes, the acceptable level of correlation between model data and SCADA data was 5 to 15 percent.

5.3.2 Hydraulic Model Updates

As part of this SMP effort, CCU's existing hydraulic models were updated to reflect ongoing improvement projects in the planning, design, and construction phases as well as new infrastructure that has been constructed since the 2017 SMP. A coordinated effort with CCU staff confirmed and updated the modeling data at each lift station, including pump make and model, impeller specifications, and wet well diameters. Additionally, the models were updated in accordance with the current operations of the transmission systems. The operations updates were based on information from CCU staff and included reviewing lift station force main manifolding, valving, and flow schematics of the system.

5.3.3 Flow Projection Methodology

Flow projecting allows for long-term planning by estimating future demands on the sewer collection system and facilities. The methodology for projecting future flows is provided in this section and is the same as that documented in the *West Port Water Reclamation Facility Expansion, Design Flows and Loads* TM (HDR and Jones Edmunds, 2023).

To determine the base flow projection, historical flow data are used to establish current wastewater flows in the respective service areas. Medium-growth rates developed by the University of Florida Bureau of Economic and Business Research (BEBR, 2024) were applied to the current year data to forecast future wastewater flows for 2025 through 2040 at 5-year increments. Buildout demands are based on population projections and future land zoning within Charlotte County using the SWFWMD Geospatial Small-Area Population Forecasting (GSAPF) Model Methodology. Appendix H provides further details on the current and buildout flow and dwelling units estimates for Charlotte County.

Wastewater flows from planned developments, utility acquisitions, and planned areas for S2S conversions are not accurately represented in the BEBR and SWFWMD population projections. Therefore, a collaborative effort was conducted with CCU to refine the wastewater flow projections based on impacts from the following components:

- Planned developments.
- Utility acquisitions.
- Planned areas for S2S conversions.
- Known areas of historically low growth.

5.3.3.1 Planned Developments

Planned development flows from 2025 through 2040 are added to the base flow projections for their buildout year. The developments are based on the County's available information and knowledge of ongoing and future developments. Potential planned developments include but are not limited to Placida RV, Harbor East, Fishery, The Cove, David Boulevard Apartments, Harbor Village, and Cape Haze Multifamily.

5.3.3.2 Utility Acquisitions

Additional flows were added based on the potential for CCU to acquire and/or accept flows from a neighboring utility. The expected utility acquisitions are based on the County's available information and knowledge of ongoing and future acquisitions. Potential utility acquisitions include but are not limited to Sun-N-Shade Family Campground, Harborview

Mobile Home Park, Hideaway Bay Beach Club Condo, Little Gasparilla Island, Sandalhaven Utilities, Bocilla, and Knight Island Utilities.

5.3.3.3 Planned Areas for S2S Conversions

Charlotte County has adopted a multi-pronged approach to improve water quality in the local water bodies including the Myakka and Peace Rivers, Charlotte Harbor, and various bays that connect the Harbor to the Gulf of Mexico. The plan includes a combination of establishing a water quality monitoring plan through the *One Charlotte, One Water* program, improving WRF treatment to AWT, and S2S conversion projects.

S2S projects were reevaluated and prioritized as part of the environmental assessment discussed in Chapter 4. The methodology was based on that presented in the 2017 SMP. Additionally, this 2024 SMP Update includes a focus on the project areas within the Manchester Lock/Little Alligator Basin permit compliance area.

5.3.3.4 Known Areas of Historically Low Growth

Some large areas with sewer service were identified as historically little to no flow. The flow projections were adjusted accordingly based on discussions with CCU staff. An example of these areas is the Meadows and Villas community in southeast West County, where sewer infrastructure was built in anticipation of homes being built. However, the expected inflow did not occur and since then other developments and communities have been more successful in appealing to new residents, such as the West Port development in Mid County. The low growth in these areas is expected to continue until further notice, such as if a developer purchases the land and accelerates the development.

Charlotte Harbor Sunset(johneliasphotography)

5.3.4 Hydraulic Modeling Assumptions and Evaluation Criteria

5.3.4.1 Average and Maximum Daily Flows

The 2017 SMP used an average daily flow (ADF) of 160 gpd per residential connection, documenting that the actual ADF was 135 gpd. Since 2017, Jones Edmunds has worked with CCU on several wastewater planning and modeling efforts and has continued to evaluate the appropriateness of the 160-gpd-per-connection assumption. The actual ADF generally ranges from approximately 80 to 140 gpd per residential connection based on County data, with newly constructed systems reporting as low as 80 to 100 gpd per connection. Modeling simulations used 160 gpd per residential connection as a balanced ADF planning value to provide adequate transmission capacity throughout the service areas but not to oversize future improvements and system upgrades.

The improvements identified from the hydraulic modeling were using a maximum daily flow (MDF) factor applied to the ADF.

Peaking factors were determined for each WRF service area using historical plant flow data that were used for modeling the maximum daily extended-period flow simulations that included peak hourly flows (PHFs).

5.3.5 Evaluation Criteria

The wastewater hydraulic models were used to evaluate the existing wastewater system performance under the current, 5-year, 10-year, 15-year, and buildout flow scenarios. The evaluation criteria for establishing wastewater collection system performance included system capacity and wastewater velocity with transmission pipelines:

- System pumping capacity was determined adequate if a stand-by pump was not needed.
- Force main velocities were considered sufficient if the sustained velocities did not exceed the force main operating guideline of 8 feet per second (fps).*
- System improvements were identified and listed for each flow scenario if the evaluation criteria were not met.

** The "Recommended Standards for Wastewater Facilities" (also known as the "10-States Standards") recommends 6 fps for force main design flows; however, for extended-period modeling purposes, setting the threshold to 8 fps will capture the systems that have reached 6 fps for extended periods.*

5.4 Near-Term System Improvements

CCU Operations staff maintain and operate the current wastewater systems. Charlotte County has already determined CIP projects and budgeting for the next 6-year CIP planning period from 2024 to 2030. Since the Lakeview Midway S2S project is currently in design and projected to start construction in the near-term, it was included in the near-term system improvements. The near-term modeling analysis used the current system model to diagnose the transmission system and determine if the County considers additional CIP projects between 2024 and 2030. The results of the modeling analyses were compared to the level-of-service evaluation criteria presented in Section 5.3.5 to determine if the County considers upgrades or improvements. Appendix I provides further details on each project for each of the capital improvement years.

The modeling analysis was completed under the condition that the following S2S project areas, as discussed in Chapter 4, have been implemented, complete with associated lift stations, vacuum stations, force mains, or other infrastructure required for conveyance of wastewater to East Port WRF from the respective areas:

- M61 – Seacrest
- M62 – Hurtig

- M63 – Beaumont
- M64 – Abhenry
- M67 – Crestview Circle
- M68 – Lakeview Corridor
- M69 – Seabold
- M70 – Ellicott Circle

The following projects were determined to be beneficial for improving system hydraulics to the level established in the evaluation criteria and to incorporate the S2S project areas included in the Near-Term Improvement Plan:

- 1-M-LS – Woodbury (LS-45) Pump Upgrade
- 2-M-FM – Altoona (LS-139) to Wawa (LS-93)
- 3-M-FM – Cochran Boulevard from El Jobean Road to Midway Boulevard
- 4-W-FM – Boulevard West (LS-816) to Boundary Boulevard
- 5-M-LS – Judd Lift Station SCADA Installation

Figure 5-3 presents an overview of the near-term Mid County system improvements that are described in this section.

5.5 2030 Improvement Plan

The 2030 Improvement Plan was determined based on the 2030 modeling scenario, which includes projected development and wastewater flows from 2030 to 2035. This modeling scenario represents a period starting after the County's near-term CIP projects have been completed. Additionally, the projects from the near-term system improvements area are assumed to be implemented for this modeling scenario.

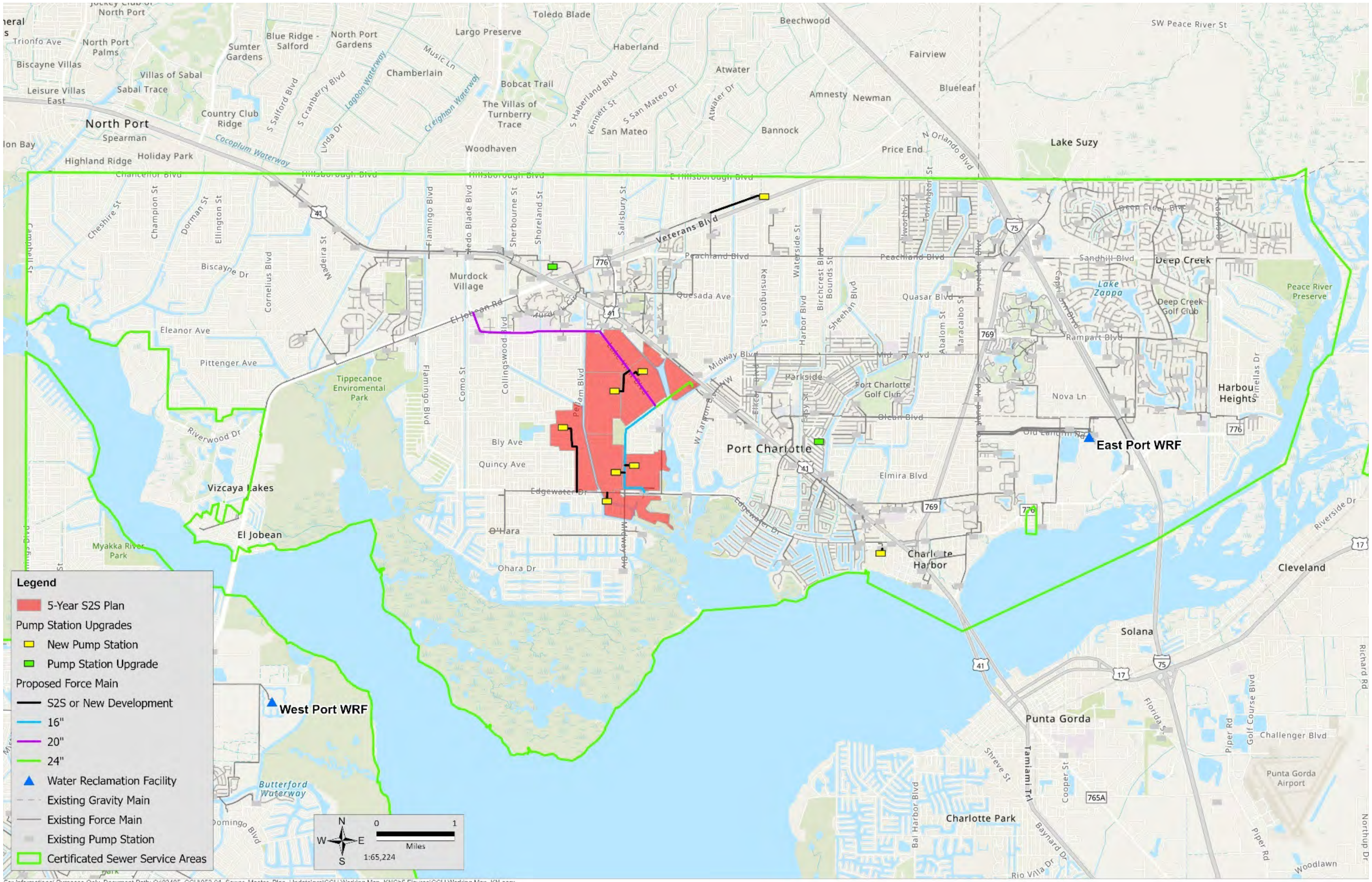
5.5.1 Mid County 2030 Model Results and Improvements

The 2030 modeling analysis suggested that the transmission system with the improvements included in the current systems Improvement Plan adequately meets the County's level of service for conveying the 2030 flows for Mid County.

Similar to the near-term modeling, the 2030 modeling analysis was completed under the condition that the following S2S project areas have been completed:

- M47 – Cedarwood
- M51 – Windswept
- M52 – Auburn
- M59 – Cannolot
- M60 – Placid
- M78 – Nimrod
- M79 – Blaine

Figure 5-3 Mid County Near-Term Improvement Plan



To implement the additional S2S project areas included in the 2030 Improvement Plan for Mid County, the model suggested the following projects should be considered to improve system hydraulics:

- 8-M-FM – Toledo Blade Boulevard from Tamiami Trail to El Jobean Road
  - This 16-inch main improvement along Toledo Blade Boulevard was modeled as a 16-inch main for continuation of force main sizing along US 41. CCU has indicated that a 12-inch main may be installed along this corridor with new development.

The 2030 Improvement Plan and S2S project areas should be re-evaluated as part of the 2030 SMP. Figure 5-4 presents an overview of the 2030 Mid County system improvements that are described in this section.

5.5.2 South County 2030 Model Results and Improvements

Results of the 2030 South County hydraulic modeling analysis suggested the following projects should be considered to improve system hydraulics to meet the level of service criteria:

- 9-S-LS – Prada (LS-415) Pump Upgrade

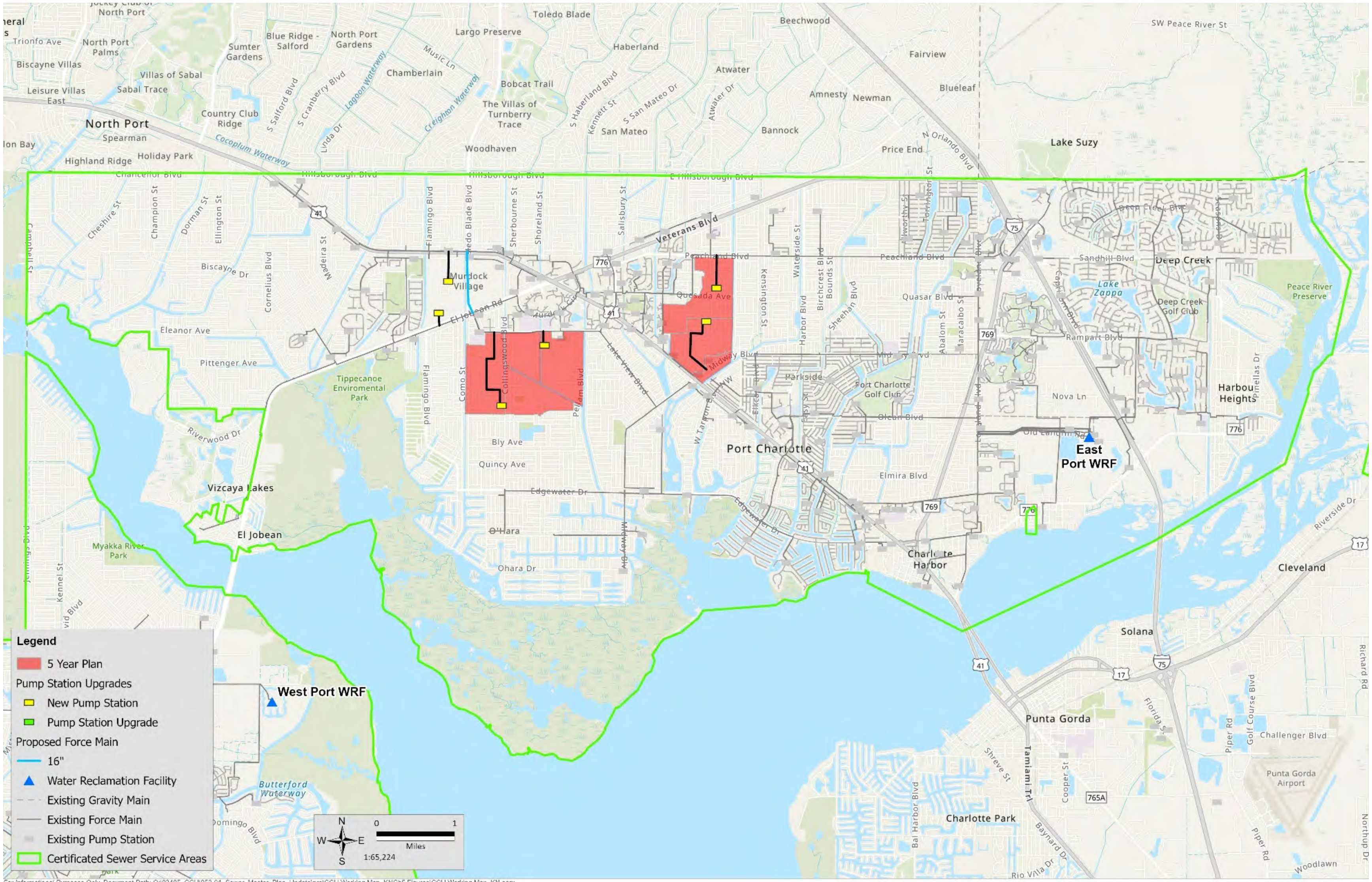
5.5.3 West County 2030 Model Results and Improvements

Results of the 2030 West County hydraulic modeling analysis suggested the following projects should be considered to improve system hydraulics:

- 6-W-FM – White Marsh-Boundary #1 (LS-852) Discharge Pipe
- 7-W-FM – Landings (LS-868) to SR 775
- 11-W-LS – Placida Bay (LS-810) Pump Upgrade
- 12-W-LS – Silage (LS-865) Pump Upgrade

Figure 5-5 presents an overview of the 2030 West County transmission improvements.

Figure 5-4   Mid County 2030 Improvement Plan



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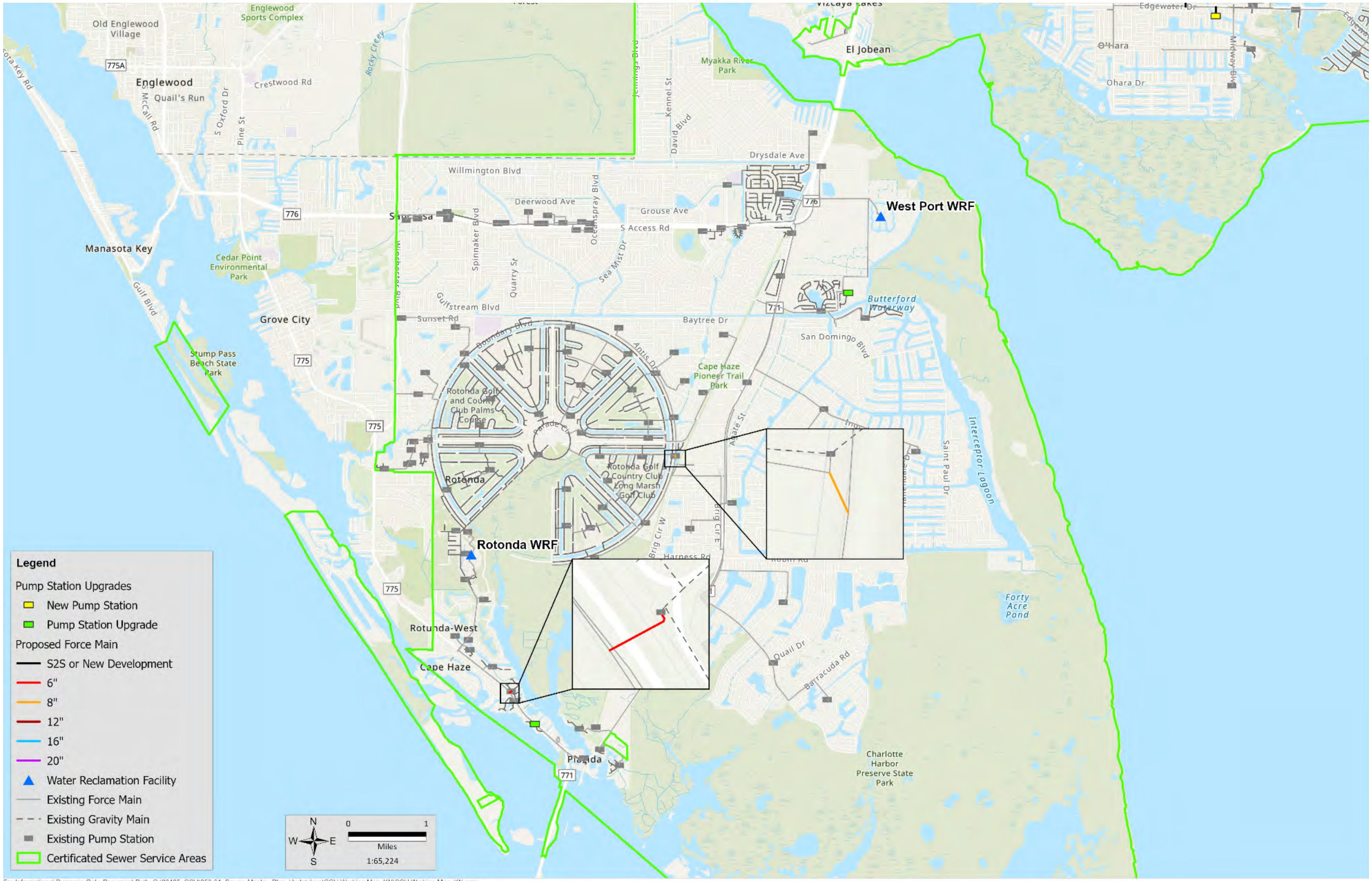
Note: The 16-inch main improvement along Toledo Blade Boulevard (shown above in blue) was modeled as a 16-inch main for continuation of force main sizing along US 41. CCU has indicated that a 12-inch main may be installed along this corridor with new development.

Figure 5-5 West County 2030 Improvement Plan



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5.6 2035 Improvement Plan

The 2035 Improvement Plan was determined based on the 2035 modeling scenario, which includes projected development and wastewater flows from 2035 to 2040. Similarly, the improvement projects from previous modeling analyses are assumed to be implemented for this modeling scenario.

5.6.1 Mid County 2035 Improvements

The 2035 modeling analysis showed that the transmission system with the improvements included in the 2035 Improvement Plan adequately meets the County's needs to convey the 2035 flows for Mid County.

The 2035 modeling analysis was completed under the condition that the following S2S project areas have been completed:

- M80 – Yorkshire Phase II
- M81 – Yorkshire Phase I
- M82 – Danley
- M83 – Hayworth
- M84 – Kensington
- M86 – Birchcrest Phase I

Results of the 2035 Mid County hydraulic modeling analysis suggested that additional improvements are not required to meet the evaluation criteria.

Figure 5-6 presents an overview of the 2035 Mid County transmission improvements and project areas.

5.6.2 South County 2035 Improvements

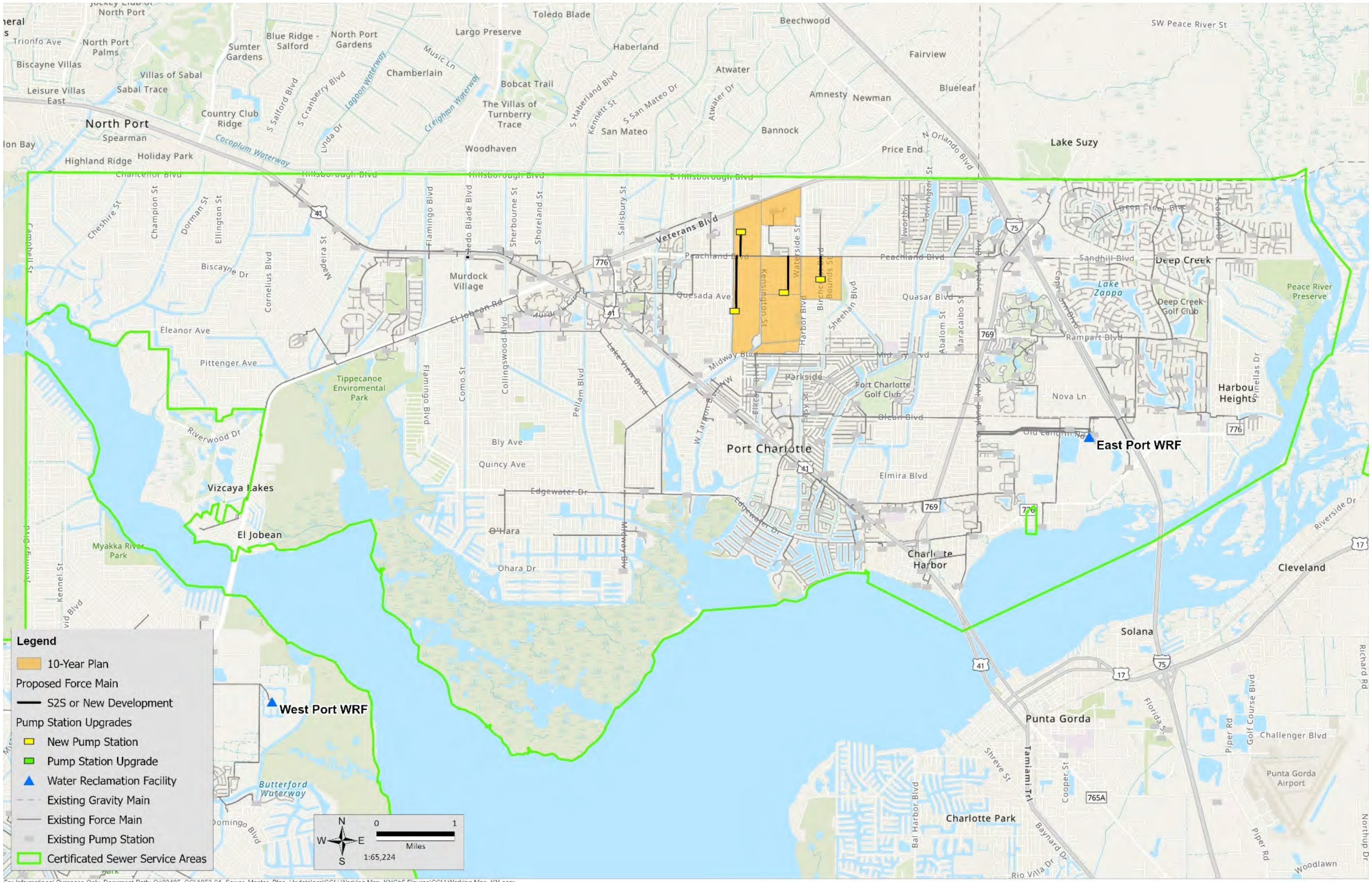
Results of the 2035 South County hydraulic modeling analysis suggested that additional improvements are not required to meet the evaluation criteria.

5.6.3 West County 2035 Improvements

Similar to the 2030 modeling, the 2035 modeling analysis was completed under the condition that the following S2S project areas have been completed:

- W17 – Gunther
- W18a – Ebro
- W18b – Seabrook
- W20a – Del Ray Phase I
- W20b – Del Ray Phase II
- W3 – Cape Haze

Figure 5-6 Mid County 2035 Improvement Plan



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To implement the additional project areas included in the 2035 Improvement Plan for West County, the modeling results suggest the following projects should be considered:

- 12a-W-FM – SR 776 from SR 771 to Oceanspray Boulevard
- 12b-W-FM – SR 776 from Sunnybrooke Boulevard to Spinnaker Boulevard

Figure 5-7 presents an overview of the 2035 West County transmission and sewer collection system area improvements.

5.7 2040 Improvement Plan

The 2040 Improvement Plan was determined based on the 2040 modeling scenario, which includes projected development and wastewater flows from 2040 to 2045. Similarly, the improvement projects from previous modeling analyses are assumed to be implemented for this modeling scenario.

5.7.1 Mid County 2040 Improvements

The 2040 modeling analysis showed that the transmission system with the improvements included in the 2040 Improvement Plan adequately meets the County's needs to convey the 2040 flows for Mid County.

The 2040 modeling analysis was completed under the condition that the following S2S project areas have been completed:

- M85 – Snowden
- M87 – Birchcrest Phase II
- M89 – Fitzsimmons
- M90 – Presque Lake
- M91 – State
- M92 – Laika
- M93 – Tady
- M94 – Ruby
- M113 – Dover
- M114 – S. Whidden Bay

To implement the additional project areas included in the 2040 Improvement Plan for Mid County, the modeling results suggest the following projects should be considered:

- 15-M-FM – East side of Franz Ross Park to Quesada (LS-37)
- 16-M-FM – Veterans Blvd from Centennial Boulevard to Toledo Blade Boulevard
- 17-M-FM – Tamiami Trail to South Port (LS-65)
- 18-M-LS – Aswan Way (LS-306) Pump Upgrade
- 19-M-MLS – Peachland Boulevard Master Lift Station

Figure 5-8 presents an overview of the 2040 Mid County transmission and sewer collection system improvements.

Figure 5-7 West County 2035 Improvement Plan

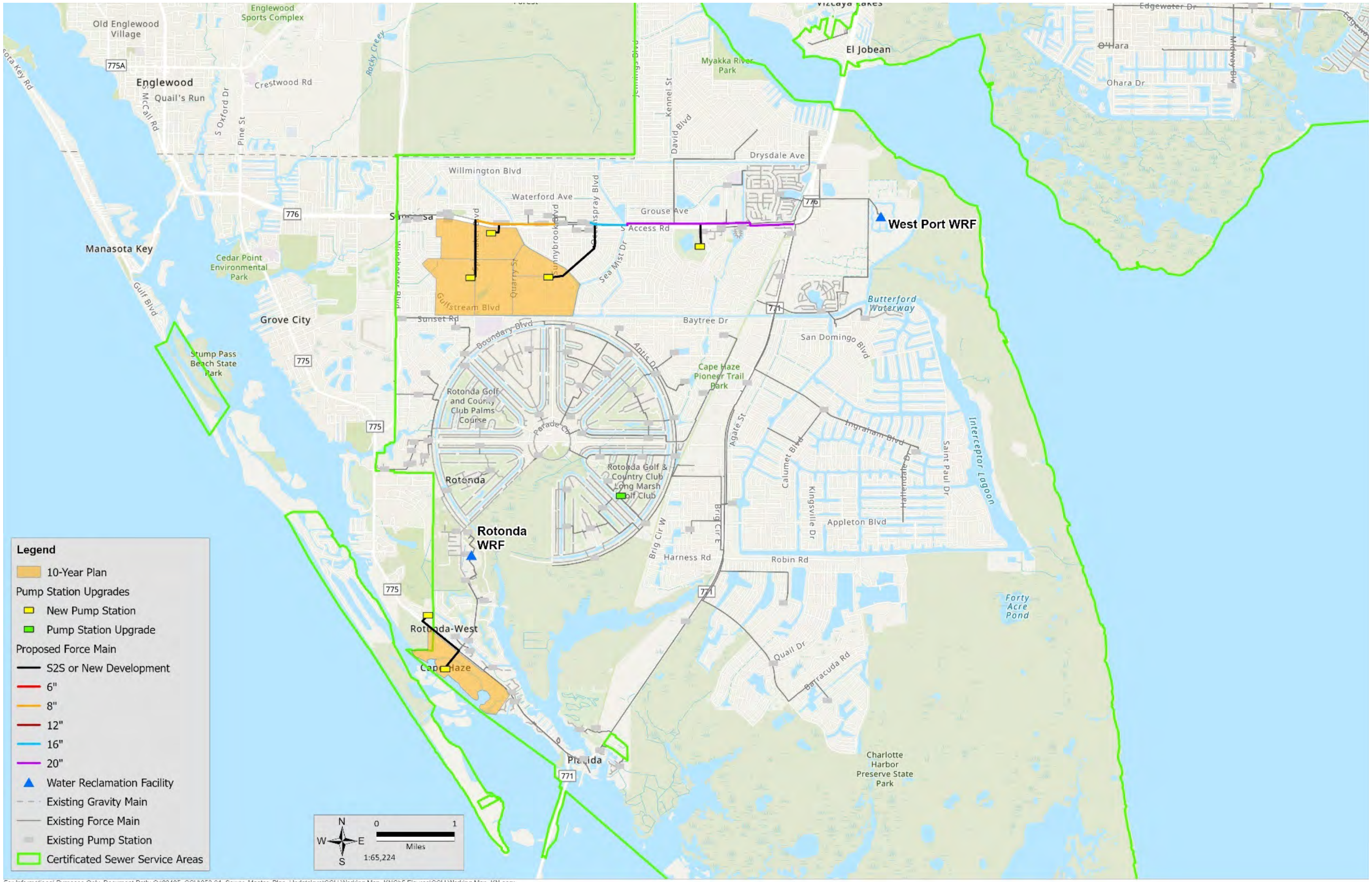

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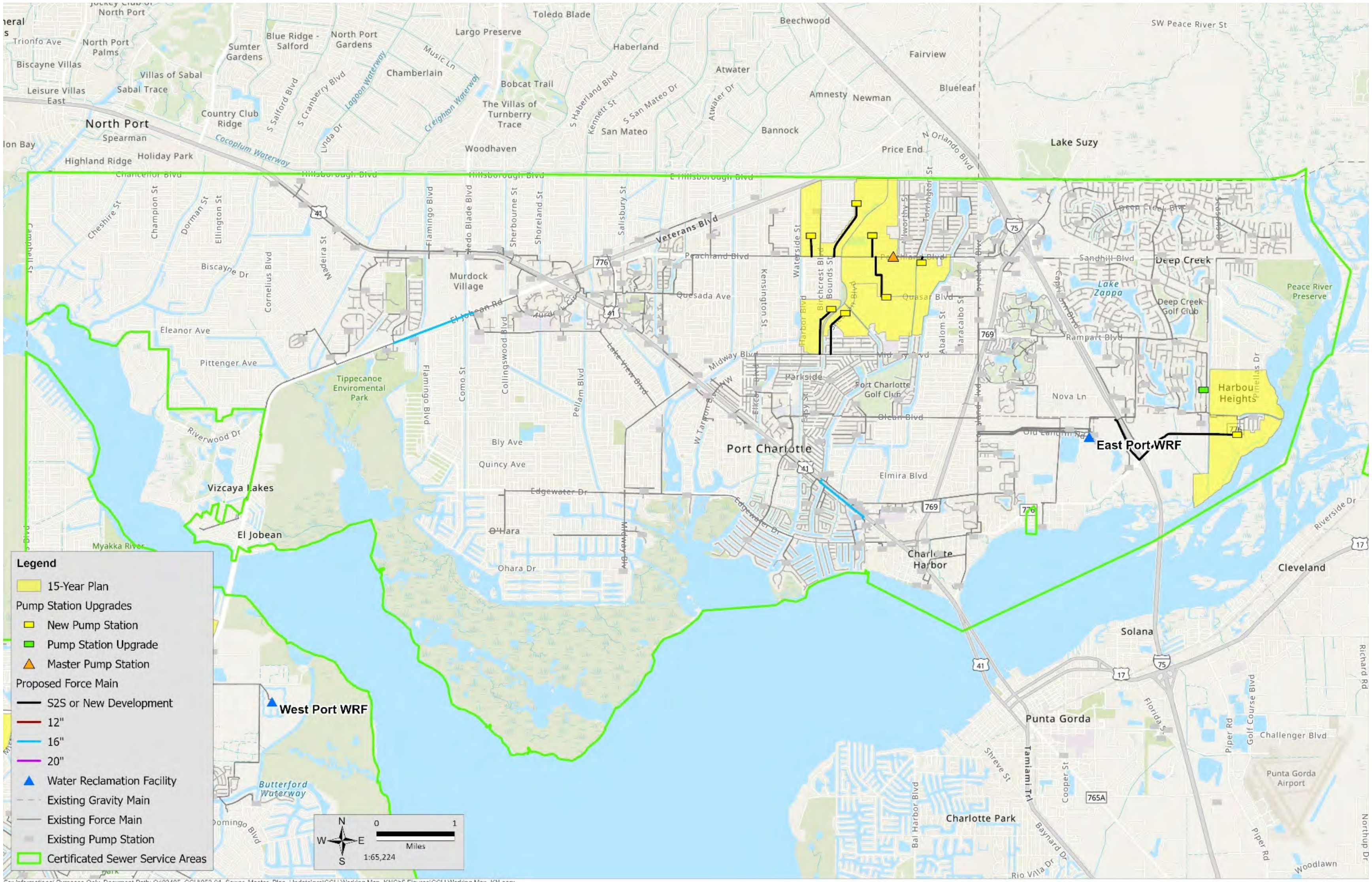
Figure 5-8 Mid County 2040 Improvement Plan



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5.7.2 South County 2040 Improvements

Results of the 2040 South County hydraulic modeling analysis suggested that additional improvements are not required to meet the evaluation criteria.

5.7.3 West County 2040 Improvements

The 2040 modeling analysis was completed under the condition that the following S2S project areas have been completed:

- W19a – Carnegie
- W19b – Peacock
- W33b – Dayton Pond
- W34a – Venus
- W34b – Ulysses

To implement the additional project areas included in the 2040 Improvement Plan for West County, the modeling results suggest the following projects should be considered:

- 13-W-FM – Long Meadow Road to Parade Circle
- 14-W-FM – Field (LS-801) to Rotonda WRF

Figure 5-9 presents an overview of the 2040 West County transmission and sewer collection system improvements.

5.8 Buildout Models

The County is committed to updating their SMP every 5 years. The buildout models are based on SWFWMD population and land zoning data projected for a future ultimate buildout scenario where Charlotte County is 100-percent occupied. The buildout models inform CCU of potential improvements that may need to be completed but that are contingent on development, in-fill growth, and the rate of S2S conversion projects. The buildout models are not intended as a recommendation for improvements beyond the planned period of 2024 through 2045 but rather to provide an overall picture and concept of the wastewater system’s infrastructure sizing at ultimate buildout.

The following sections describe the improvements that may be required for Mid, West, and South County to convey the projected flows under buildout conditions. Figure 5-10 presents a County-wide map of the possible upgrades to be expected to allow for sufficient capacity in the transmission system for buildout conditions.

5.8.1 Mid County

- Improve force main transmission capacity and upgrade the MLS along the Peachland/ Loveland corridor to accommodate for increased flows from S2S projects in north Mid County. This improvement can be delayed by providing a new MLS along Peachland, as noted in the 15-year Improvement Plan.
- Improve force main transmission capacity along Chamberlian Boulevard and install an MLS near the intersection of Chamberlian Boulevard and Tamiami Trail (US 41). This improvement depends on population growth for the northwest area of Mid-County near Chamberlian Boulevard.

Figure 5-9 West County 2040 Improvement Plan

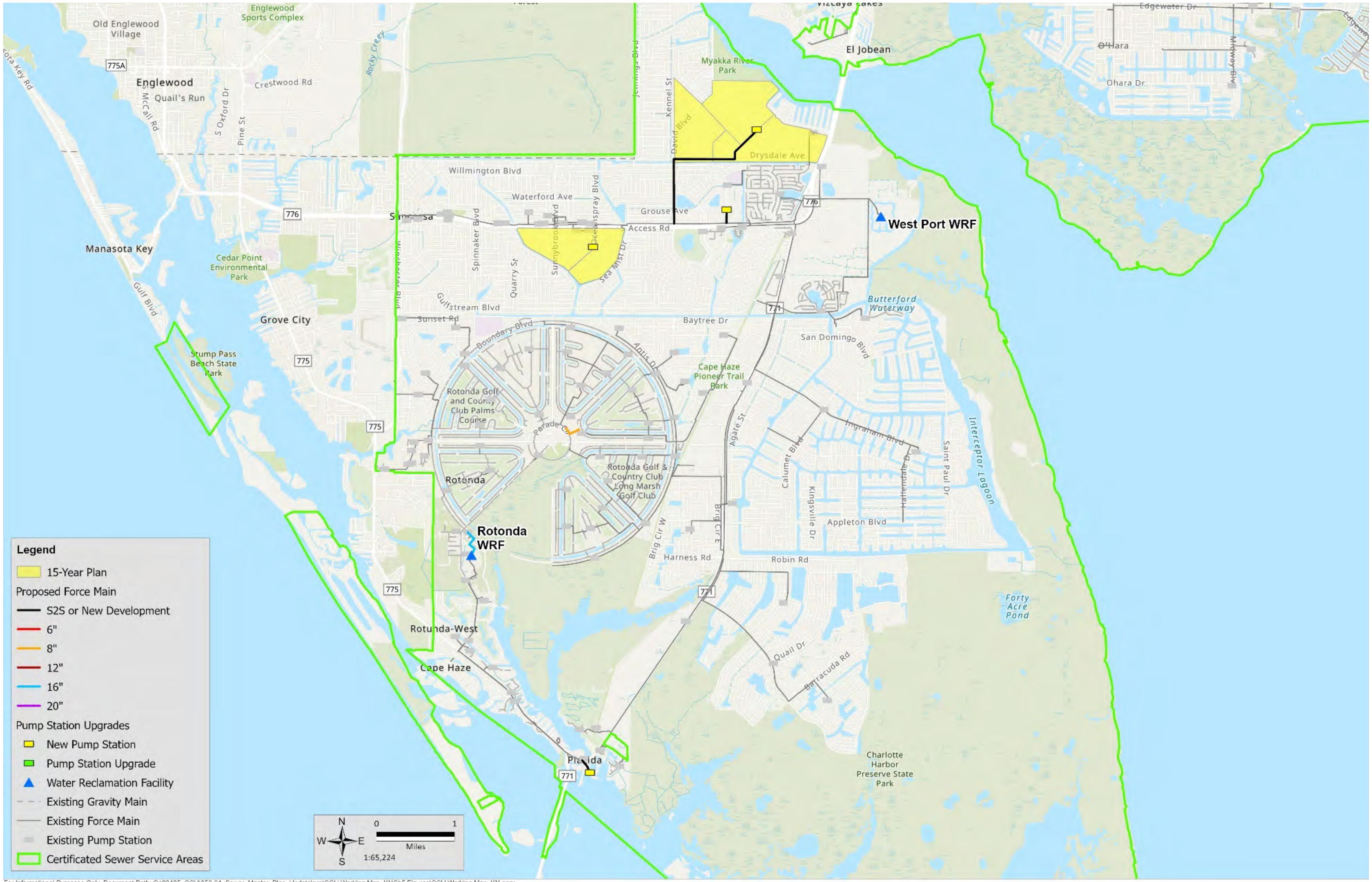

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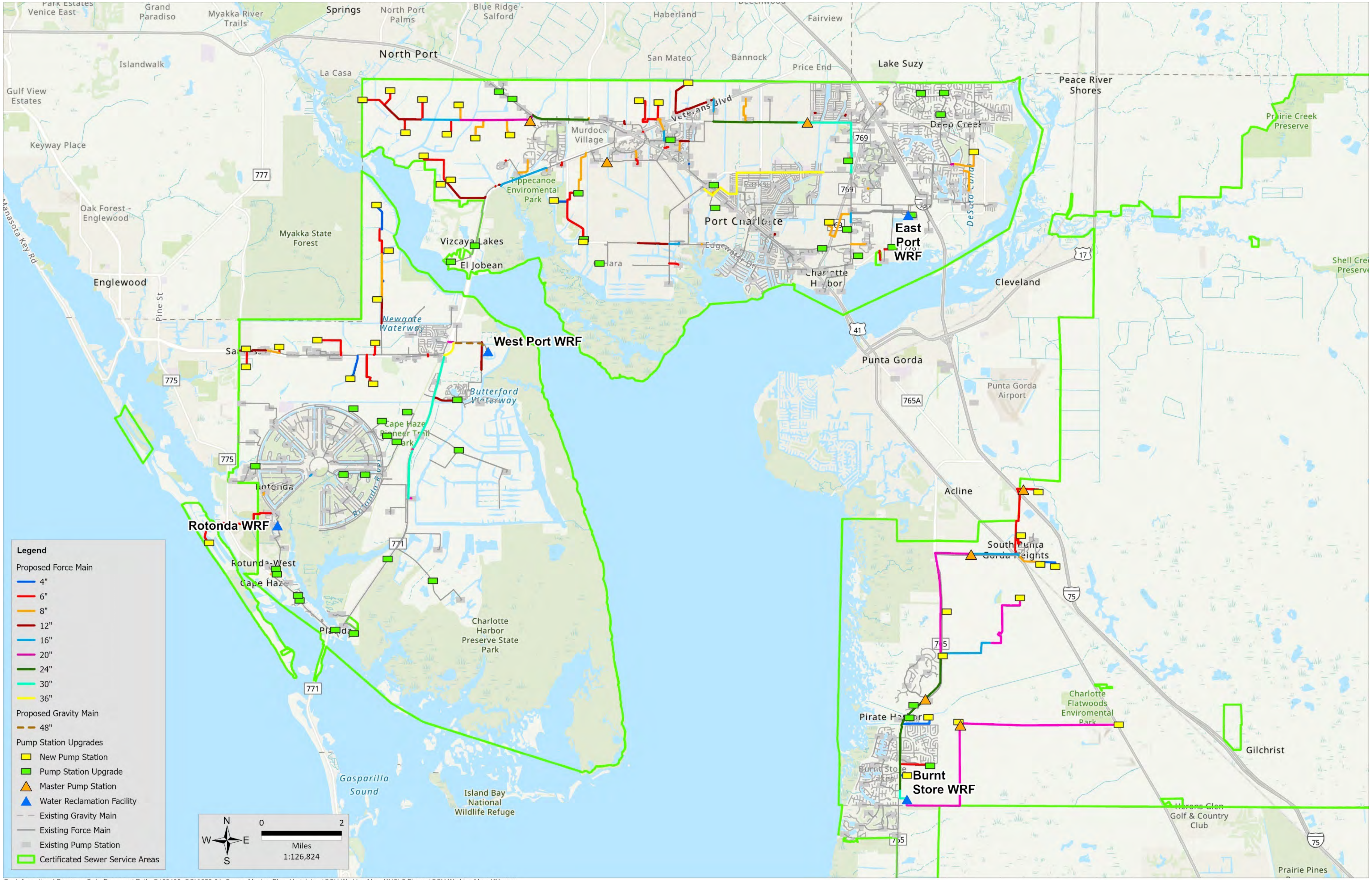
Figure 5-10 Charlotte County Buildout Models



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- Construct a new MLS along Cochran Boulevard to reduce hydraulic constraints from onboarding additional S2S projects in west Mid County and along SR 776.
- Improve force main transmission capacity from the Midway Boulevard and Tamiami Trail (US 41) intersection to the gravity interceptor leading to the East Port WRF. This improvement depends on increased flows from S2S projects and population growth around the Lake View Midway area.
- Improve gravity intercept transmission capacity leading to the East Port WRF to accommodate for increased flows due to population growth across Mid County and previous project capacity improvements. A parallel main should also be considered as an option for increased capacity.

5.8.2 West County

- Install a gravity interceptor and an MLS along Cattle Dock Road to alleviate hydraulic constraints associated with completing S2S projects in Gulf Cove and along SR 776. The modeling results indicated that the timing for this improvement would be after 2045.
- Improve force main transmission capacity along the Gasparilla Road corridor. Future improvements would be considered due to population growth and the occupancy of the Sands and Meadows community. A parallel main should be considered as an option to increase the force main flow capacity.
- Improve force main transmission capacities along David Boulevard leading north to Gillot Boulevard and lift station improvements along the west side of SR 776. These improvements depend on the population growth along the east and south sides of the Myakka State Forest.

5.8.3 South County

- Install force main and an MLS along North Burnt Store Road to accommodate capacity constraints from the South Punta Gorda Heights area. This improvement should be considered due to population growth and completed once the area's occupancy is near buildout conditions.
- Construct an MLS near I-75 and S. Jones Loop Road once population nears buildout conditions in this area and additional flow capacity is necessary.
- Install a force main and MLS along Zemel Road leading to the Burnt Store WRF once population growth near US 41 and Zemel Road is close to full capacity in the area.

5.9 Capacity Program

Ensuring that the CCU sewer collection systems have adequate capacity to meet current and future demands is essential. The intent of the Capacity Program is to develop a high-level approach and roadmap for CCU to continually assess, maintain, and improve the capacity of its sewer collection systems. An additional goal of the Capacity Program is to take advantage of key capacity-related studies to ensure consistency between efforts. The capacity-related studies include the *Capacity, Management, Operations, and Maintenance (CMOM) Program* (Kimley-Horn, 2021) and the *Capacity Assessment and Assurance (CAAP) & Flow Monitoring Program* (Veith Engineering Business Solutions, 2024).

5.9.1 Sewer System Inventory

The sewer collection system inventory information in CCU's Cityworks and GIS databases is continually updated to include new assets and to add or modify data from field inspections or investigations. These updates are processed through Cityworks work orders that are digitally tied to the field assets. CCU's inspection details and wastewater collection system inventory is also presented herein.

The CCU staff clean and inspect the existing sewer collection system at different intervals depending on the system component, i.e., pipes, manholes, and lift stations. Typically, pipe inspections focus on older areas of the system where potentially deteriorating pipe conditions are a concern. CCU's goal is to evaluate a percentage of the sewer collection system per year, inclusive of visual observation, data analytics, cleaning and closed-circuit television (CCTV), smoke testing, etc., to comply with Rule 62-600.705, FAC. This Rule stipulates that each WWTF should establish a 5-year sewer collection system action plan with a minimum goal of performing basis evaluations for 25 percent of the system or 5 percent per year. As CCU continues to hire additional staff, they will move closer to achieving their goal to inspect 10 percent of the sewer collection system per year. Lift station wet wells and manholes that are known to be at higher risk for corrosion and odor, such as those with force main discharge and upstream LPS contributions, should be monitored and inspected more frequently.

Figure 5-11 is a County-wide figure showing gravity pipes color coded by material (unknown pipe material is noted as "Unidentified"). As stated above, CCU is updating the unknown pipe material as inspections are completed. In general, CCU Engineering and Operations staff have a good understanding of pipe material throughout the system.

Table 5-5 complements Figure 5-11 by showing the percent distribution and total miles of gravity pipe material for each of the four service areas.

Table 5-5 Miles of Each Piping Material for Each WRF Service Area Sewer Collection System

WRF Service Area	VCP	PVC	Unidentified	Total
East Port	58	43	139	240
West Port	10	2	15	27
Rotonda	18	3	53	74
Burnt Store	0	9	45	54
Totals	**86**	**57**	**252**	**395**

Note: VCP = vitrified clay pipe. Values rounded for simplicity.

Jones Edmunds collaborated with CCU to review and discuss the overall condition and concerns of the sewer collection system with respect to capacity. CCU staff identified WWCS areas that experience higher flow during wet-weather events and areas of related concern. The WWCS areas include systems with 1970s VCP gravity pipe, thin-walled PVC pipe, areas of known high wet-weather flow, and new PVC systems to compare results. This information was used as a basis to establish a representative plan to analyze I&I on a lift station service area basis throughout the CCU service area. Figure 5-12 shows the sewer collection system areas for the I&I analysis. The nine areas labeled A through I were evaluated using lift station pump data retrieved from SCADA.

Figure 5-11 Map of Gravity Main Piping Network for the CCU WRFs

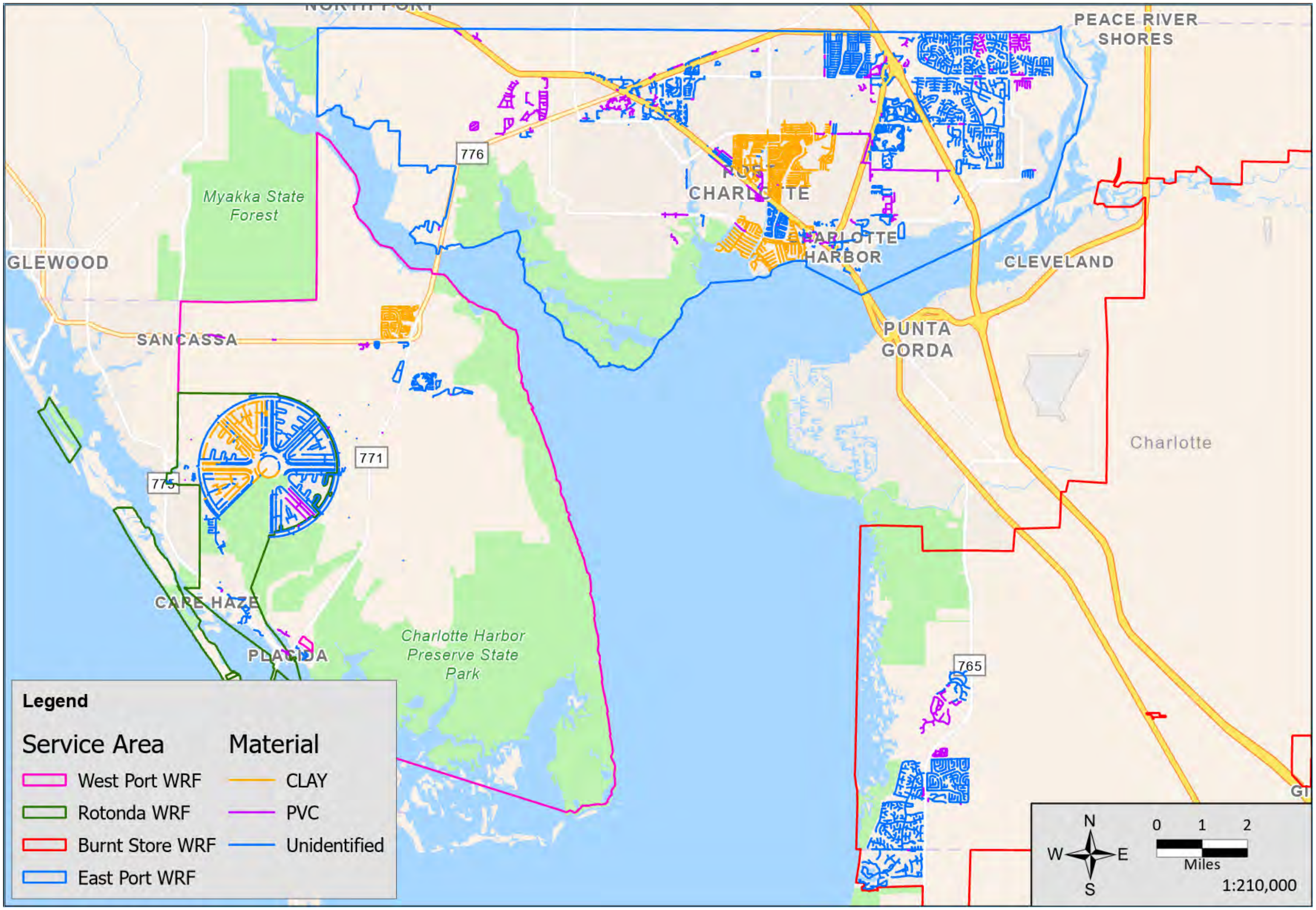
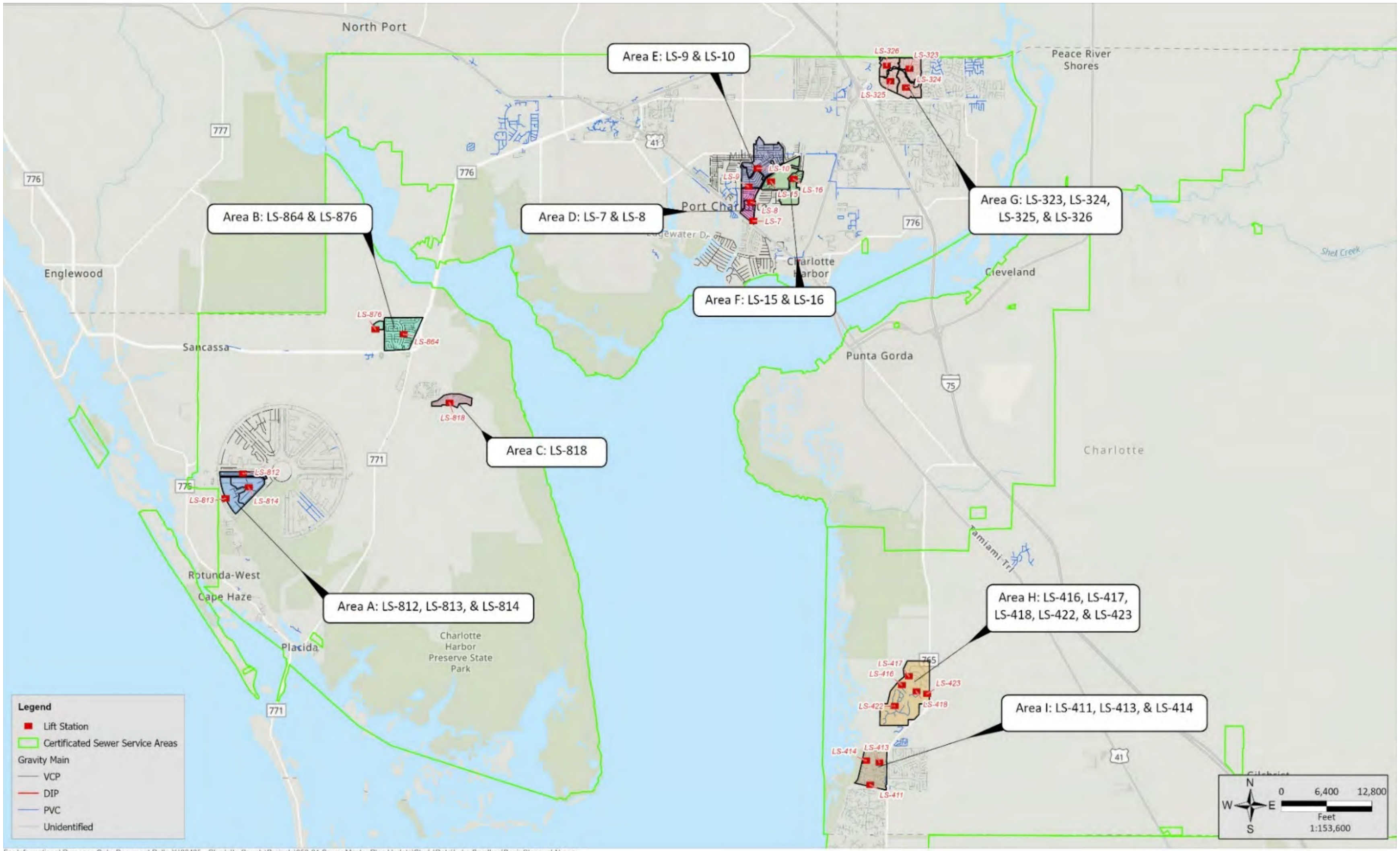


Figure 5-12 I&I Assessment Areas



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5.9.2 Wet-Weather-Related SSOs and Areas of Known Limitations

One objective of the CAP is to evaluate the WWCS capacity and minimize SSOs related to I&I. As documented in the *Capacity, Management, Operations, and Maintenance (CMOM) Program* (Kimley-Horn, 2021), CCU experienced minimal SSOs related to I&I in 2019 and 2020, with I&I-related events causing 2 percent of CCU's total SSOs and accounting for only 1 percent of the total SSO discharge volume. CCU recently completed an update to their *SSO Response Plan and SSO Analysis Report* (Jones Edmunds, 2024) to identify and implement improved SSO response, activities, and tracking. CCU uses Cityworks to report and manage SSO events, including those I&I related. Figure 5-13 presents a snapshot of CCU's current SSO dashboard (2023) driven by Cityworks data.

Figure 5-13 CCU 2023 SSO Dashboard (Cityworks)

Table 5-6 identifies the locations and dates of CCU's I&I-related SSOs from 2021–2023 based on available Cityworks data. Table 5-6 also demonstrates that CCU experiences minimal I&I-related SSOs historically with no I&I-related SSOs being reported in 2023. The County continues to monitor, track, and prevent to the extent possible all SSO events.

Table 5-6 SSO Wet-weather Related Events from 2021–2024

Events	Date	Location
1	7/7/2021	22420 Olean Boulevard
2	7/7/2021	701 JC Center Court
3	7/7/2021	22091 Hernando Avenue
4	7/7/2021	2133 Mauritania Road
5	7/7/2021	1589 Navigator Road
6	8/4/2021	26578 Copiapo Drive
7	6/11/2022	23516 Olean Boulevard
8	6/11/2022	3160 Loveland Boulevard

Although not a major contributor to SSOs, I&I can have a significant impact on the available sewer collection system and WRF capacities. Therefore, the principal goal of reducing the amount of I&I in the WWCS is a way for CCU to restore available WRF capacity and potentially postpone the need for future WRF expansions.

5.9.3 Lift Station Capacity Analysis

This section discusses the CAP Decision Matrix, which is the basis of the systematic approach established for CCU to use in assessing the level of I&I within its sewer collection system. A supplemental detail is also provided to help guide CCU staff in understanding the process of identifying and solving I&I. For consistency, the process has been numbered according to the order presented in the decision matrix (Figure 5-19) as follows:

1. I&I rates from hydrograph decomposition were estimated for each WRF and form the basis for this initial decision step. Appendix J includes additional details of the hydrograph decomposition. The I&I decision values are based on industry standards and are summarized in EPA's *Quick Guide for Estimating Infiltration and Inflow*. Table 5-7 defines the three categories of I&I severity.

Table 5-7 Severity of I&I

I&I (gpd/IDM)	I&I Severity
<1,500	Low
1,500 to 4,000	Moderate
>4,000	High

Note: gpd/IDM = gallons per day per inch-diameter-mile.

2. VCP pipe areas within the WWCS are associated with the oldest segments of the sewer collection system and are typically most prone to infiltration due to leaking joints, root intrusion, and pipe cracking.

3. CCU staff have a working knowledge of known problem areas that may lie outside the VCP pipe areas or are in areas with "unidentified" pipe materials. These areas warrant I&I investigation via the techniques outlined in the *CCU Wastewater Collection System O&M Manual*. Investigating "unidentified" pipe material will allow for CCTV confirmation of possible I&I locations and will identify pipe material for future reference.

4. The goal of this systematic approach is to estimate I&I levels within a lift station service area using lift station runtime data. The estimated lift station service area I&I can then be compared to the previously estimated I&I for the WRF service area, thereby identifying areas contributing the highest levels of I&I to the system that warrants further investigation to appropriately establish priorities for pipeline rehabilitation.

5. Lift stations that do not receive flow from other lift stations are the logical starting point for the investigation since this allows a lift station collection system to be directly evaluated to estimate the I&I level associated solely with gravity sewers within that lift station's service area. Additionally, lift stations selected for this process must be those that are currently on the CCU SCADA system and have pump runtime data available. If a lift station of concern receives flow from other lift stations that are on SCADA, those lift stations should be evaluated individually to estimate their own sewer collection system

I&I levels. If a lift station of concern receives flow from lift stations that are not on SCADA, the combined sewer collection system of all contributory lift stations can be evaluated via runtime analysis of the downstream (receiving) lift station of concern, with future evaluation of the contributory lift station collection systems warranted if the overall area is determined to have “high” I&I levels.

6. Identifying lift station areas with “high” I&I will allow CCU to focus its sewer collection system inspection efforts on locating those pipelines and/or manholes that are the highest potential I&I sources. These inspections should be completed in accordance with the methods and procedures outlined in the *CCU Wastewater Collection System O&M Manual*. Initial efforts would focus on inspecting manholes and CCTV-inspecting the pipes within the sewer collection system feeding the lift station.

7. If the manhole and CCTV inspections do not identify specific issues that explain the “high” I&I level in the sewer collection system, further measures will be required to determine the potential sources. Additional measures, such as smoke testing and dye testing, are outlined in the *CCU Wastewater Collection System O&M Manual*.

8. If no obvious sources of I&I are identified for the sewer collection system mains and/or manholes, the next logical source to evaluate is the individual service lateral pipes to homes and businesses. The *CCU Wastewater Collection System O&M Manual* provides guidance on the appropriate measures for such evaluations.

5.9.3.1 Runtime Analysis

The systematic capacity analysis approach uses lift station runtime data from the CCU SCADA combined with pumping rate data for the lift station pumps to establish hourly flow data. The pumping rate data used for the lift station pumps are combined rated flow capacities and drawdown tests performed by CCU personnel for dual-pump operation flow rates.

The runtime analysis of a lift station focuses on understanding the operating times of the station’s pumps and associated equipment to ensure proper function and identifying any potential issues. For the initial runtime analysis program, Jones Edmunds coordinated with CCU personnel to identify lift stations to include in the program that would achieve the goals of evaluating the following:

- Lift stations from all four WRF service areas to represent each major area of the County.
- Lift stations from areas with gravity sewers constructed predominately of VCP.
- Lift stations from known areas with high flows during wet weather.
- Lift stations from areas with gravity sewers constructed predominantly of thin-walled PVC.
- Lift stations from new developments with gravity sewers constructed entirely of new PVC.

Based on the stated goals, 11 lift stations were selected for runtime analyses. Lift stations from new developments were included in the initial program to demonstrate if newer sewer construction materials/techniques achieve tighter systems less susceptible to I&I.

Figure 5-12 shows that each main area within the WWCS, A through I, contains at least one lift station that is linked to the CCU SCADA system. Table 5-8 summarizes the specific information related to the selected lift stations within each main segment of the WWCS.

Table 5-8 SCADA-Equipped Lift Stations and Contributing Lift Stations for Each I&I Analysis Area

Area	SCADA-Equipped Lift Stations	Contributing Lift Stations	Service Area
A	LS-813 Marina	LS-812, LS-814	West County
B	LS-864 Coliseum	LS-876	West County
C	LS-818 Harbor West	N/A	West County
D	LS-7 Pure Oil	LS-8	Mid-County
E	LS-9 Church LS-10 Hernando	LS-10 N/A	Mid-County
F	LS-15 Sistina LS-16 Beacon	LS-16 N/A	Mid-County
G	LS-323 Aysen	LS-324, LS-325, LS-326	Mid-County
H	LS-422 Heritage Landing MLS	LS-416, LS-417, LS-418, LS-423	South County
I	LS-411 San Ciprian	LS-413, LS-414	South County

For each SCADA-equipped lift station, three separate 7-day periods were chosen for 2022/2023 to represent dry-weather and wet-weather conditions. The three dry-weather periods were evaluated to estimate dry-weather groundwater infiltration and average daily sanitary flows for each sewershed. The three wet-weather periods were selected to reflect periods in which the recorded influent flows to the receiving WRFs experienced influent flow increases.

The runtime data for each lift station were downloaded from SCADA for each of the 7-day dry-weather and wet-weather periods. The runtime data were converted to hourly flow data using drawdown testing data for the lift stations that established pumping rates for each pump and the combined rate with both pumps operating. The runtime data were analyzed to establish the periods of dual-pump operation for each lift station. To obtain the most current pumping rates for each lift station, drawdown tests were conducted during a site visit on October 29, 2024. If the drawdown data were unavailable for a particular lift station, then the flow calculations were based on the rated capacity of the pumps and an assumed dual-pump operation rate of 60 percent of the combined pump capacities.

Following conversion of the runtime data to hourly flow data, graphs were generated to depict the flow data for each lift station during their respective 7-day evaluation period. From the graphs for the three dry-weather periods, an assessment was made to develop a typical dry-weather base flow for each lift station. For the wet-weather periods, the individual wet-weather flow graphs were evaluated, and the 7-day period that represented the highest flows was selected for each lift station. Rainfall data for each of the wet-weather periods at each lift station location were downloaded from the Next Generation Weather Radar (NEXRAD) website and plotted on a secondary axis of each lift station flow graph.

5.9.3.2 Runtime Analysis Results

For the nine sewer collection systems evaluated (Areas A through I), 11 lift stations equipped with SCADA were used for runtime analysis. For each lift station, a graph was generated to facilitate an I&I analysis of their respective sewer collection system. These graphs plot typical dry-weather flow (ADF), the maximum wet-weather flow (MDF), and rainfall data on the same chart.

Figure 5-14 and Figure 5-15 are presented as examples; Appendix K provides graphs for each of the 11 lift stations.

Figure 5-14 LS-7 Pure Oil I&I Analysis

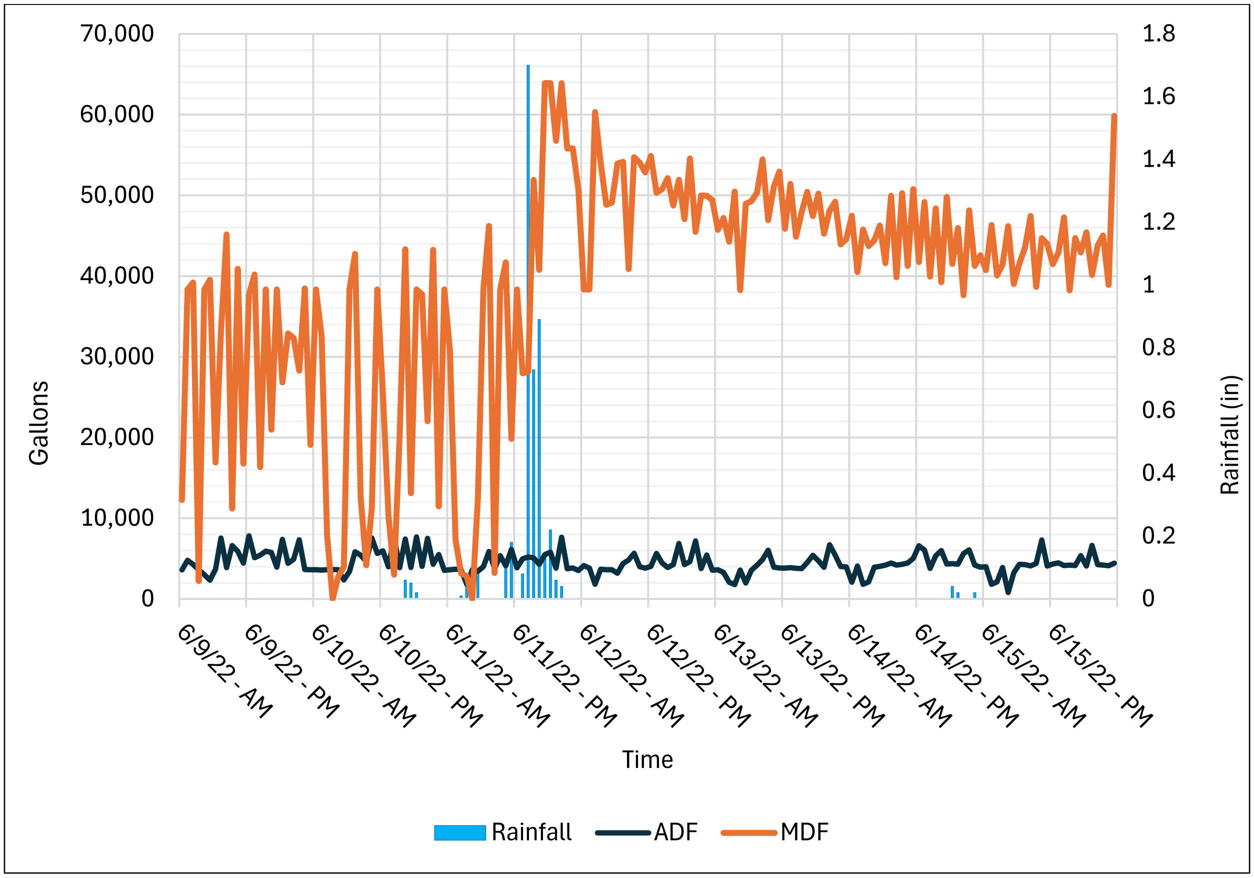
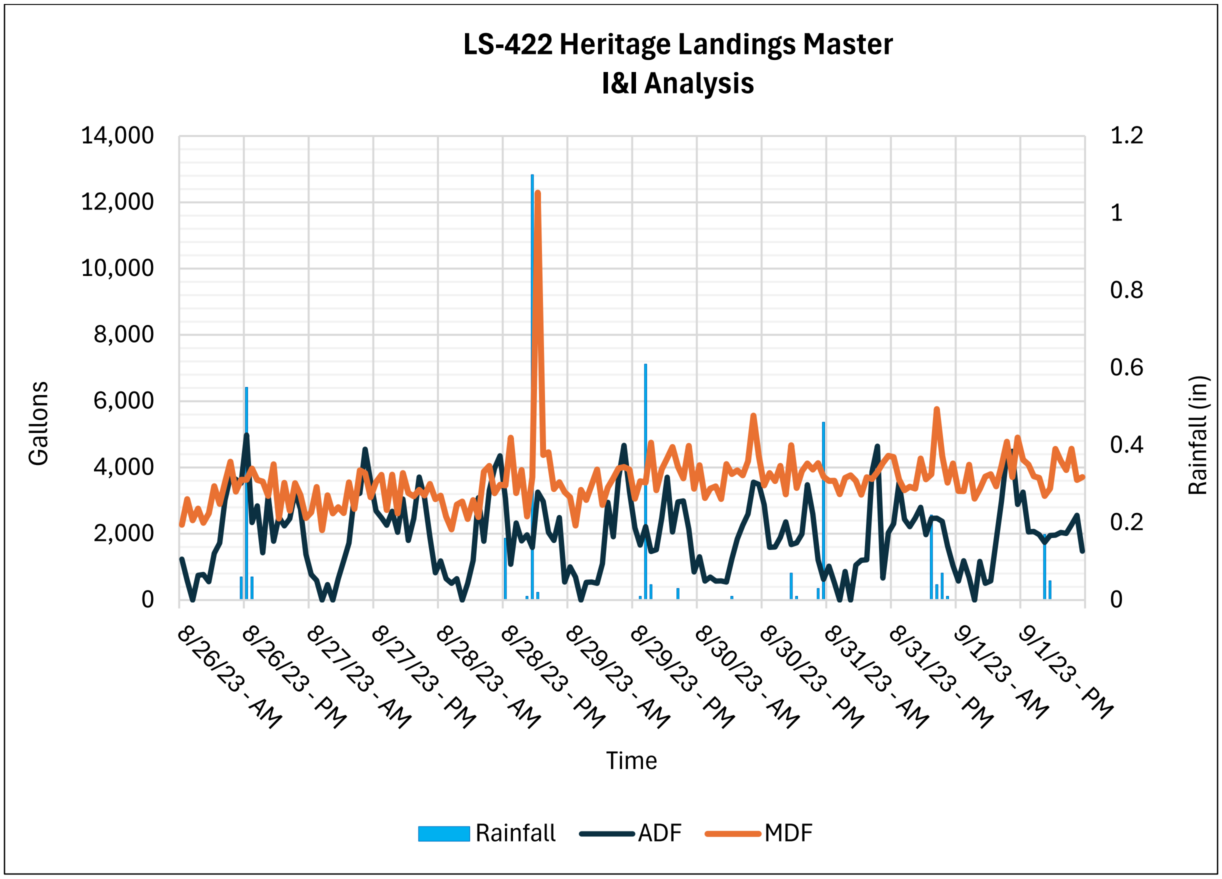


Figure 5-15 LS-422 Heritage Landings Master I&I Analysis



The lift stations' flow response to significant rainfall provides insight into the magnitude of the possible I&I of the lift station collection system. Figure 5-14 illustrates the response of LS-7, which receives flow from its own sewershed and that of the LS-8 sewershed. The gravity pipe of the sewer collection system is constructed of VCP that was installed circa 1960. LS-7's MDF response to the 11-hour rain event on June 11, 2022, exhibits a sharp increase just after the rain and remains at elevated levels for several days after the rain. The combination of a long rain event to saturate the soil and the old VCP creates conditions that lead to high I&I levels due to the increased pressure within the soil.

Figure 5-15 depicts the performance of LS-422, the Heritage Landings MLS. LS-422 receives flow from LS-416, LS-417, LS-418, and LS-423, which all have their own sewer collection systems made from PVC circa 2021. The comparison between LS-7 and LS-422 shows the potential improvement to I&I that can be achieved with a new or replacement PVC sewer collection system versus an aged VCP sewer collection system.

After the rain event on August 28, 2023, the MDF response of LS-422 exhibits a sharp initial increase, which quickly returns to ADF levels. This brief increased flow suggests that LS-422 does not experience system-wide increased flows since no delayed MDF flow occurs. The associated soils around the sewer collection system, Isles Muck and EauGallie Sand, are poorly drained soils that have slow infiltration. Additionally, three other instances of approximately 0.5 inch of rainfall occur with no significant MDF response observed to provide evidence of I&I from these rainfall events. Taken together, the MDF-to-ADF response time, no MDF response for other rain events, poorly drained soil, and the new PVC piping network give reason that minimal I&I is observed in this location. Because the WWCSs have different size pipe diameters and total lengths, a relative means for comparing I&I is required. This method is described in the following section.

5.9.4 Estimate of Peak Flows and Potential Significant Areas of I&I

To calculate the maximum I&I rate for each lift station area, the hourly flows for the typical dry-weather period were subtracted from the corresponding wet-weather data, representing an estimate of the increase in flow during wet weather.

To standardize the different lift stations and their associated sewer collection systems, IDMs and MDF gpd increases are used to calculate an estimated I&I that is respective to the sewer collection system size for each lift station. The MDF gpd increase for each lift station is obtained by adding the hourly flow data for the whole day following the rain event. IDM is the product of the diameter of pipe measured in inches and the length of pipe measured in miles. This standardized identifier allows each lift station collection system to be compared to another by normalizing the size and extent of the systems into a single metric, facilitating direct comparison of the infrastructure regardless of variations in pipe dimensions or network lengths. CCU can use IDM to evaluate lift station system capacity, performance, and maintenance needs across different lift station systems more consistently and accurately. Table 5-9 summarizes the lift station infrastructure, capturing the relationship between construction year, pipe material, gpd, and IDM. The I&I rates presented in Table 5-9 and Figure 5-16 were compared to the I&I severity levels presented in Table 5-7 to identify the severity for each lift station collection system.

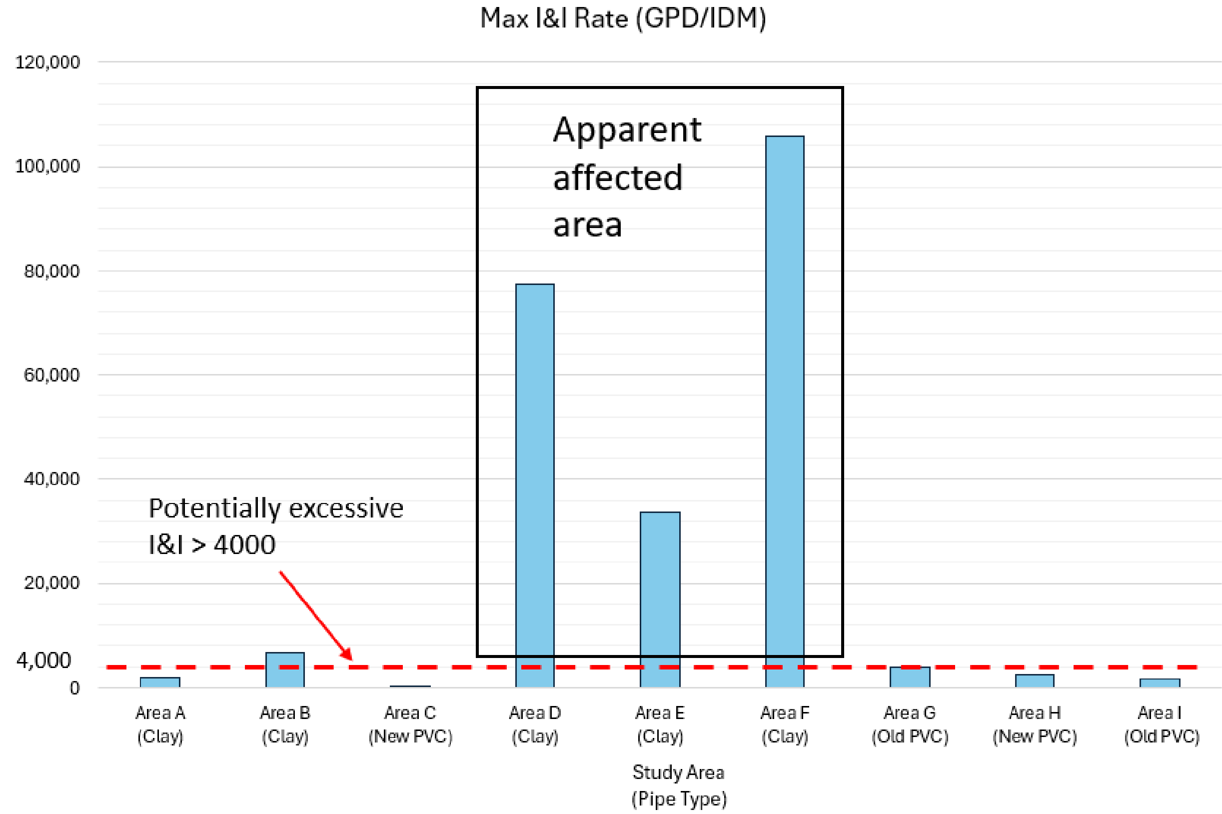
Table 5-9 Lift Station I&I Analysis

Lift Station	Lift Station Construction Year	Gravity Pipe Material	MDF Increase (gpd)	Pipe IDM	Max I&I Rate (gpd/IDM)
LS 7	1980	VCP	1,100,000	14.2	77,500
LS-9	1984	VCP	1,484,000	44.1	33,600
LS-10	1980	VCP	226,000	31.8	7,100
LS-15	1981	VCP	564,000	5.3	105,800
LS-16	2004	VCP	289,000	8.1	35,800
LS-323	1980	PVC	136,000	33.6	4,000
LS-411	1980	PVC	32,000	19.0	1,700
LS-422	2021	PVC	50,00	20.0	2,500
LS-813	1978	PVC	56,000	27.3	2,000
LS-818	2019	PVC	4,000	4.6	100
LS-864	2002	VCP	179,000	26.5	6,800

Note: Values are rounded.

Figure 5-16 summarizes the overall results of the I&I analysis. These data demonstrate the relative magnitude of the lift station collection systems and the levels of I&I based on a standardized value, gpd/IDM.

Figure 5-16 I&I Analysis Summary



5.9.4.1 Recommendations

Based on the findings of the lift station capacity analysis, the primary recommendation to address I&I is for CCU to focus additional inspection efforts on the lift stations with the highest I&I rates. From Table 5-9, the lift station systems with the highest I&I rates are:

- LS-15 (105,800 gpd/IDM)
- LS-7 (77,500 gpd/IDM)
- LS-16 (35,800 gpd/IDM)
- LS-9 (33,600 gpd/IDM)

However, as noted in Table 5-8, LS-15 receives flow from LS-16, LS-9 receives flow from LS-10, and LS-7 receives flow from LS-8. As a result, some adjustments in the ranking of I&I levels can be estimated by subtracting the contributory upstream lift station I&I values for LS-9 and LS-15. LS-8 is currently not on CCU SCADA, so LS-7's I&I level cannot be adjusted.

Subtracting the LS-10 I&I value from the LS-9 I&I value, an adjusted I&I value for just the LS-9 sewer collection system is calculated to be 26,500 gpd/IDM. Similarly for LS-15, an adjusted I&I value can be determined for just the LS-15 collection area of 70,000 gpd/IDM by subtracting the LS-16 I&I value.

Taking these calculations into account, the adjusted listing of lift station systems with the highest I&I rates are:

- LS-7 (77,500 gpd/IDM)
- LS-15 (70,000 gpd/IDM)
- LS-16 (35,800 gpd/IDM)
- LS-9 (26,500 gpd/IDM)

Since LS-7 receives flow from LS-8, the I&I rate for just the LS-7 sewer collection system is likely lower than 77,500 gpd/IDM. Furthermore, whether the LS-7 or LS-8 sewer collection system is the primary source of the I&I calculated at LS-7 or if they are equally contributory is currently unknown. Therefore, a CIP project is recommended to install SCADA at LS-8 to determine where CCU should focus any additional inspection efforts for this combined sewer collection system. Refer to Figure 7-1 for additional information on CMP projects.

As discussed above, the primary recommendation to address I&I is for CCU to focus additional inspection efforts on the lift stations with the highest I&I rates. The sewershed(s) with the highest calculated I&I rate should be the first priority. Since the LS-7 and LS-8 sewersheds are very similar in age and pipe material, an adjustment to the LS-7 I&I rate that removes the LS-8 I&I contributions will significantly reduce its I&I level. Therefore, the LS-15 sewershed is also recommended as a top priority for CCU to focus its additional sewer system inspection efforts.

Section 5.9.5 describes techniques for focused sewer system inspections to further refine the assessment of contributory factors to I&I within a sewershed. With more information regarding the type, extent, and physical location of sewer system issues that are contributing to I&I, CCU will be able to best apply its manpower and financial resources to make targeted repairs to problem areas in the most cost-effective and efficient manner.

Secondly, to continue the CAP, CCU should annually identify the lift station sewersheds that require runtime analyses. This will allow CCU to establish I&I rates for additional sewersheds and integrate them into an overall priorities list for further investigation efforts systemwide. An allowance for this is included in the proposed CMP presented in Chapter 7.

5.9.5 Collection System Evaluation Methods

The flow monitoring plan comprises many investigation techniques to evaluate problem areas within the CCU system. The investigation techniques include the following:

1. Identifying areas of SSOs and line limitations due to pipe material or age.
2. Analyzing runtime data for the lift stations.
3. Estimating I&I problem areas and their severity.
4. Inspecting the sewer system.

To narrow the search for WRF problem areas experiencing high I&I, the lift station runtime analyses discussed above can be used to efficiently evaluate sewer collection systems. The runtime analysis uses the on/off times from a lift station pump's SCADA data to determine how much excessive flow occurs during wet weather. The times when the pump is operating can be converted to an estimated flow by using drawdown test data, which would give the number of gallons pumped over a given time period. By measuring the flow in dry- and wet-weather conditions, a comparison can be made to determine whether the sewer collection system experiences excessive flow during wet-weather periods. Dry- and wet-weather conditions can be determined through rainfall data corresponding to the sewer collection system location. This runtime analysis will demonstrate if a sewer collection system is experiencing I&I.

After evaluating the runtime analysis data, further investigation techniques should be used to continue locating the specific sewer collection system and/or section of sewer collection systems experiencing I&I. Sewer system inspection techniques involve physically and/or visually examining the infrastructure to ensure proper function and identifying potential problem areas. Typical inspection techniques used in the field include:

- CCTV Inspection
- Manhole Inspection
- Smoke Testing
- Dye Testing

For additional information on inspection techniques, refer to the 2021 CCU *Capacity, Management, Operations, and Maintenance (CMOM) Program* by Kimley-Horn.

5.9.6 Collection System Rehabilitation

Once a sewer collection system area is determined to have a high or excessive suggested I&I, the next step is field investigation (CCTV, manhole inspection, etc.). The field inspection will be aimed at determining the extent and sources of I&I and allow CCU to identify the appropriate repair or rehabilitation required for the gravity pipe and/or manholes. Methods to reduce I&I and restore capacity in the WWCS include gravity pipe lining, point repairs, and complete pipe replacement. To adequately address excessive I&I in an area may require any of or a combination of these methods.

Cured-in-place pipe (CIPP) is a method to line the inside of pipe to repair cracks or holes within the pipe wall as well as to seal and eliminate leaking pipe joints. Table 5-10 presents the estimated price-per-linear-foot cost by pipe sizes for relining with CIPP.

Table 5-10 Cost Estimate for CIPP

Size (inches)	Cost ($/LF)
8	32
10	37
12	44
18	64
24	111
36	172
42	213

Following field inspections within each area noted to have excessive I&I, CCU will be able to make informed decisions on the next steps required to address excessive I&I – pipe lining, replacement, or some combination of these measures. Manhole lining should also be considered within areas of excessive I&I whenever field investigations identify manhole deficiencies that are contributing to I&I. Field investigations should include manhole investigations, pipe CCTV, and entry points of gravity pipe into manholes.

5.9.7 Force Main Capacity Analysis

The County-wide sewer model was used to evaluate the capacity of the existing force mains and determine the need for improvements to handle current and future flows. However, force mains also have the potential to contribute to SSOs. Force main field evaluations can be completed to minimize the potential for SSOs from new construction and repairs (one of the leading causes of force main SSOs). The evaluation should focus on older cast iron and ductile iron pipelines or known problem areas. A coupon sample can be taken to analyze actual pipe wall thickness relative to design wall thickness. Mains 8 inches and larger may not be as impacted as smaller-diameter mains.

5.9.8 Odor Control and Corrosion

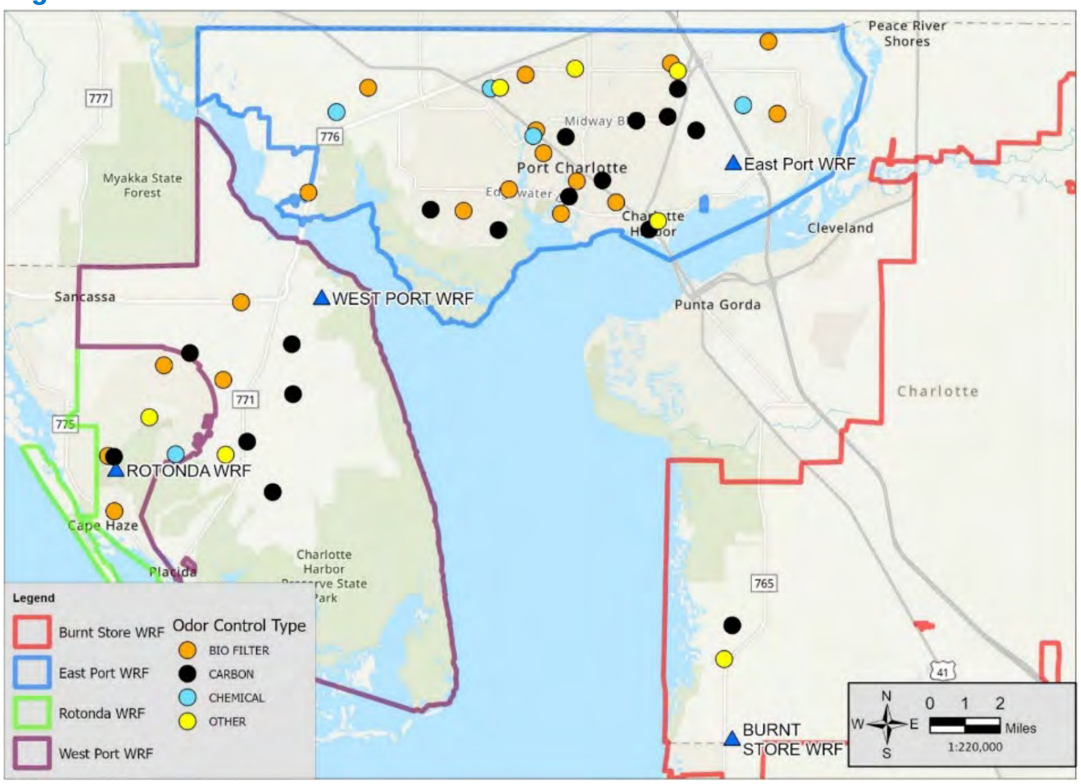
Due to the vast extent of the wastewater system, wastewater spends a significant amount of time in the system, making the CCU sewer collection systems prone to odor and corrosion. Hydrogen Sulfide (H2S) can build up within the system, leading to strong odors and destructive corrosion. H2S reacts with oxygen in the system to produce sulfuric acid as a condensate on sewer structure walls, leading to leaks and a weakened structure. Figure 5-17 shows the effects of corrosion in the wet well of LS-44. The County has historically invested efforts to address odor and corrosion in the sewer collection system and is seeking to optimize the spending and effectiveness of odor control and corrosion measures as the next step.

Figure 5-17 Example of Notable Corrosion at LS-44

Current odor- and corrosion-control measures primarily applied at lift stations across the County include biofilters, carbon filters, chemical addition, and other passive measures such as Hi-Vent systems. As of 2024, the County expends approximately $1.2M annually on recurring chemical additions.

Jones Edmunds recommends that CCU complete an Odor and Corrosion Control Study as the next step to optimizing spending and employing odor- and corrosion-control measures. The study should include field sampling at strategically selected locations throughout the system to quantify corrosion and odor potential as well as reviewing options and recommended solutions to reduce annual odor- and corrosion-control costs. Figure 5-18 shows the various odor-control systems at lift stations across the County.

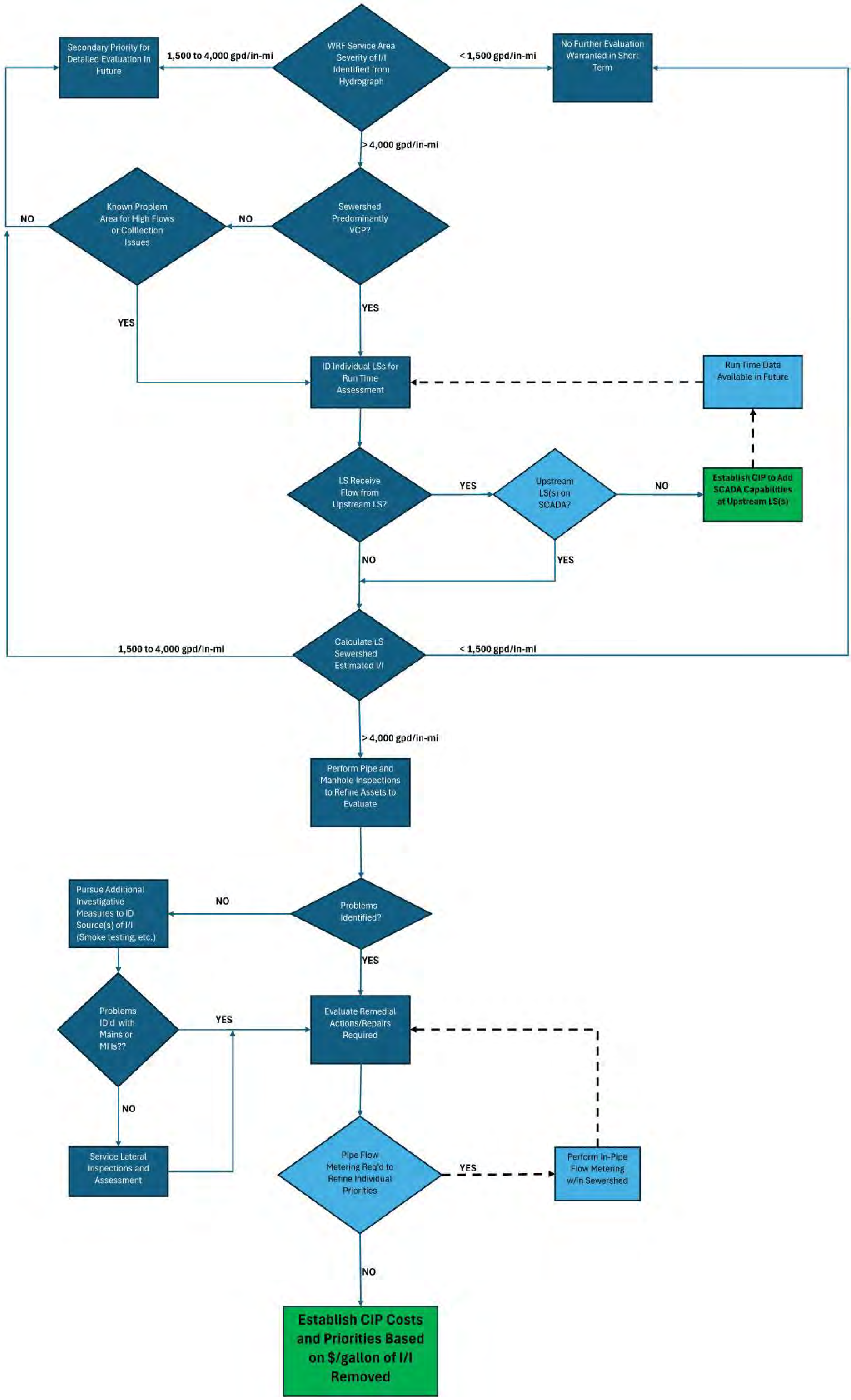
Figure 5-18 Odor and Corrosion Control at CCU Lift Stations



5.9.9 Capital Maintenance Project Recommendations

Fully implementing the CAP, as well as the requisite sewer system inspection program and address the potential types of sewer remediation measures needed to address excessive I&I, may require CCU to outsource some work. Therefore, CCU should plan for and budget annually for an ongoing CMP that has allowances for the CAP and the various cleaning, inspections, and pipeline rehabilitation/repair/replacement that may be needed. To this end, Chapter 7 presents a recommended CMP containing preliminary allowances for an ongoing CAP, a sewer collection system cleaning and inspection program, and a pipeline rehabilitation/repair/replacement program. The preliminary CMP budgets should be reviewed and modified as needed annually. Repair, replace, or upgrade the areas identified because of damaged or undersized infrastructure causing capacity limitations in the CCU sewer system.

Figure 5-19 Capacity Analysis Program Decision Matrix



6 WATER RECLAMATION FACILITIES

OVERVIEW

The complexity and importance of WRFs are often overlooked; therefore, this chapter briefly discusses their purpose, monitoring requirements, and planning protocols.

This chapter also assesses the current WRF processes and operations, reviews the historical flows and treated water (reclaimed water) quality characteristics, lists ongoing improvements, and describes timing for future expansions based on flow projections and biosolids management and disposal.

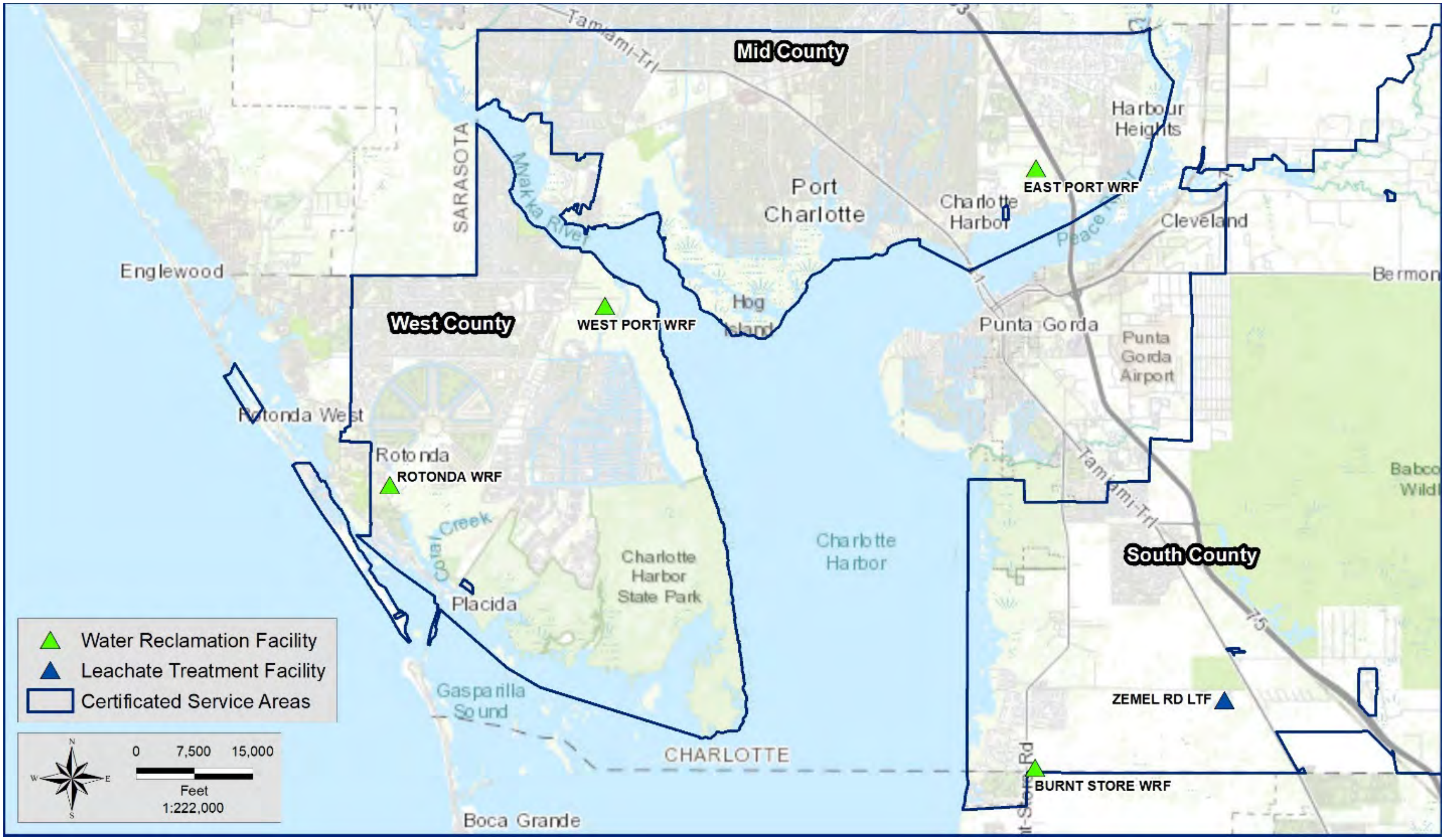
6.1 WRF Treatment, Monitoring, and Planning Overview

WRFs are designed to treat the wastewater collected throughout the community and return the treated water to the environment. The treatment methods implemented at the CCU WRFs include a number of physical and biological processes designed to provide optimal conditions for nutrient removal. The level and method of treatment depend on local conditions, disposal methods, and regulations set forth to protect the health and safety of the public and our natural resources. FDEP is the state agency that issues WRF permits and requires utilities to record and submit DMRs of flows and water quality characteristics to maintain compliance with the regulations.

CCU owns and operates four WRFs throughout Charlotte County. Figure 6-1 shows that the East Port WRF serves Mid County, the West Port and Rotonda WRFs serve West County, and the Burnt Store WRF serves South County. Each WRF is unique in its design and treatment approach; as such, each facility must be independently evaluated. The WRFs are designed and permitted to treat a specific volume of wastewater on an AADF basis. In addition, each WRF has to meet reclaimed water quality requirements for constituents such as CBOD, total suspended solids (TSS), TN, TP, and fecal coliform before safely distributing the reclaimed water for irrigation.

As the community population grows, wastewater flows to the WRFs increase and eventually require the plants be expanded. The timing for expansions and infrastructure improvements can be estimated using historical patterns and flow projections. As part of the master planning effort, wastewater flow projections were developed to identify future improvements for each WRF and delineate the project areas identified for 2025, 2030, 2035, 2040, 2045, and buildout. The flow projection methodology is described in Chapter 5.

Figure 6-1 Charlotte County WRFs



The timing of WRF expansions presented in this chapter is based on flow projections and FDEP Rule 62-600.405, FAC, *Planning for Wastewater Facilities Expansion*. This Rule specifies when an owner of a WRF is required to prepare and implement a capacity analysis report (CAR) or a CAR Update, preliminary design, final design, and an FDEP permit application for constructing an expansion based on the historical flows recorded in DMRs.

Initiating construction of an expansion depends on the complexity of the expansion, the growth rate of the WRF service area, the availability of funding, and other operational factors. For this reason, CCU staff and outside consultants routinely conduct facility assessments to identify improvements to optimize the operation and treatment efficiency of the WRFs.

The most recent assessments were completed in January 2024 and identified the physical conditions, capacity, performance, and reliability for each WRF. For planning purposes, this 2024 SMP Update assumes that construction is initiated 3 years before the WRF exceeds its permitted capacity.

The following wastewater flows will be presented as data for each WRF in this chapter. They are defined as follows in accordance with Rule 62-600.200, FAC:

- Annual Average Daily Flow (AADF) – The rolling average of 365 consecutive days of flow or the 12-monthly ADFs calculated during any consecutive 12-month period. Timing and necessity for planning, design, and construction of plant expansions are based on historical and projected AADF values.
- Monthly Average Daily Flow (MADF) – The total volume of influent wastewater during a calendar month divided by the number of days in a month.
- Maximum Monthly Average Daily Flow (MMADF) – The highest recorded MADF recorded during a year.
- 3-Month Average Daily Flow (TMADF) – The average of the 3 monthly average daily flows calculated during any consecutive 3-month period. TMADF indicates wet-weather and seasonal flow influx from I&I due to rainfall or seasonal population increase (such as “snowbird” season).
- Maximum 3-Month Average Daily Flow (MTMADF) – The maximum TMADF during a 12-month period.
- Maximum Daily Flow (MDF) – The maximum flow recorded for a single day (24-hour period).

The timing requirements for expansion depend on the permitted capacity in terms of AADF. WRFs are designed with a peaking factor to treat higher than typical flows, such as during the months where MMADF and MTMADF are recorded.

6.1.1 County’s Commitment to AWT

In 2021, the SB 64 was passed requiring utilities to submit a plan to FDEP to eliminate applicable surface water discharges by 2032. FS 403.086 requires applicable wastewater treatment facilities to upgrade to AWT before discharging to surface waters.

CCU's plan demonstrates that CCU does not discharge to surface waters because the discharge is into stormwater management systems that are subsequently withdrawn by users for irrigation purposes (permitted under FS 403.064). FDEP's SB 64 Annual Progress Report form is required to be submitted by October 31 every year. Appendix L includes this form and the County's *Surface Water Discharge Elimination Plan* that was accepted by FDEP in 2021.

CCU is permitted to distribute reclaimed water from the East Port WRF to four reclaimed water large-user ponds that contain emergency outfalls (see FDEP Permit No. FL00402091 discharge identifications D-001 to D-004). Under this permit, the East Port WRF is permitted to continue reclaimed water distribution to these four users under the condition that the East Port WRF is upgraded to AWT; construction to upgrade the East Port WRF to AWT standards began in January 2024 and is expected to be completed by December 2026.

In accordance with FS 403.086, the Charlotte County BCC expressed interest in upgrading all County WRFs to achieve AWT requirements to reduce the levels of CBOD, TN, and TP that are discharged into their reclaimed water produced and distributed to unrestricted-access reuse customers. AWT means treatment that will provide a reclaimed water product that contains no more, on a permitted AADF basis, than the following concentrations:

- 5-Day Carbonaceous Biological Oxygen Demand ($CBOD_5$) – 5 milligrams per liter (mg/L).
- TSS – 5 mg/L.
- TN – 3 mg/L.
- TP – 1 mg/L.

AWT also includes high-level disinfection.

CCU continues to pursue the BCC's direction for upgrading all WRFs to AWT, which will produce a better reclaimed water product, reduce nutrient loading, improve environmental water quality, and allow the utility to explore additional beneficial reclaimed water reuse options. The BCC has shown commitment to achieving these goals by adopting the *One Charlotte, One Water* plan and has continued to express interest in upgrading all WRFs to AWT treatment standards. However, the BCC is keenly aware of the financial burden that plant upgrades can place on the community and continues to carefully evaluate the transition to AWT as it is economically feasible based on user rates and as deemed necessary by evolving state regulations.

6.1.2 WRF Classifications and Operations Staffing

To ensure the efficient operation and maintenance of each WRF, they are classified based on their unique design, treatment processes, and flow rates, with corresponding staffing requirements specified by FDEP Rule 62-699.310, FAC, *Classification and Staffing of Domestic Wastewater or Water Treatment Plants and Water Distribution Systems*. Table 6-1 summarizes the classifications and staffing requirements for each of the four WRFs in Charlotte County.

Table 6-1 WRF Classifications and Staffing Requirements

Facility Name	Classification	Staffing Requirements
East Port WRF[1]	Type I, Category II, Class A	Staffing by Class C or higher operator: 24 hours/day for 7 days/week. The lead/chief operator must be Class A.
West Port WRF	Type I, Category II, Class B	Staffing by Class C or higher operator: 16 hours/day for 7 days/week. The lead/chief operator must be Class B or higher.
Rotonda WRF	Type I, Category II, Class B	Staffing by Class C or higher operator: 16 hours/day for 7 days/week. The lead/chief operator must be Class B or higher.
Burnt Store WRF[2]	Type I, Category III, Class C	Staffing by Class C or higher operator: 6 hours/day for 5 days/week and one visit on each weekend day.

[1] The East Port WRF is under construction to expand from 6.0 MGD AADF to 9.0 MGD AADF with AWT. After completion, the treatment facility will become Category I and retain the same staffing requirements.

[2] The Burnt Store WRF is planned to expand from 1.0 MGD AADF to 2.5 MGD AADF with AWT. After completion, the treatment facility will become Category I and require staffing by Class C or higher operator for 16 hours/day for 7 days/week with the lead/chief operator being Class B or higher.

A regulatory minimum staffing requirement for safety purposes does not exist; however, Jones Edmunds highly encourages and recommends that a minimum of two staff personnel be provided at all times at each WRF for safety reasons.

The criteria established in Rule 62-600.405 include:

- *A CAR shall be submitted to FDEP when the TMADF of the most recent 3 consecutive months exceeds 50 percent of the permitted capacity of the WRF or reclaimed water and disposal systems.*
- *If the permitted capacity (AADF) will not be equaled or exceeded in at least 10 years, then a CAR shall be submitted every 5 years.*
- *If the permitted capacity (AADF) will be equaled or exceeded in 10 years, then a CAR shall be submitted annually.*
- *If the latest CAR concludes that the permitted capacity (AADF) will be equaled or exceeded:*
  - *In the next 5 years: Planning and preliminary design of a WRF expansion need to begin.*
  - *In the next 4 years: Final design documents (drawings and specifications) need to be prepared.*
  - *In the next 3 years: An FDEP permit application for expansion needs to be prepared.*

6.2 EAST PORT WRF – MID COUNTY

6.2.1 OVERVIEW OF EAST PORT WRF

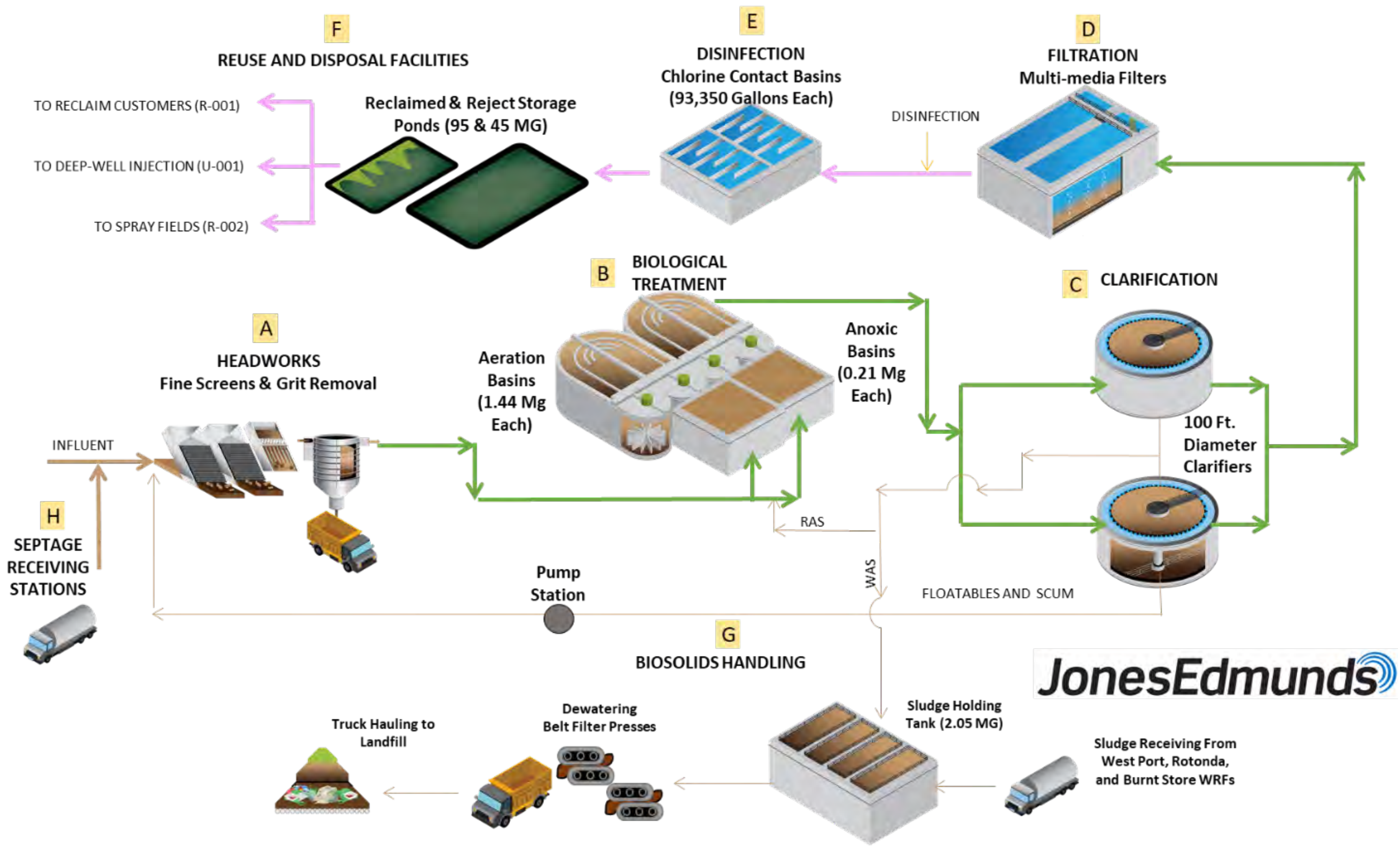
The East Port WRF is at 3100 Loveland Boulevard, Port Charlotte. The WRF began operations in 1996 under FDEP Permit No. FL0040291 and has a currently permitted operating capacity of 6.0 MGD on an AADF basis. The East Port WRF uses a two-stage activated-sludge process to treat domestic wastewater collected from the Mid County service area. The East Port WRF is permitted for three options for reclaimed water reuse and disposal, which are described in greater detail in this section:

- R-001 – 10.233 MGD AADF. Reuse via reclaimed water distribution for irrigation using CCU's MRS. See Section 6.2.1.1 for details.
- R-002 – 1.45 MGD AADF. Reuse via on-site sprayfields.
- U-001 – 9.60 MGD AADF. Disposal via deep injection well (DIW) system IW-1 and IW-2.

The WRF site is approximately 500 acres, which includes 51 acres of conservation easement and approximately 80 acres occupied by WRF structures. The East Port WRF main operations building also includes the National Environmental Laboratory Accreditation Program (NELAP)-certified East Port Laboratory (EPLAB). CCU uses the EPLAB to test and monitor water quality for wastewater, reclaimed water, and potable water services provided by CCU.

Figure 6-2 shows the East Port WRF process flow diagram. The key components of the East Port WRF process are described in the following sections.

Figure 6-2 East Port WRF Flow Diagram



A. ***Headworks:*** Raw wastewater enters the WRF headworks structure where screening and grit removal take place. After screening, wastewater flows into one of the two vortex-type grit-removal units for grit separation. Compacted screening and separated grit are dewatered and discharged to dumpsters for disposal. Internal plant flows from the on-site pump station are introduced to the headworks downstream of the influent flow meter. These internal plant flows include biosolids dewatering system filtrate, tank and unit process drains, septage hauling, pump station flows, and supernatant from the aerobic digesters.

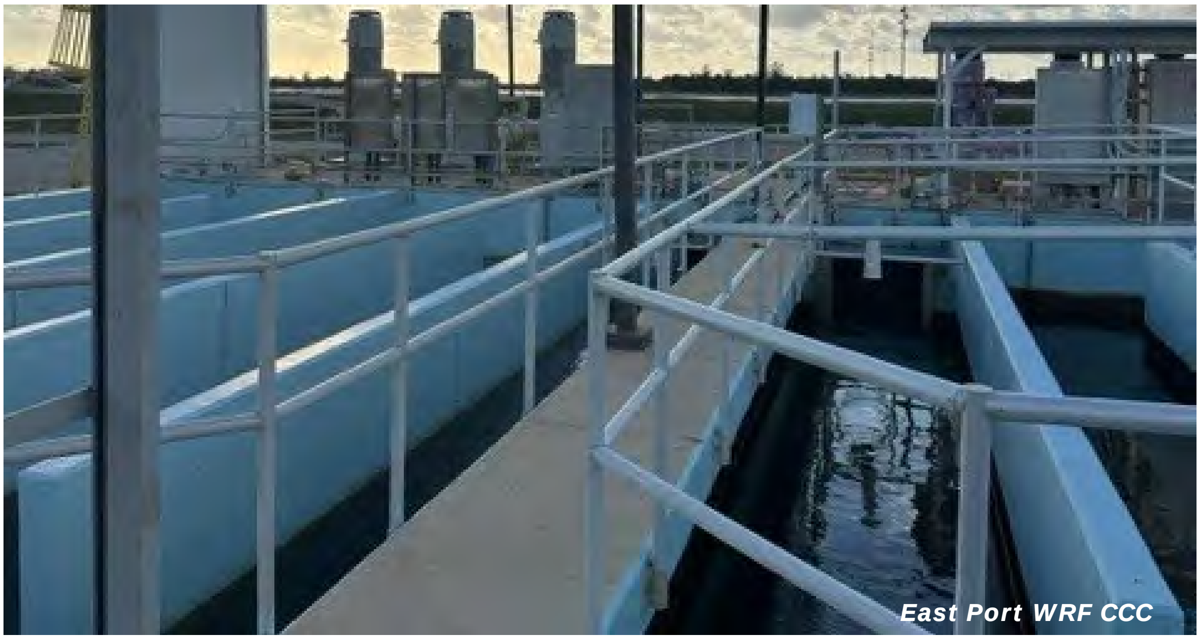
B. ***Biological Treatment:*** Wastewater flow from the headworks splits between two treatment trains configured in a Two-Stage Anoxic/Aerobic, Modified Ludzack-Ettinger (MLE) Process. Each train includes an anoxic basin and oxidation ditch (aeration basin) for organics and TN removal. Mixers keep solids suspended and homogenous in the anoxic zones. Mechanical surface agitators keep the oxidation ditches aerated and maintain a channel velocity to keep mixed liquor in suspension. Internal recycle (IR) pumps send mixed liquor rich in nitrate-nitrogen from the oxidation ditch (aeration basin) to the anoxic basins to promote denitrification and enhance TN removal.


East Port WRF Anoxic/Aerobic Basin

C. ***Clarification:*** Flow from the biological treatment process splits between two clarifiers. The clarifiers provide a quiescent environment to promote mixed liquor solids separation. The clarifiers are skimmed to remove floating materials and scum, which are sent to the aerobic digester for treatment. The clarifier effluent flows over a circumferential weir into a final effluent launder trough. Weir washers travel along the scum skimmer to remove algae from the weirs and trough. Settled solids from the secondary clarifiers are pumped to the front of the anoxic basins as return-activated sludge (RAS) to replenish the microbial community, and a portion is pumped to the aerobic digesters as waste-activated sludge (WAS).

D. ***Filtration:*** Clarified water splits between two automatic backwash (AB) traveling bridge filters containing sand and anthracite to remove suspended matter. TSS concentrations of 5 mg/L or below must be achieved for public reclaimed water distribution. The filters are equipped with a metal canopy and an ultraviolet (UV) shade cloth to inhibit algae growth and provide equipment protection from sun exposure. Filter backwash is recycled back to the headworks by in-plant pump station No. 2.

E. ***Disinfection:*** Filtered water splits between two chlorine contact chambers (CCCs) where liquid sodium hypochlorite is dosed for disinfection. CCC No. 1 is designated for reclaimed water production for PAR where a minimum chlorine residual of 1 mg/L must be achieved (referred to as high-level disinfection). CCC No. 2 is designated for disinfection before discharge to deep injection wells or sprayfields where a minimum of 0.5 mg/L must be achieved for sprayfield application (referred to as basic disinfection). Sodium hypochlorite is stored in a 6,000-gallon bulk storage tank. Non-reagent analyzers are used to adjust chlorine feed rates and for chlorine residual compliance measurement. Reclaimed water is transferred from the CCCs to storage ponds via high-service pump station (HSPS) No. 1.


East Port WRF CCC

F. ***Reuse and Disposal Facilities:*** The WRF includes a reclaimed water storage pond that can be used before transmission and distribution through the MRS. In accordance with the reclaimed operating protocol, excess or substandard quality reclaimed water can be diverted to the reject pond or discharged through the on-site sprayfields or deep injection wells.

G. ***Biosolids Handling:*** WAS is pumped from the clarifiers to the 2.0-million-gallon (MG) sludge-holding tank where blowers aerate the sludge before dewatering using two Ashbrook 2-meter belt filter presses (BFPs). The East Port WRF digester is permitted to accept waste sludge from the West Port, Rotonda, and Burnt Store WRFs. The County owns two 6,000-gallon tanker trucks that make daily hauls from the other three WRFs and off-load into the East Port WRF digester. Operations staff decant the digested sludge several times a week, and the supernatant is pumped back to the headworks. The sludge transfer pumps at the digester are operated by control panels at each BFP to pump thickened WAS to the dewatering units. Sludge is dewatered to 17-percent total solids and is transported to the Charlotte County Zemel Road Class I Municipal Landfill for disposal at the Synagro Biosolids and Yard Waste Co-Compost Facility.

H. ***Septage Receiving Stations:*** The WRF has two Lakeside Raptor Septage Receiving Stations for domestic septage tank haulers to off-load septage. The septage haulers have unique access codes for off-loading and invoice generation. Septage haulers enter their access code in the receiving station control panel, the valve opens to allow off-load, and the flow meter records the septage volume for billing each hauler. The system allows for fast off-loading, minimal operations oversight, and administrative features to collect and record hauler data for invoicing. The septage is screened and directly pumped to the WRF headworks.

Table 6-2 summarizes the permitted reclaimed water large users (0.1 MGD and greater) within the East Port WRF service area.

Table 6-2 Reclaimed Water Large Users for East Port WRF as of February 2024

Large User	Area (acres)	CCU Agreement Capacity (MGD)	FDEP Permitted Capacity (MGD)	Pond/Direct
Charlotte County Sports Park	115	0.250	0.446	Pond
Deep Creek Golf Club	88	0.180	0.343	Pond
Kingsway Golf Course	100	0.230	0.388	Pond
Maple Leaf Estates	100	0.388	0.388	Pond
Port Charlotte Country Club	158	0.613	0.613	Pond
Riverwood Community Development District	222	1.200	1.200	Pond
Suncoast Lakes	35	0.067	0.136	Direct
West Port Community Development District	109	0.450	0.450	Pond
Totals	**927**		**3.964**	

6.2.1.1 Master Reuse System

The MRS was established and permitted by FDEP in 2014 as an interconnected reclaimed water transmission and distribution system that links the East Port, West Port, and Rotonda WRFs.

Reclaimed water is primarily distributed through the MRS using the unrestricted public-access reclaimed water system (R-001). The MRS allows CCU to shift excess reclaimed water between the East Port, West Port, and Rotonda WRFs, serving primarily large users by bulk such as golf courses, recreation areas, sports fields, and residential developments. The current total capacity of the shared MRS is 10.233 MGD AADF, expanded since 2017 from the capacity of 8.792 MGD AADF.

6.2.2 East Port WRF Historical Flows

Figure 6-3 presents the AADF, MADF, and TMADF for January 2017 through December 2024. The figures shows that higher plant flows typically occur in the fall. As of December 2024, the AADF had increased to approximately 5.6 MGD, representing 94 percent of the permitted capacity of 6.0 MGD. The MMADF was 7.5 MGD in September 2017, and reached 7.7 MGD in October 2024. The plant experienced an MTMADF of 7.0 MGD in 2024, demonstrating the plant's ability to operate beyond the permitted design capacity for several consecutive months.

Figure 6-3 Historical Influent Flows for East Port WRF

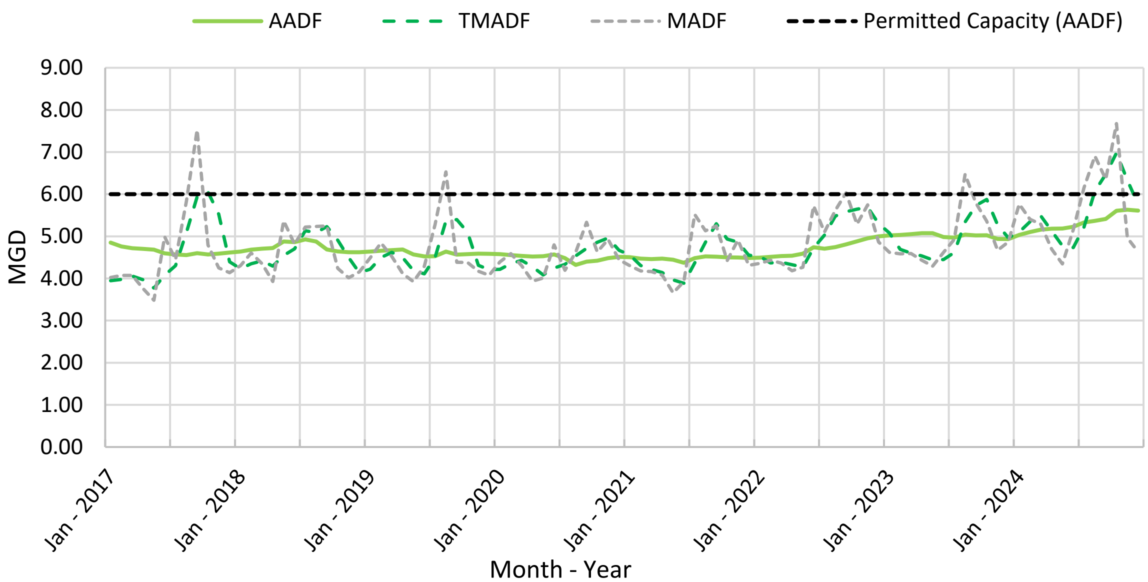


Table 6-3 summarizes values from the graph for historical influent flows at the East Port WRF from 2020 to 2024, including the percent capacity of actual AADF-to-permitted-AADF and MMADF-to-AADF peaking factors.

Table 6-3 Historical Influent Flow Summary for East Port WRF

Year	AADF (MGD)	MMADF (MGD)	MTMADF (MGD)	Percent Capacity (Actual AADF/ Permitted AADF)	Monthly Peaking Factor (MMADF/AADF)
2020	4.51	5.33	4.96	75 percent	1.2
2021	4.49	5.52	5.30	75 percent	1.2
2022	5.00	6.03	5.69	83 percent	1.2
2023	4.94	6.47	6.08	82 percent	1.3
2024	5.62	7.68	6.98	94 percent	1.4

6.2.3 East Port WRF Historical Loadings

Figure 6-4 displays the historical influent CBOD and TSS concentrations on an average monthly basis. Vertical bars are included during December through April to represent the traditional period of winter resident occupancy. Influent CBOD and TSS average monthly concentrations are relatively stable. In general, the CBOD and TSS concentrations are within the typical range of average-strength municipal wastewater.

Figure 6-4 Historical CBOD and TSS Concentrations for East Port WRF

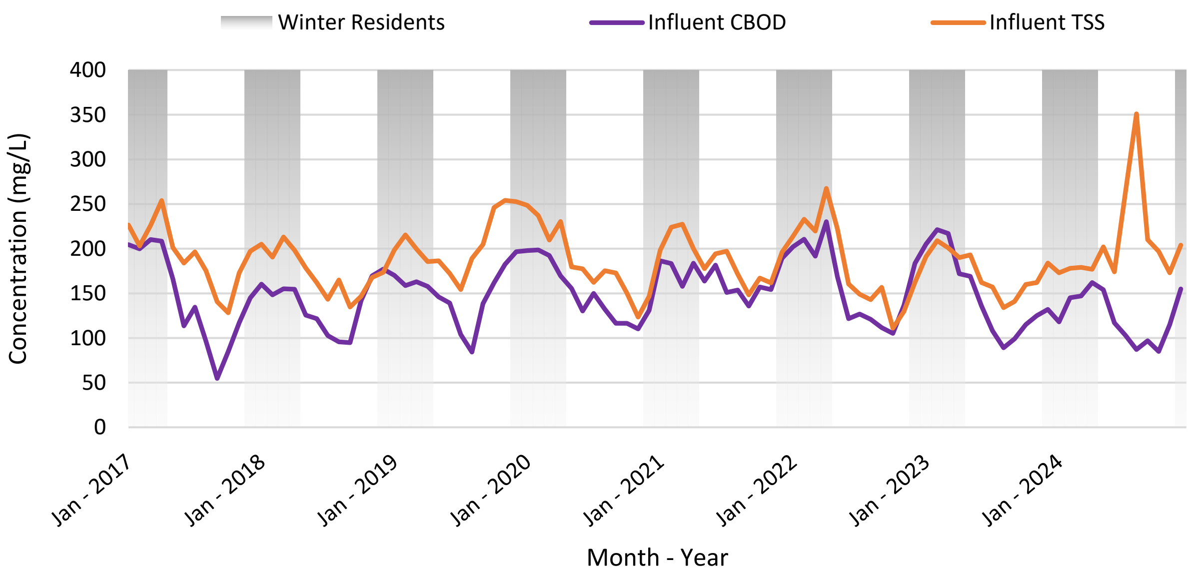


Table 6-4 summarizes the historical influent CBOD and TSS loadings from 2020 to 2024 based on the average annual CBOD and TSS concentrations. The annual average influent CBOD concentrations ranged from approximately 130 to 170 mg/L, equating to CBOD loadings of 5,600 to 6,700 pounds per day (ppd). On the other hand, TSS concentrations approximately ranged between 180 and 210 mg/L and loadings of 6,800 to 9,800 ppd. Loadings increase as concentrations and/or plant flows increase.

Table 6-4 Historical Influent Loadings for East Port WRF

Year	AADF (MGD)	CBOD[1] (mg/L)	CBOD[2] (ppd)	TSS[3] (mg/L)	TSS[2] (ppd)
2020	4.51	150	5,600	180	6,800
2021	4.49	170	6,400	190	7,100
2022	5.00	160	6,700	180	7,500
2023	4.94	150	6,200	170	7,000
2024	5.62	120	5,600	210	9,800

[1] Typical average-strength municipal wastewater CBOD range is between 120 and 380 mg/L.

[2] CBOD and TSS Loadings = AADF (MGD) x Concentration (mg/L) x 8.34 pounds per gallon.

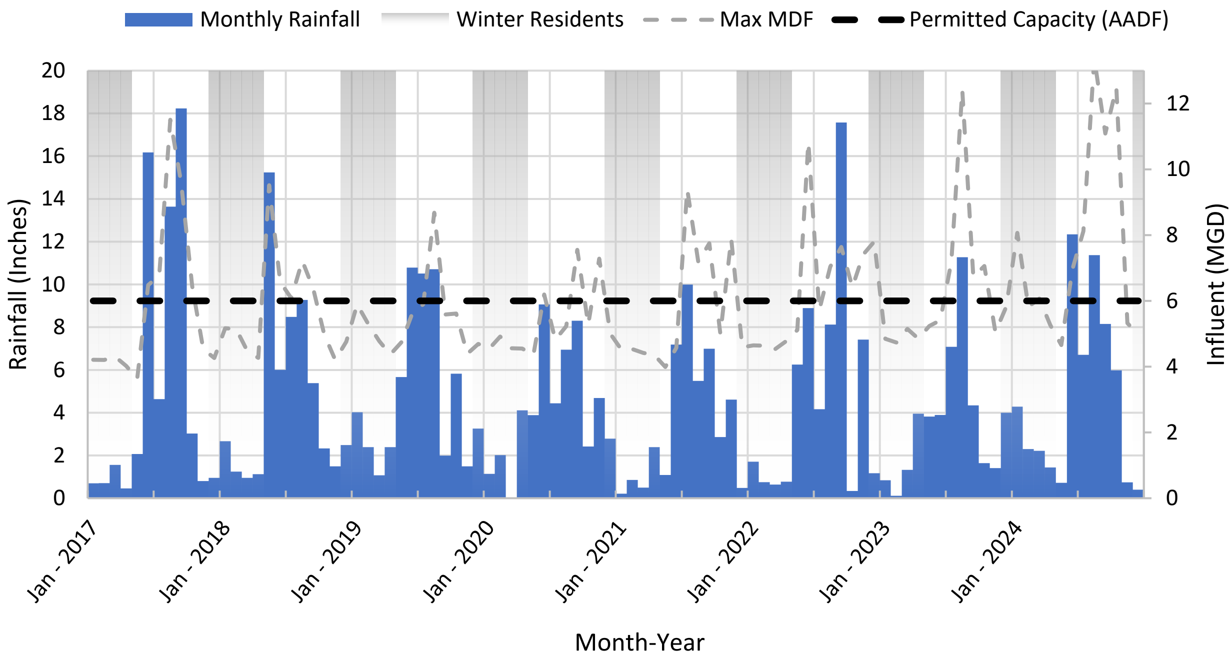
[3] Typical average-strength municipal wastewater TSS range is between 120 and 370 mg/L.

6.2.4 East Port WRF I&I Impacts

The effects of wet weather and resulting local I&I within the East Port WRF sewer collection system can be estimated using Figure 6-5, which plots historical total monthly rainfall and MADF at the East Port WRF. As shown, MADF increases significantly during months with significant rainfall (typically June through September), which can be attributed to I&I. For sewer collection systems experiencing I&I, a decrease in CBOD and TSS concentrations can usually be observed during wet-weather months, such as shown in Figure 6-4. A decline in influent CBOD and TSS concentrations at the WRF suggests that wastewater may be diluted due to the introduction of groundwater or stormwater (rainfall).

Another trend observed in Figure 6-5 is the increase in MADF during winter months. However, the data suggest that the effects of I&I have a larger impact on monthly flows than the seasonal population increase from winter residents.

Figure 6-5 Seasonal and Wet-Weather Impacts on East Port WRF



6.2.5 East Port WRF Reuse and Disposal

The East Port WRF reclaimed water distribution system includes two lined ponds – a 95-MG reclaimed water storage pond and a 45-MG reject pond. The 45-MG reject pond is used to divert and temporarily store substandard quality or excess reclaimed water for recycling to the headworks for retreatment, reuse via sprayfields (R-002), or disposal via the deep injection well system (U-001). Figure 6-6 graphs the historical usage versus permitted capacity of reclaimed water reuse and disposal at the East Port WRF as follows:

- R-001: MRS – As of December 2024, the East Port WRF contributed approximately 1.3 MGD AADF of reclaimed water, or 13 percent of the total MRS capacity. Figure 6-7 breaks down the flow each plant contributes toward the total MRS capacity of 10.233 MGD.
- R-002: Sprayfields – In general, CCU used this option in a low-to-minimal capacity since 2019, using a maximum of 0.1 MGD AADF of the 1.45-MGD permitted capacity.
- U-001: Deep Injection Wells – Figure 6-8 plots the daily historical flow for IW-1 and IW-2 (2014–2023) against the UIC-permitted MDFs of 2.04 and 7.56 MGD, respectively. The East Port WRF historically operates their two DIWs within their individual MDF limits permitted by the FDEP UIC Department. Two exceedances have occurred in the past 5 years.

Figure 6-6 Historical Reclaimed Water Reuse and Disposal for the East Port WRF

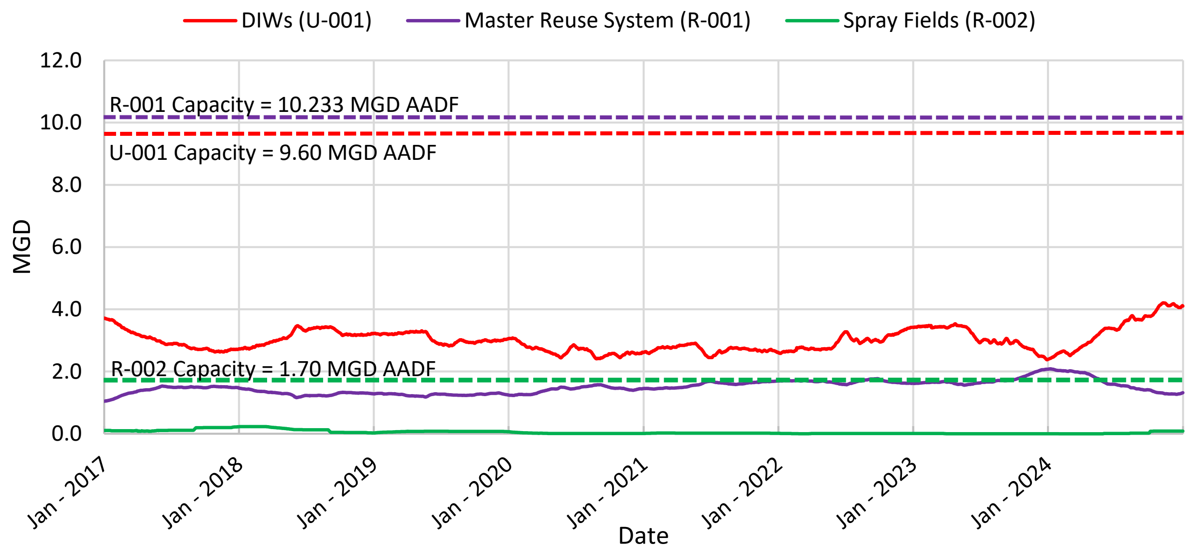


Figure 6-7 Historical Total WRFs Reuse System AADFs

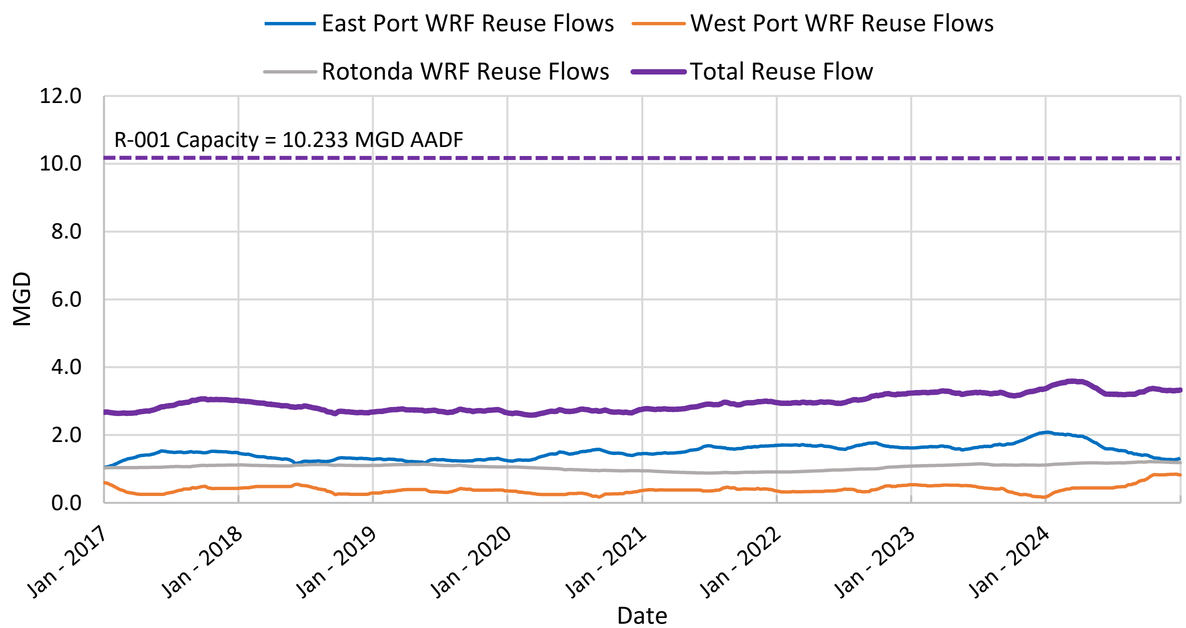
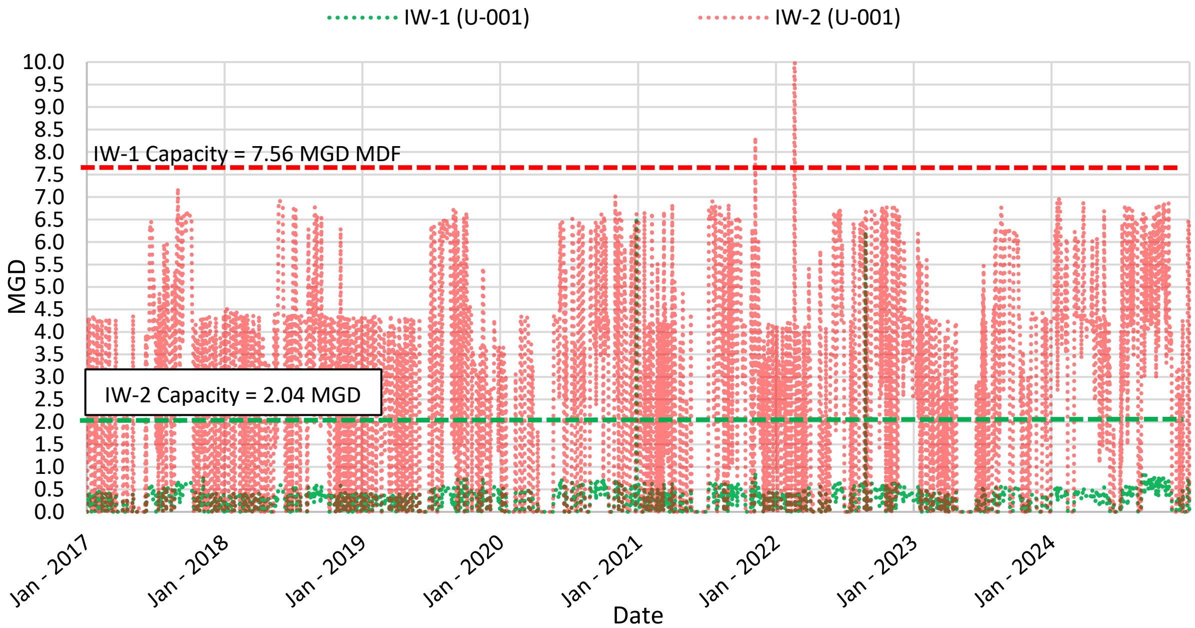


Figure 6-8 Historical Injection Well Disposal for East Port WRF



Generally, DIWs IW-1 and IW-2 have historically operated within their permitted MDF capacities with additional capacity typically available at both wells. Increased flows observed suggest that the injection wells are relied on more frequently during wetter months to handle excess reclaimed water that is produced as a result of increased plant influent flows.

6.2.6 Ongoing East Port WRF Improvements

As discussed in the 2017 SMP, the East Port WRF has been undergoing planning and design for East Port WRF Stage 1 through 5 Improvements since 2012 as follows:

- Stage 1 and 2 Improvements – Completed in 2016
    - Improvements to headworks (including a new 11.5-MGD mechanical screen), maintenance and improvements to BNR processes and pumping, maintenance improvements to filtration and disinfection, sludge-handling expansion and upgrades, and electrical upgrades to replace switchgear; additional motor control centers (MCCs), and removal and salvage of aluminum power wiring and replacement of all equipment power wiring with 480-V copper wire.
- Stage 5 Improvements – Completed in 2018
    - Improvements to enhance reclaimed water storage and transmission capacity. Included constructing a new 9.5-MGD reclaimed water distribution HSPS and converting the 95-MG reject pond to a reclaimed water storage pond.
    - Work related to Stage 5, which was damaged in Hurricane Ian in 2022 and/or is aging equipment that needs to be replaced, includes the following:
        - Replacing HDPE reclaimed water pond liners for the 95-MG and 45-MG storage ponds that were damaged during Hurricane Ian.

- Replacing 30-year old DIW pumps in the 45-MG reject water storage pond used to pump excess reclaimed or reject water to the DIWs for disposal.
- Installing a new aeration system in the 95-MG pond to mix and aerate to mitigate algae formation.
- Installing a continuous backwash filter on the discharge side of the 9-MGD reclaimed water HSPS.
- Installing an air-burst self-cleaning Hendriks Screen on the 95-MG pond intake.

- 9.0-MGD Expansion with AWT (Stage 3 and 4 Improvements) – Ongoing
  - Expansion of plant capacity from 6.0 to 9.0 MGD AADF including improvements to meet AWT reclaimed water standards. Section 6.2.6.1 describes the improvements.
  - Construction started in January 2024 and is expected to be substantially completed by December 2026. The major components included as part of the expansion to 9.0 MGD AADF are outlined below.

6.2.6.1 East Port WRF 9.0-MGD Expansion with AWT

Figure 6-9 shows the East Port WRF process flow diagram for the 9.0-MGD expansion with AWT; the key components of the East Port WRF processes are described in the sections that follow.

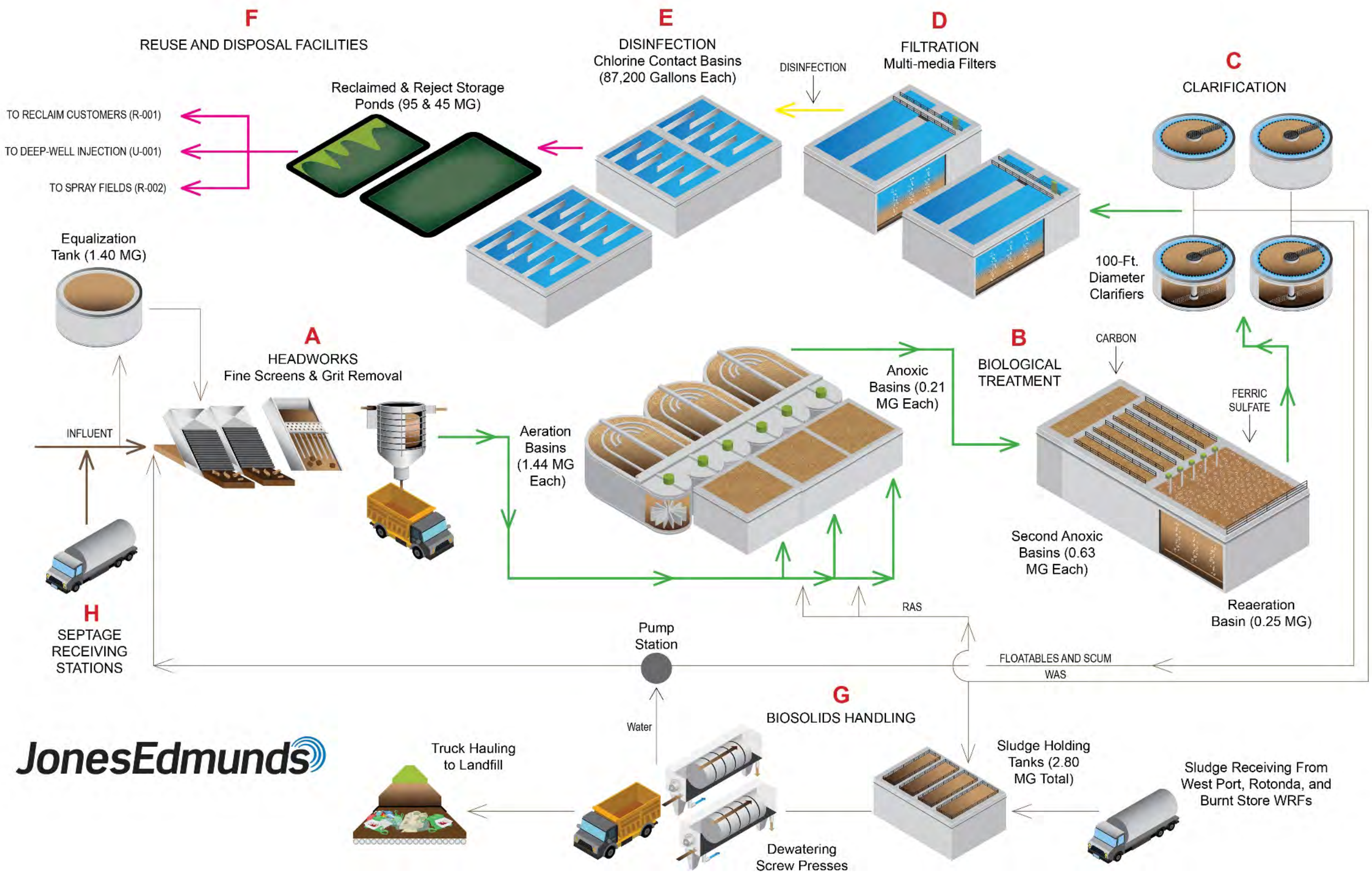
A. Headworks

- Construct a new headworks splitter box to split influent flows and plant recycle flows to the equalization (EQ) tank and/or biological treatment trains, and sized to accommodate connection of the future 12-MGD headworks (with mechanical screens, vortex grit removal, odor and corrosion control).
- Construct a new 1.4-MG EQ tank with a pump station.

B. Biological Nutrient Removal (BNR)

- Construct anoxic/aeration basin No. 3 consisting of a 0.21-MG anoxic zone and 1.44-MG oxidation ditch-type aeration zone and new IR pump station to match anoxic/aeration basins No. 1 and No. 2.
- Construct 0.630-MG second anoxic basins No. 1, 2, 3, and 4 with four baffled mix zones and a submersible mixer designed for 12.0-MGD future expansion capacity.
- Construct a supplemental carbon feed system (using MicroC) consisting of a 5,400-gallon HDPE dual-containment chemical-storage tank and skid-mounted chemical-feed pumps to feed supplemental carbon to the influent channel of the second anoxic basins to enhance denitrification and TN removal.
- Construct a 0.250-MG reaeration basin with coarse-bubble diffusers and a positive-displacement blower system.
- Construct a ferric sulfate chemical feed system consisting of a 6,500-gallon HDPE dual-containment chemical-storage tank and skid-mounted chemical-feed pumps to feed ferric sulfate to the reaeration basins to enhance TP removal within the clarifiers.

Figure 6-9 East Port WRF Process Flow Diagram at 9.0 MGD AADF



C. Clarification

- Modify the clarifier splitter box by raising the walls to increase free-board and install new stainless-steel isolation gates and weirs for flow splitting.
- Construct 100-foot-diameter clarifiers No. 3 and No. 4, with new a RAS/WAS pumping station and associated suction and discharge piping.
- Construct scum pump stations No. 1 and No. 2 to serve clarifiers No. 1, 2, 3, and 4.

D. Filtration

- Construct a new 48-inch ductile iron pipe (DIP) and a new 42-inch DIP filter bypass with a motor-operated valve and new connections for filter Nos. 1, 2, 3, 4, and 5 (future).
- Construct automatic backwash effluent filters No. 3 and No. 4.

E. Disinfection

- Construct new sodium hypochlorite chemical feed system facilities for performing high-level disinfection.
- Construct 0.27-MG CCCs No. 3 and No. 4 and install new flash mixers into the splitter boxes at CCCs No. 1 and No. 2 and CCCs No. 3 and No. 4.
- Construct effluent transfer pumps No. 4 and No. 5 at CCCs No. 3 and No. 4 clearwells along with associated piping.

F. Reclaimed Water

- Construct approximately 4,000 feet of 30-inch DIP force main from the irrigation pump station to DIWs IW-1 and IW-2.

G. Biosolids Handling

- Construct a new 0.800-MG aerobic digester tank No. 4 and associated appurtenances to provide a total of 2.8 MG of aerobic digester capacity.
- Construct a centralized biosolids dewatering facility and a covered truck-loading facility.

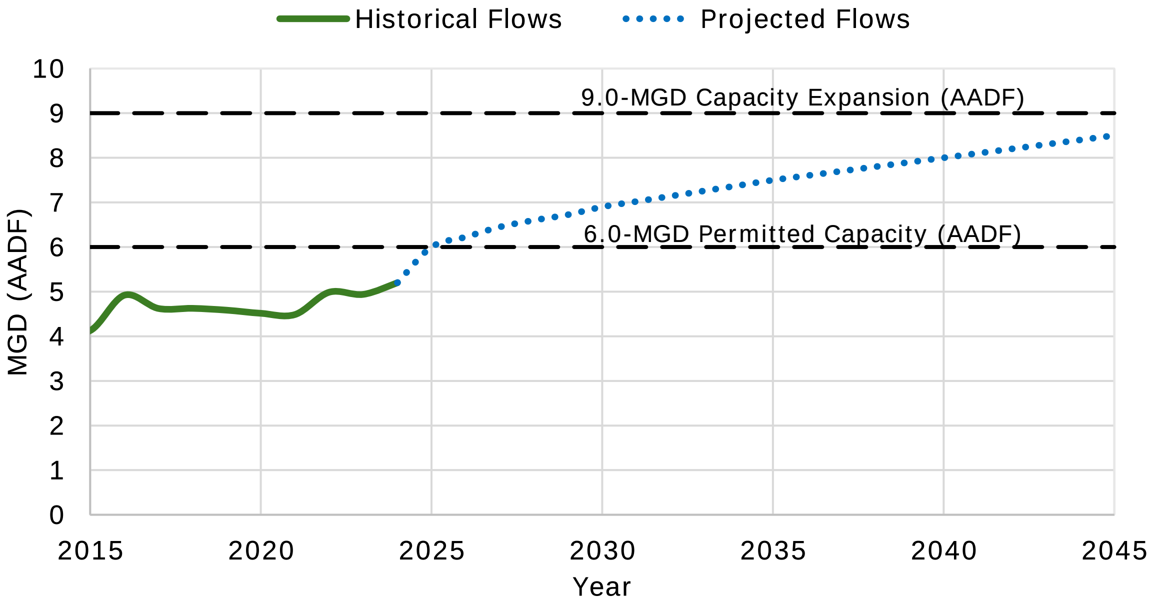
H. Septage Receiving Stations

- Construct a new septage-receiving station consisting of two septage-receiving screening units and a septage wet well with chopper pumps.

6.2.7 East Port WRF Flow Projections

Figure 6-10 displays the historical and projected flows based on the methodology presented in Chapter 5. The permitted existing and future capacities of 6.0- and 9.0-MGD AADF, respectively, are shown for reference.

Figure 6-10 East Port WRF Historical and Projected AADFs



The flow projections show the current permitted capacity of 6.0-MGD AADF may be reached as early as 2025. However, the following considerations apply:

- WRF expansion to 9.0-MGD AADF is expected to be completed by December 2026.
- The flow projection for 2025 is a conservative value assuming:
  - Full buildout and full occupancy of West Port Phase 1, Bachmann Tract, Jacaranda Place Phase 2, and others. Currently, none of these developments are completed.
  - Completion of the Ackerman S2S conversion project (Zones 3 and 4 and LPS – bids have been received and the project was awarded for construction).

CCU should closely monitor increases in influent wastewater flow to the East Port WRF until the 9.0-MGD expansion is completed in December 2026.

The flow projections suggest that the 9.0-MGD AADF expansion provides adequate treatment capacity through 2045, where 9.0-MGD would be reached around 2050 based on extrapolation. The East Port WRF site plan and 9.0-MGD expansion with AWT are designed to accommodate a future plant expansion to 12.0 MGD with AWT. If the East Port WRF service area is expanded beyond what has been evaluated as part of this SMP, the timings and need for expansion should be reevaluated.

CCU should reevaluate the need for future expansion to 12.0 MGD as part of CCU’s next SMP update, which is assumed to occur in 2030 as part of CCU’s commitment to updating this SMP on a 5-year recurring basis.

Recent discussions have occurred that East Port WRF may treat new developments along the Route 17 corridor on the east side of the Peace River. This would require the developer to allocate a wastewater capacity of approximately 1.18 MGD AADF at the East Port WRF to serve the area. This would accelerate future expansion needs at the East Port WRF and likely require an expansion beyond 9.0 MGD before 2045; therefore, planning for expansion to 12.0 MGD should occur between 2035 and 2040 based on reductions in available flow capacity.

6.2.8 Future East Port WRF Improvements

6.2.8.1 Existing (2025) Improvements

- Complete ongoing construction to expand system capacity to 9.0 MGD AADF with AWT by December 2026. Closely monitor increases in influent wastewater flow to the existing East Port WRF in the interim.
- Upsize the DIW discharge main to improve capacity.

6.2.8.2 Buildout Improvements

- Begin planning and design for treatment capacity expansion to 12.0 MGD.

Flow projections for the East Port WRF suggest that capacity expansion to 9.0 MGD AADF will be adequate through 2045. For the 9.0-MGD expansion, the County contracted Jones Edmunds to provide engineering design and construction services. As part of this contract, Jones Edmunds also completed 60% design plans and specifications for plant improvements to achieve a treatment capacity of 12.0 MGD AADF with AWT. The 60% design documents detail integrated improvements for re-rating the permitted plant capacity from 9.0 MGD to 12.0 MGD AADF and meeting Class I reliability standards, including:

- New 12.0-MGD headworks structure integrated with a flow splitter box, including new mechanical fine screens, upgraded grit removal capacity, and corrosion control.
- New anoxic basin No. 4 and aeration basin No. 4 to increase BNR capacity and provide redundancy.
- New automatic backwash filter No. 5 to increase tertiary treatment capacity and provide redundancy.
- New CCC No. 5 to increase disinfection capacity and provide redundancy.

6.3 WEST PORT WRF – WEST COUNTY

6.3.1 OVERVIEW OF WEST PORT WRF

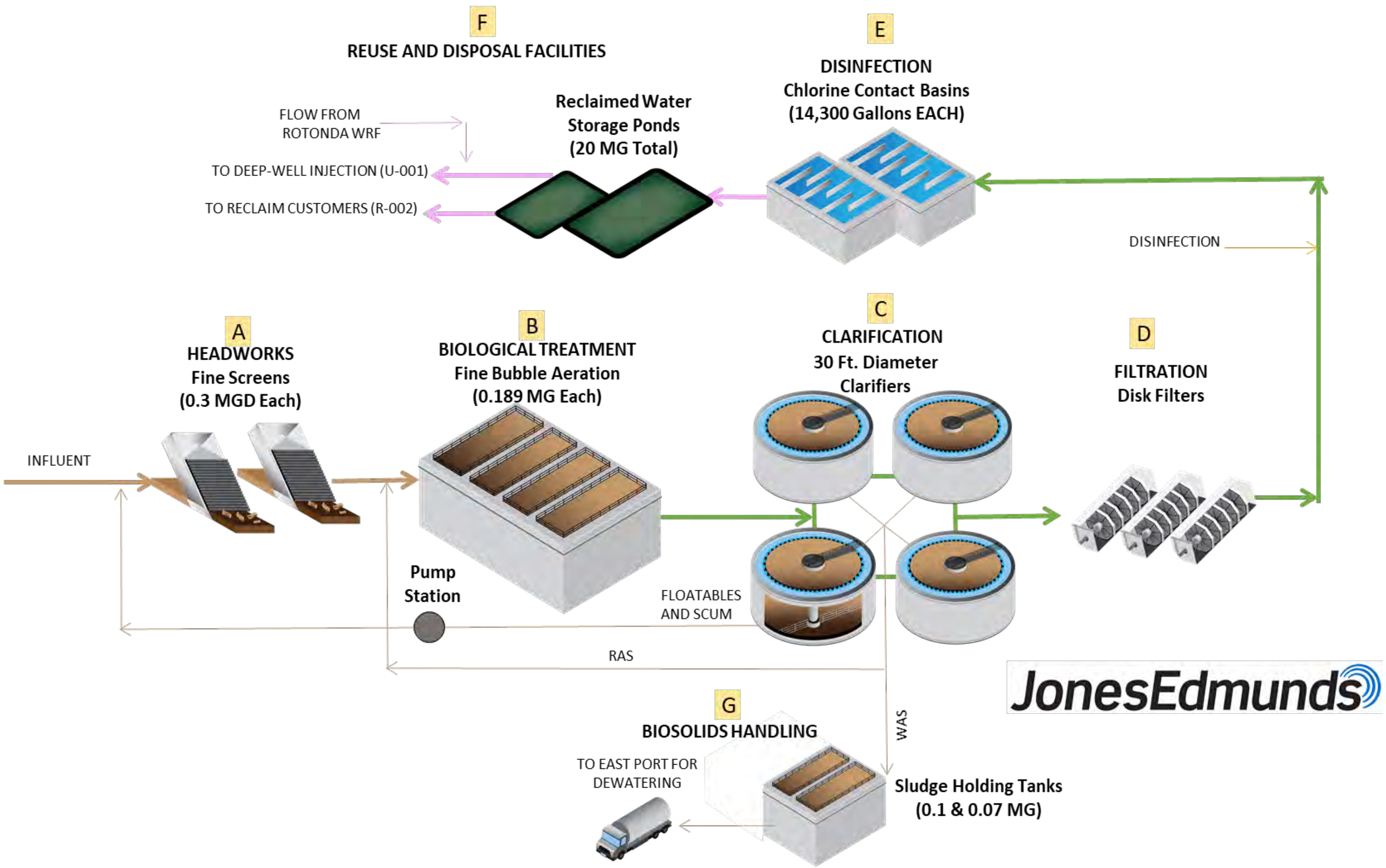
The West Port WRF is in the South Gulf Cove area of West Charlotte County at 15005 Cattle Dock Point Road, Port Charlotte. This WRF was purchased by Charlotte County in 1996 and operates under FDEP Permit No. FLA014048. It has a current permitted capacity of 1.2 MGD AADF. The West Port WRF uses an activated-sludge process to treat domestic wastewater collected from part of the West County service area. The West Port WRF is permitted two options for reclaimed water reuse and disposal, which are described in greater detail in this section:

- R-002 – 10.233 MGD AADF: Reuse via reclaimed water distribution through the MRS (combined capacity from the East Port, West Port, and Rotonda WRFs).
- U-001 – 4.75 MGD AADF: Disposal via DIW IW-1. Excess reclaimed water is also received from the Rotonda WRF.

Figure 6-11 shows the West Port WRF process flow diagram. The key components of the West Port processes are described in the sections that follow.

A. ***Headworks:*** Raw wastewater from the West County service area collection/ transmission system enters the headworks where it is screened by four rotary influent screens to remove large inorganic material. A manual bar screen is also available for bypass use. Screenings are collected in a dumpster and transported to the Zemel Road Landfill for disposal. Internal plant flows from the on-site pump station are introduced at the bar screens.

Figure 6-11 West Port WRF Flow Diagram



B. *Biological Treatment:* Screened wastewater is split equally into four aeration basins where aeration and microorganisms are used to treat biodegradable material. Blowers aerate the wastewater through fine-bubble diffusers in each aeration basin.

C. *Clarification:* Flow from the biological treatment process is split between four secondary clarifiers for solids separation. The clarifiers have rotating skimmer arms to remove floatables and scum before the effluent flows over a circumferential weir. Telescoping valves adjust sludge withdrawal from the bottom of each clarifier and convey it to the sludge-return chamber. The sludge exits the return chamber where it is conveyed to the front of the aeration basins as RAS to replenish the microbial community or to the sludge holding/aerobic digestion tanks as WAS.

West Port WRF Clarifiers

D. *Filtration:* Clarified water enters three automatic, disc-type, cloth-media cleaning filters for tertiary filtration to remove the remaining solids. The filters are housed in individual steel tanks.

E. *Disinfection:* The filtered water enters the CCCs where liquid sodium hypochlorite is dosed for disinfection. Only one chamber is currently in use.

F. *Reuse and Disposal Facilities:* Reclaimed water is pumped to two lined 5- and 15-MG hydraulically connected ponds for storage before distribution through the MRS. Excess and substandard reclaimed water not meeting PAR is disposed of on site via the Class I DIW (U-001). Additionally, this deep injection well is used as a backup disposal option for the Rotonda WRF, where reclaimed water can be received through the MRS, if needed.

G. *Biosolids Handing:* WAS is pumped from the clarifiers to the sludge-holding tanks where blowers provide aeration through coarse-bubble diffusers. The sludge is gravity thickened and decanted before being transported to the East Port WRF for aerobic digestion, dewatering, and transfer to the Zemel Road Landfill, where it is processed into compost available for sale as a soil conditioner.

Table 6-5 summarizes the permitted reclaimed water large users within the West Port WRF service area.

Table 6-5 Reclaimed Water Large Users for West Port WRF as of February 2024

Large User	Area (acres)	CCU Agreement Capacity (MGD)	FDEP Permitted Capacity (MGD)	Pond/Direct
Coral Creek Golf Course	124	0.308	0.308	Pond
Rotonda Meadows	341	N/A	1.315	Direct
Rotonda Sands	370	N/A	1.427	Pond
South Gulf Cove	106	N/A	0.409	Pond
Totals	**941**		**3.459**	

6.3.2 West Port WRF Historical Flows

Figure 6-12 presents the AADF, MADF, and TMADF for January 2017 through December 2024. In general, historical influent flows declined in 2023 compared to past years. As the graph shows, higher plant flows typically occur in the fall. From April 2023 to August 2023 the AADF was reduced from 0.81 MGD AADF to 0.71 MGD AADF, representing 50 percent of the permitted capacity of 1.20 MGD. The reduction in AADF is due to shifting flows in the current swing zone from West Port WRF to Rotonda. The influent AADF returned to the flow conditions from before the switch at 0.80 MGD AADF in March 2024.

Figure 6-12 Historical Influent Flows for West Port WRF

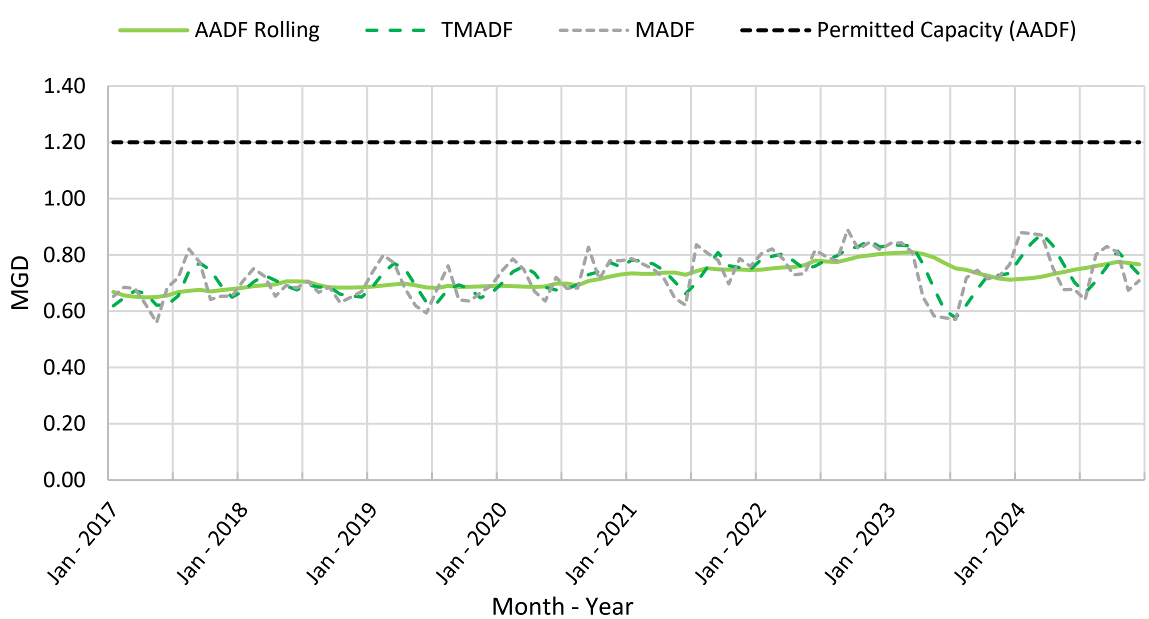


Table 6-6 summarizes the values from Figure 6-12 for historical influent flows at the West Port WRF from 2020 to 2024, including percent capacity of actual AADF to permitted AADF and the MMADF-to-AADF peaking factors.

Table 6-6 Historical Influent Flow Summary for West Port WRF

Year	AADF (MGD)	MMADF (MGD)	MTMADF (MGD)	Percent Capacity (Actual AADF/ Permitted AADF)	Monthly Peaking Factor (MMADF/AADF)
2020	0.73	0.83	0.77	61 percent	1.1
2021	0.75	0.84	0.81	63 percent	1.1
2022	0.80	0.89	0.85	67 percent	1.1
2023	0.74	0.84	0.83	62 percent	1.1
2024	0.77	0.88	0.77	64 percent	1.1

6.3.3 West Port WRF Historical Loadings

Figure 6-13 displays the historical influent CBOD and TSS concentrations on an average monthly basis. In general, influent CBOD and TSS average monthly concentrations are stable and within the typical range of average-strength municipal wastewater. Over the past 8 years, the WRF has experienced three instances where the average monthly TSS concentration was above 300 mg/L and one instance in March 2021 above 500 mg/L.

Figure 6-13 Historical CBOD and TSS Concentrations for West Port WRF

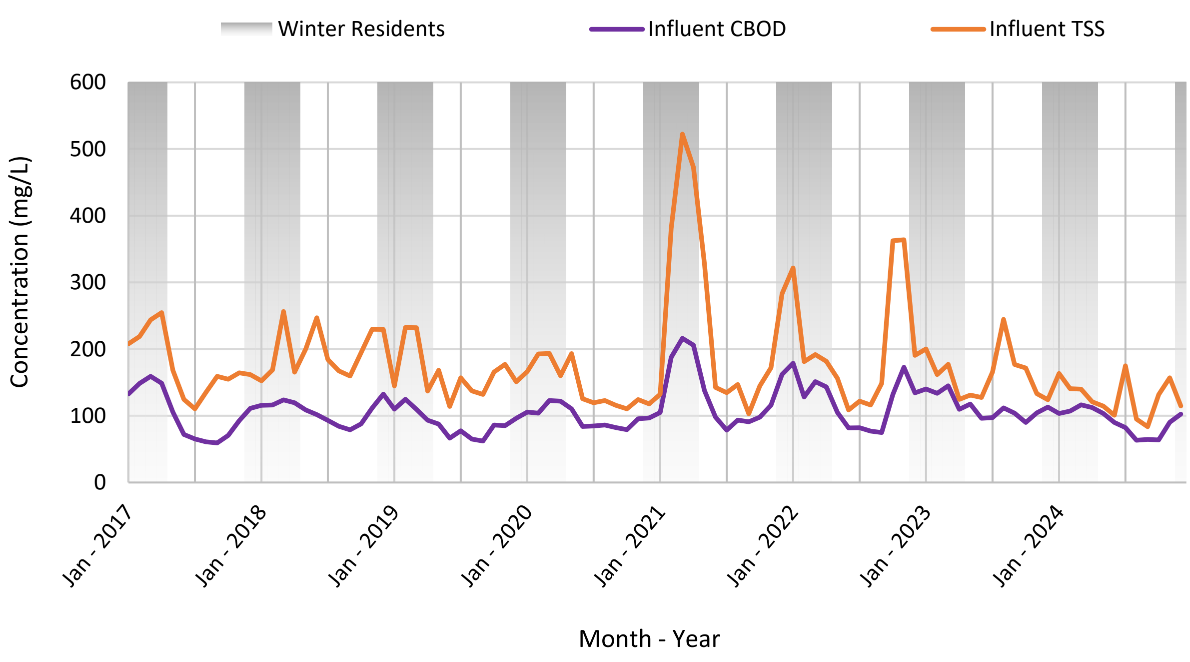


Table 6-7 summarizes the historical influent CBOD and TSS loadings from 2020 to 2024 based on average annual CBOD and TSS concentrations. The annual average influent CBOD concentrations ranged from approximately 100 to 130 mg/L, equating to CBOD loadings of 610 to 810 ppd. Similarly, TSS ranged approximately between concentrations of 150 and 250 mg/L and loadings of 910 to 1,600 ppd.

Table 6-7 Historical Influent Loadings Summary for West Port WRF

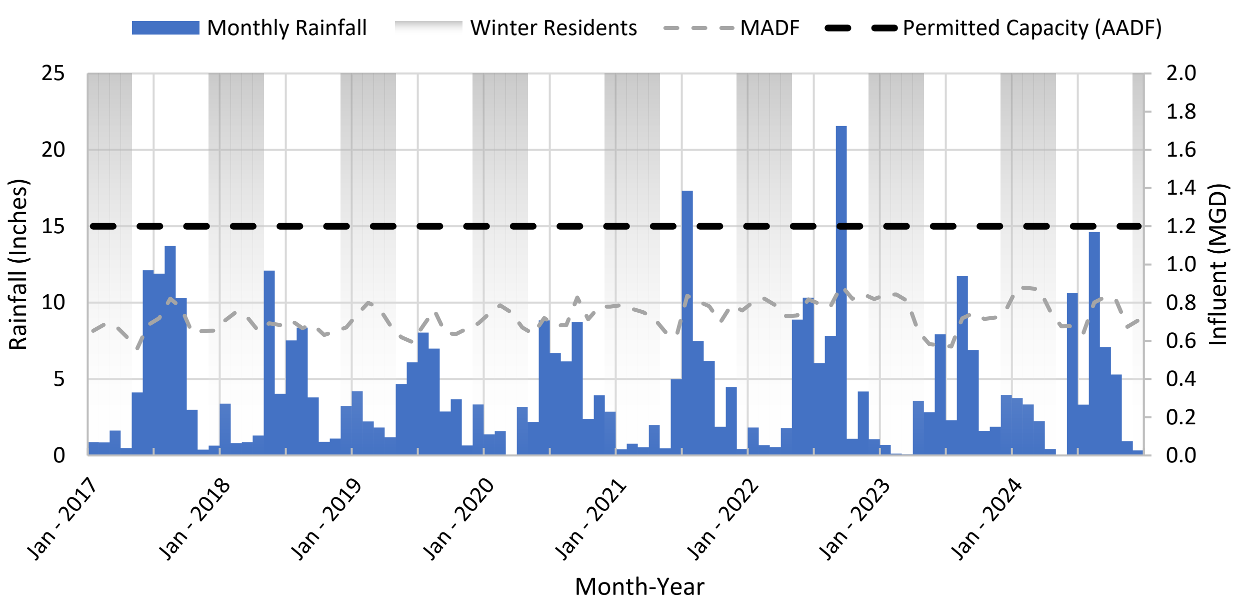
Year	AADF (MGD)	CBOD[1] (mg/L)	CBOD[2] (ppd)	TSS[3] (mg/L)	TSS[2] (ppd)
2020	0.73	100	610	150	910
2021	0.75	130	810	250	1,600
2022	0.80	120	800	200	1,300
2023	0.74	130	800	160	990
2024	0.77	100	640	150	960

[1] Typical average-strength municipal wastewater CBOD range is between 120 and 380 mg/L.
[2] CBOD and TSS Loadings = AADF (MGD) x Concentration (mg/L) x 8.34 pounds per gallon.
[3] Typical average-strength municipal wastewater TSS range is between 120 and 370 mg/L.

6.3.4 West Port WRF I&I Impacts

The effect of wet weather and resulting local I&I within the West Port WRF sewer collection system can be estimated using Figure 6-14, which plots total monthly rainfall and MADF at the West Port WRF from January 2017 to December 2024. As shown, MADF experiences increases during winter resident months and wetter months with significant rainfall, which can be attributed to I&I. Total monthly rainfall and MADFs peaked in September 2022. Similar to East Port WRF, CBOD and TSS concentrations decreased during periods of high rainfall.

Figure 6-14 Seasonal and Wet-Weather Impacts on West Port WRF



Overall, the graph suggests that the effects of I&I have a similar impact on monthly flows as the seasonal population increases of winter residents.

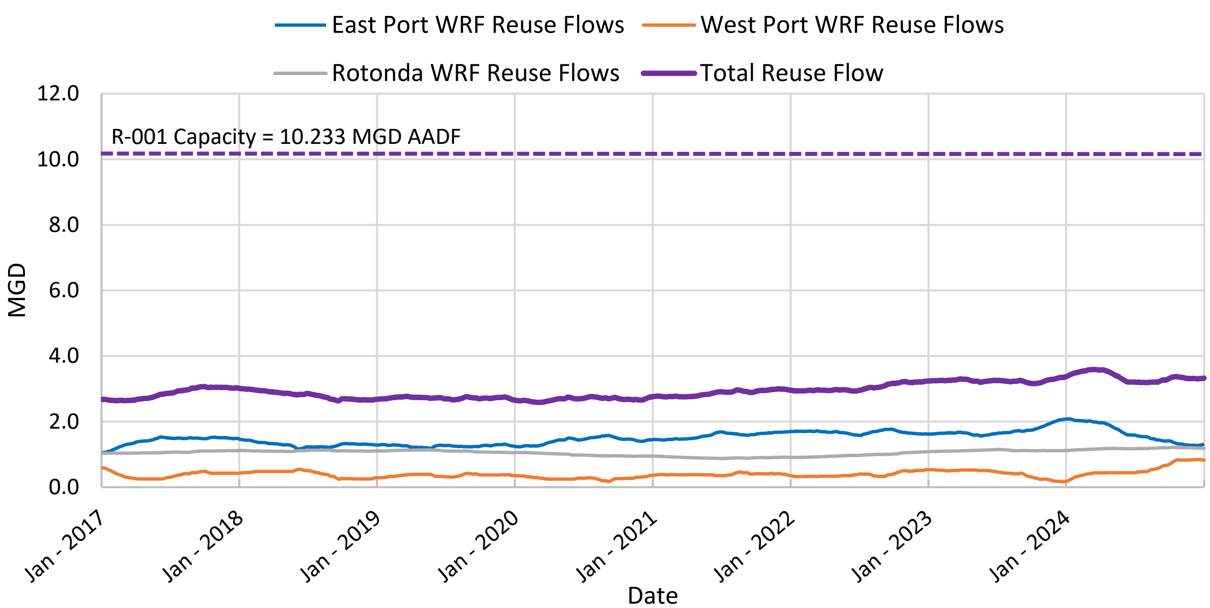
6.3.5 West Port WRF Reuse and Disposal

The West Port WRF is permitted to distribute reclaimed water to PAR via the MRS and into an underground injection well system.

Figure 6-15 graphs the historical usage versus permitted capacity of reclaimed water reuse and disposal option R-001 at West Port WRF and breaks down the flow each plant contributes toward the total MRS capacity of 10.233 MGD. As shown, the West Port WRF historically operates within permitted AADF capacities. Analysis of the data suggests the following:

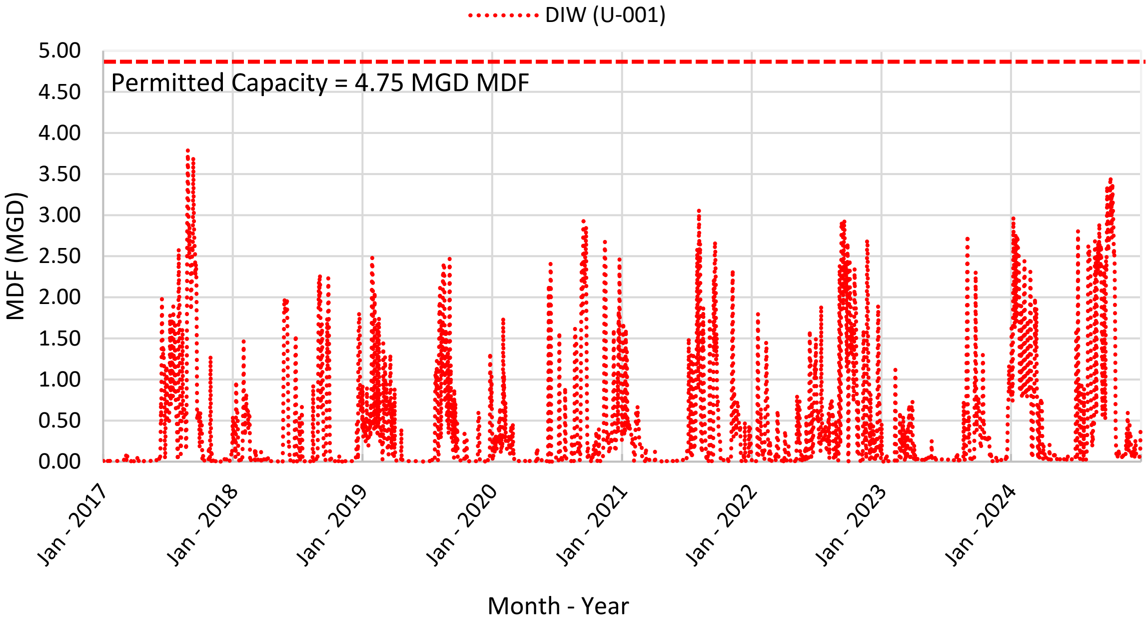
- R-002 – MRS: As of December 2024, the West Port WRF distributed approximately 0.8 MGD AADF of reclaimed water to Charlotte County, which is 8 percent of the total capacity. Therefore, West Port WRF's average annual reclaimed water reuse efficiency is approximately 63 percent, or 0.5 MGD AADF of the actual daily plant flow (0.8 MGD AADF).
- U-001 – DIW: The West Port WRF historically operates their DIW IW-1 within the total permitted capacity of 4.75 MGD AADF/MDF, where MDF is the more stringent compliance requirement permitted under the IW-1 UIC permit.

Figure 6-15 Historical West Port WRF Reuse System AADFs



The DIW system U-001 comprises only one well, IW-1. Figure 6-16 plots the daily history flow for IW-1 against the permitted MDF capacity. Increased flow observed during wet-weather months suggests that the injection well is relied on more frequently to handle excess reclaimed water produced by the West Port and Rotonda WRFs. Regardless, the DIW has been operated under its permitted capacity with adequate room to increase. For example, the absolute maximum flow to IW-1 recorded over the past 10 years of DMRs occurred in August 2017 at 3.8 MGD.

Figure 6-16 Historical West Port WRF Injection Well MDF



Note: The graph shows the total well usage, including flows from the West Port and Rotonda WRFs.

6.3.6 Ongoing West Port WRF Improvements

- West Port WRF Expansion – Ongoing

  West County is experiencing high development growth similar to that of Mid County and South County. The West Port WRF requires treatment capacity expansion to meet the needs of the developing community. The County contracted the team of HDR Engineering and Jones Edmunds to prepare permitting and design documents for expansion of the facility. The project is ongoing. As part of the preliminary engineering stages of the project, a condition assessment of the existing facility was conducted. The assessment documented that most of the treatment processes and equipment are at the ends of their useful life and will not provide sustainable wastewater treatment efficiency and/or lacks adequate capacity to manage future flows. Project planning efforts propose that building a new plant on the existing site green space is the most cost-efficient approach to addressing current and future wastewater flows. Once the new facility is built, the existing influent plant flow force main would be connected before the existing facility is demolished. The current design establishes the future plant capacity will be 2.5 MGD AADF and is expected to be complete by 2032.

6.3.7 West Port WRF Flow Projections

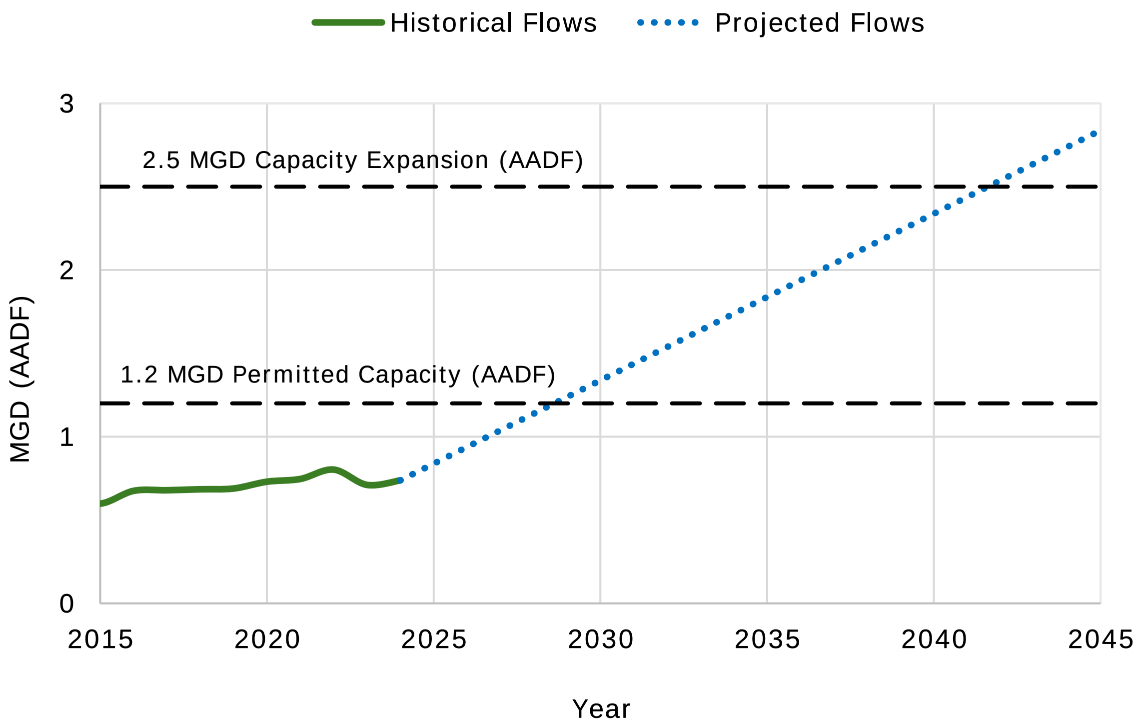
The West County service area, like other areas of Charlotte County, is experiencing residential and commercial growth. The County has the ability to delay the S2S projects until adequate capacity is available at the plant.

The flow projections suggest that the permitted treatment capacity of 1.2 MGD AADF may be exceeded by 2029. The flow projections are contingent on the following:

- WRF expansion to 2.5 MGD AADF is expected to be complete by 2032.
- The flow projections for 2030 and beyond are conservative values assuming the completion of S2S conversion projects.

Based on the above, the County should be able to complete the expansion to 2.5 MGD with AWT before exceeding the existing capacity of 1.2 MGD AADF. Additionally, the flow projections are conservative and assume that the County successfully completes an S2S conversion project in the West Port WRF service area in the next 5 years. The BCC has provided recent direction for S2S conversion projects to first prioritize areas within the Manchester Lock/Little Alligator Basin region for compliance with an FDEP permit. Using the conservative flow projections presented below, the future capacity of 2.5 MGD AADF would not be exceeded by 2041. However, planning and design for another capacity expansion would need to occur before 2045. CCU should be prepared to begin design for a future expansion in 2040, if needed. The West Port WRF service area is experiencing high developer interest and has the potential to serve thousands of additional users if existing residents are connected through S2S conversion projects. Flow projections and the need and timing for expansions should be reevaluated during the next SMP update based on development in the next 5 years and the County's future plans for S2S conversion projects in the service area. Additionally, at that time, the County's *One Charlotte, One Water* initiative and the water quality monitoring plan should be more evolved and more informative as to the County's future continuation of S2S conversion projects. Figure 6-17 presents the historical and projected flows for West Port WRF.

Figure 6-17 West Port Historical and Projected AADFs



6.3.8 Future West Port WRF Improvements

6.3.8.1 Existing (2025) Improvements Plan

- Complete the design and construction for the AWT, related plant improvements, and phased expansion of the West Port WRF for 1.2- to 2.5-MGD AADF, which include the following:
  - 1.5-MGD equalization tank and pump station with construction completion in 2026.
  - Headworks facility with mechanical screens, grit removal, and odor and corrosion control facilities with construction completion in 2027.
  - DIW and pumping station with well and surface facilities completion in 2029.

6.3.8.2 2030 Improvements Plan

- 2.5-MGD AWT facilities with construction starting in 2031 and construction completion in 2032.

6.4 Rotonda WRF – West County

6.4.1 Overview of Rotonda WRF

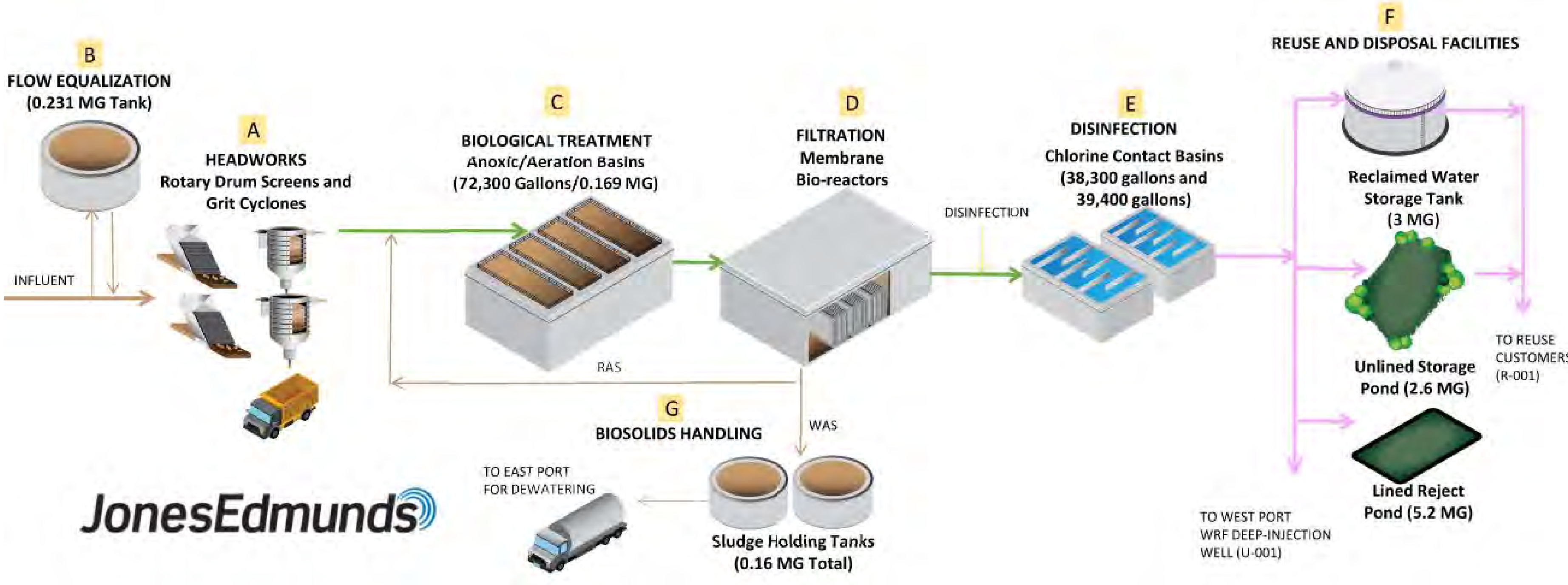
The Rotonda WRF is at 3740 Kendall Road, Rotonda West. This facility was purchased by Charlotte County in 2000 and operates under FDEP Permit No. FLA014098 with a permitted capacity of 2.0 MGD AADF. The Rotonda WRF is permitted two options for reclaimed water reuse and disposal, which are described in greater detail in this section:

- R-001 – 10.233 MGD AADF: Reuse via reclaimed water distribution through the MRS (combined capacity from East Port, West Port, and Rotonda WRFs).
- U-001 – 4.75 MGD AADF: Disposal via DIW IW-1 at West Port WRF, as needed, to handle wet-weather influx.

A wastewater transfer to the EWD WWTP is authorized through an existing connection.

Figure 6-18 shows the Rotonda WRF process flow diagram. The key components of the Rotonda WRF processes are described in the sections that follows.

Figure 6-18 Rotonda WRF Flow Diagram



Rotonda WRF Headworks Structure

H. *Headworks:* Raw wastewater from the West County service area enters the Rotonda WRF headworks for screening and grit removal. Two Baycor rotary drum fine screens remove larger inorganic material. Grit removal is achieved in two concrete tanks immediately downstream of the rotary drum screens. Settled grit is pumped through two grit cyclones and one grit “snail” washer to remove organics. Solids removed by these two processes are collected and hauled to the Zemel Road Landfill for disposal.

I. *Flow Equalization:* During peak flows, excess wastewater pours over a weir at the headworks and is diverted to a 300,000-gallon EQ tank. Pumps at the EQ tank return the wastewater to the system as the influent flows return to average conditions. The EQ tank is equipped with two forced-air pumps to maintain the biological medium and prevent hypoxic conditions.

J. *Biological Treatment:* Wastewater from the pretreatment structure enters two activated-sludge treatment trains that consist of an aerobic zone, an anoxic zone, and a swing zone that can be an aeration or anoxic zone. This configuration allows the biodegradation of organics and removal of excess nitrogen. Blowers and fine-bubble diffusers are used to provide oxygen to the wastewater in the aeration zone.

K. *Filtration:* From the biological treatment process, the wastewater flows to the four MBR filtration trains. Each train contains three cassettes. Hollow-tube membranes housed in individual cassettes provide a high level of filtration and take the place of secondary clarifiers and tertiary filters used at the other WRFs. The cassettes are periodically emptied and refilled with sodium hypochlorite during cleaning events. Sludge produced in the treatment process is pumped to two locations – to the aeration basins as RAS to support microbial activities and to the two sludge-holding tanks as WAS.

L. ***Disinfection:*** The filtered water enters the CCC splitter box, which directs the flow into one of two CCCs. Three chlorine-feed pumps introduce liquid sodium hypochlorite for reclaimed water disinfection requirements. The chlorine is thoroughly mixed using a static mixer in the CCC influent pipe. The sodium hypochlorite is controlled by flow meters on the MBR effluent piping. The three sodium hypochlorite storage tanks have a total usable capacity of 4,080 gallons.

M. ***Reuse and Disposal Facilities:*** Reclaimed water enters the on-site 3.0-MG ground storage tank (GST) and 2.64-MG reclaimed water storage pond. An on-site pump station provides flow to the reclaimed water transmission system, which is interconnected with the MRS. During wet weather, excess reclaimed water can be disposed of in the West Port WRF DIW.

The Rotonda WRF also has a lined reject pond with a storage capacity of 5.182 MG. Water is diverted to this pond when it does not meet the unrestricted public-access reclaimed water quality standards and must be retreated through the WRF.

N. ***Biosolids Handling:*** WAS is pumped to two sludge-holding tanks (170,000 gallons total capacity) for gravity thickening. The tanks are repurposed clarifiers with center surface aerators. Decanted supernatant recirculates to the headworks. Thickened sludge is hauled to the East Port WRF for additional thickening, dewatering, and final disposal at a compost facility at the Zemel Road Landfill.


Rotonda WRF HSPS and Reject Pond

Table 6-8 summarizes the permitted reclaimed water large users within the Rotonda WRF service area.

Table 6-8 Reclaimed Water Large Users for the Rotonda WRF as of February 2024

Large User	Area (acres)	CCU Agreement Capacity (MGD)	FDEP Permitted Capacity (MGD)	Pond/Direct
Cape Haze Country Club and Windward Patio Homes	86	N/A	0.333	Pond
Hacienda Del Mar Residential Development	22	0.105	0.105	Direct
Harbor West Residential Development	31	0.144	0.144	Pond
Hills Golf Club	140	N/A	0.540	N/A
Long Marsh Golf Club	120	0.450	0.460	Pond
Lemon Bay Golf Club	121	0.342	0.342	Pond
Palms Golf Course	75	0.290	0.423	Pond
Rotonda N.W. Golf Club	120	N/A	0.463	Pond
Totals	**554**		**2.054**	

6.4.2 Rotonda WRF Historical Flows

Figure 6-19 presents the AADF, MADF, and TMADF for January 2017 through December 2024. As shown, the AADF has remained consistent between 1.1 and 1.2 MGD until 2024. As of December 2024, the WRF was operating at an AADF of 1.5 MGD, representing 75 percent of its permitted capacity of 2.0 MGD AADF. The MMADF and MTMADF occur in October 2024, with the flows being 2.2 MGD AADF and 2.1 MGD AADF, respectively. The increase in AADF is due to shifting flows in the current swing zone from West Port WRF to Rotonda. The influent AADF returned to the flow conditions from before the switch in March 2024.

Figure 6-19 Historical Influent Flow for Rotonda WRF

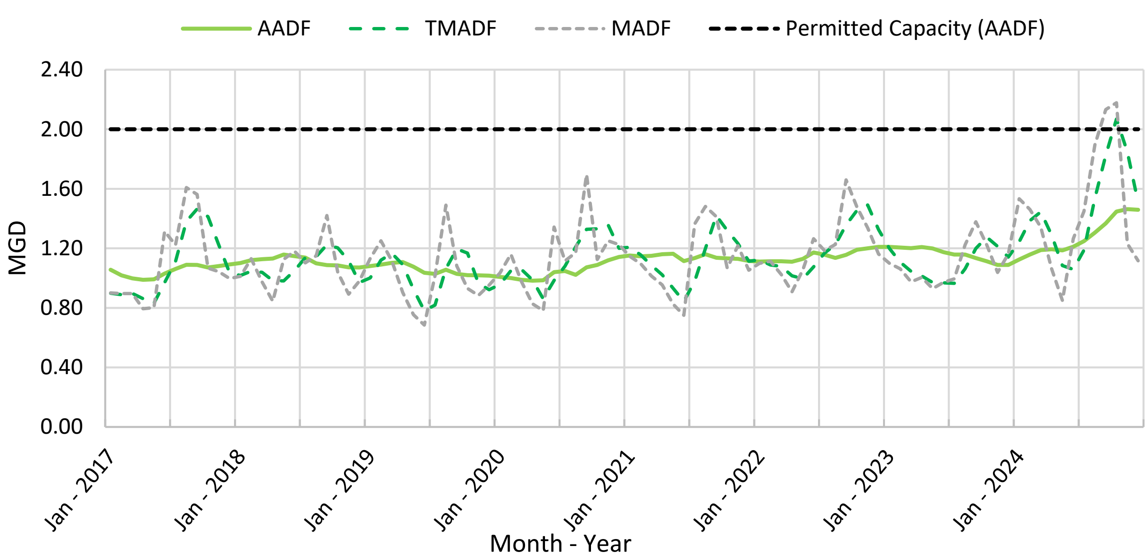


Table 6-9 summarizes the values from Figure 6-19 for historical influent flows at the Rotonda WRF from 2018 to 2023, including the percent capacity of actual AADF-to-permitted AADF and the MMADF-to-AADF peaking factors.

Table 6-9 Historical Influent Flow Summary for Rotonda WRF

Year	AADF (MGD)	MMADF (MGD)	MTMADF (MGD)	Percent Capacity (Actual AADF/ Permitted AADF)	Monthly Peaking Factor (MMADF/AADF)
2020	1.14	1.70	1.36	57 percent	1.5
2021	1.12	1.48	1.42	56 percent	1.3
2022	1.21	1.66	1.49	61 percent	1.4
2023	1.09	1.38	1.28	55 percent	1.3
2024	1.46	2.18	2.07	73 percent	1.5

6.4.3 Rotonda WRF Historical Loadings

Figure 6-20 displays the historical influent CBOD and TSS concentrations on an average monthly basis. Influent CBOD and TSS average monthly concentrations are stable and within the typical range of average-strength municipal wastewater with the exception of two spikes in TSS concentrations in April 2020 and June 2024.

Figure 6-20 Historical Influent CBOD and TSS Concentrations

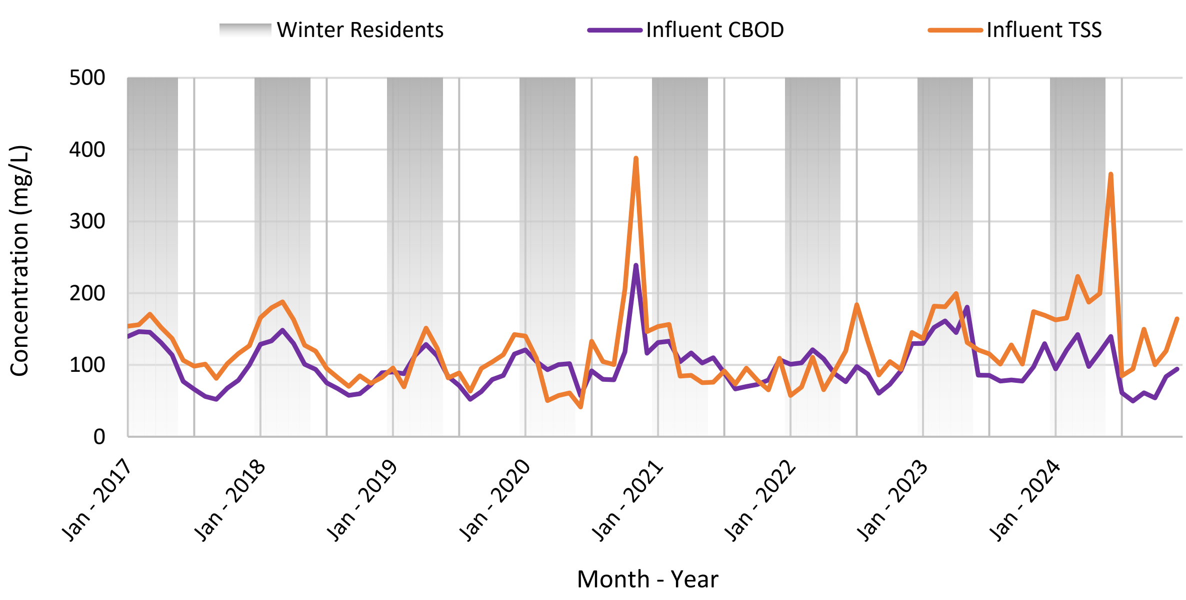


Table 6-10 summarizes the historical influent CBOD and TSS loadings from 2020 to 2024 based on the average annual CBOD and TSS concentrations. The annual average influent CBOD concentrations ranged from approximately 90 to 120 mg/L, equating to CBOD loadings of 930 to 1,100 ppd. Similarly, TSS ranged between concentrations of approximately 90 and 170 mg/L and loadings of 840 to 2,100 ppd.

Table 6-10 Historical Influent Loadings Summary for Rotonda Port WRF

Year	AADF (MGD)	CBOD[1] (mg/L)	CBOD[2] (ppd)	TSS[3] (mg/L)	TSS[2] (ppd)
2020	1.14	110	1,000	120	1,100
2021	1.12	100	930	90	840
2022	1.21	100	1,000	110	1,100
2023	1.09	120	1,100	150	1,400
2024	1.46	90	1,100	170	2,100

[1] Typical average-strength municipal wastewater CBOD range is between 120 and 380 mg/L.

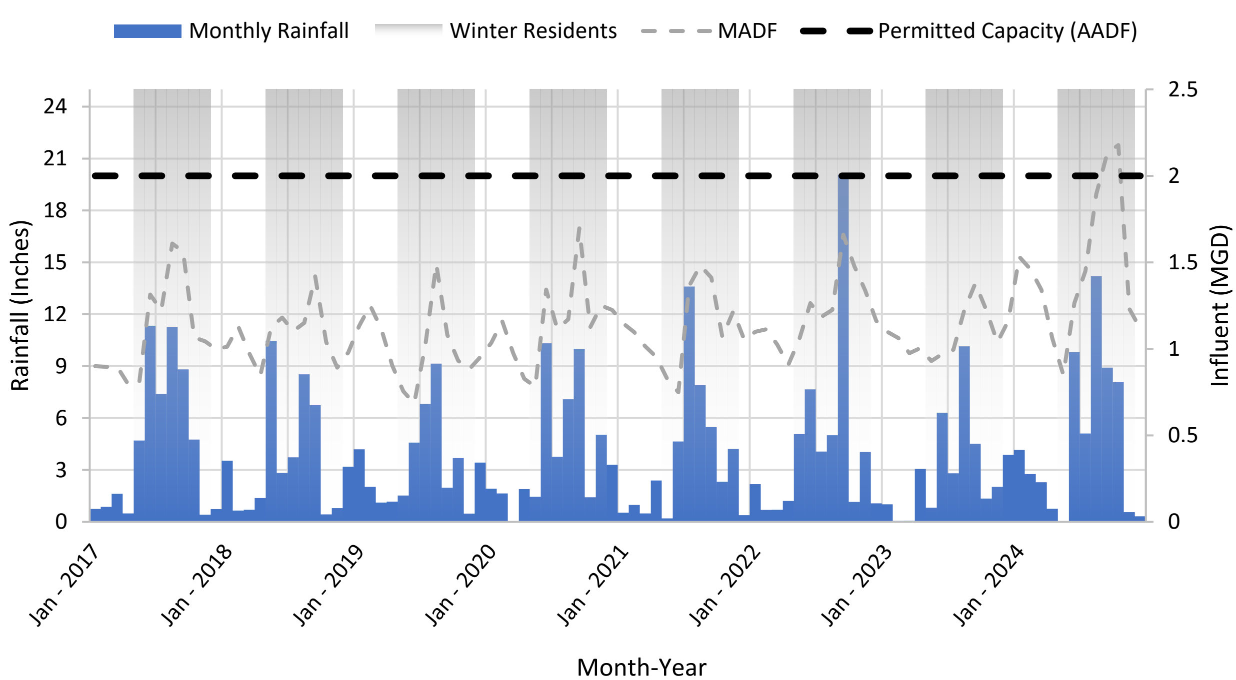
[2] CBOD and TSS Loadings = AADF (MGD) x concentration (mg/L) x 8.34 pounds per gallon.

[3] Typical average-strength municipal wastewater TSS range is between 120 and 370 mg/L.

6.4.4 Rotonda WRF I&I Impacts

The effects of wet weather and resulting local I&I within the Rotonda WRF sewer collection system can be estimated using Figure 6-21, which plots total monthly rainfall and MADF at the Rotonda WRF from January 2017 to December 2024. Total monthly rainfall and MADF peaked in September 2022. Similar to the previous WRFs, MADF at the Rotonda WRF experiences significant increases during wet weather and decreases during winter months, with trends of decreases in CBOD and TSS concentrations during wet weather. The graph suggests that the Rotonda WRF is significantly impacted by the effects of I&I.

Figure 6-21 Seasonal and Wet-Weather Impacts on the Rotonda WRF



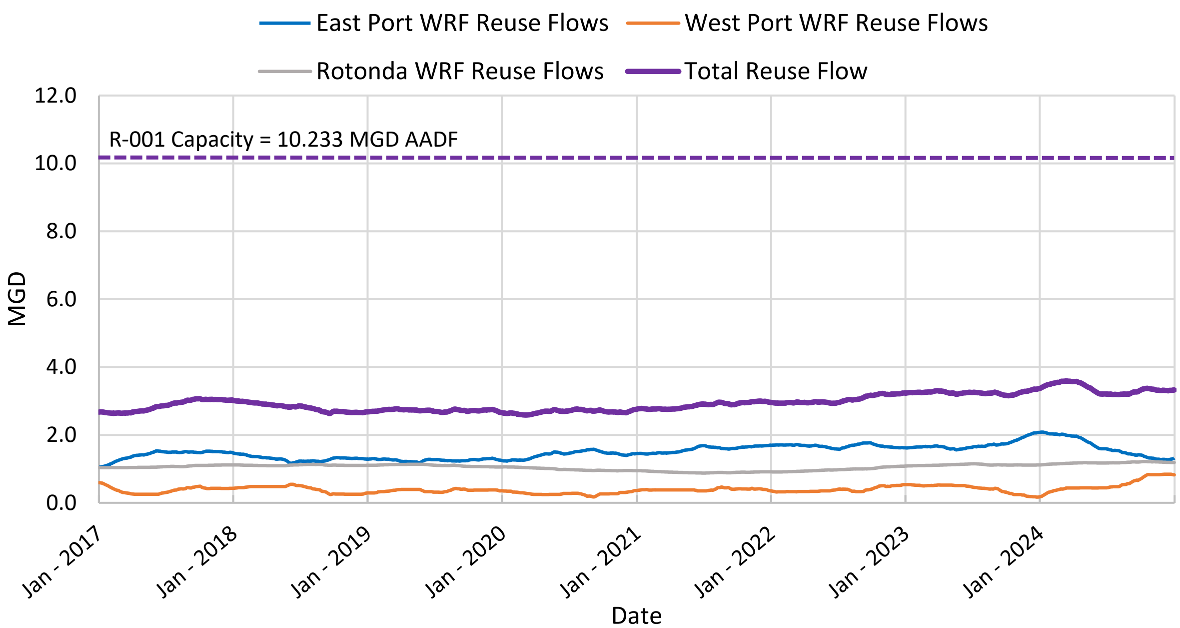
6.4.5 Rotonda WRF Reuse and Disposal

The Rotonda WRF is permitted to distribute reclaimed water using the County's MRS (R-001) or to the West Port WRF for disposal via the DIW system U-001, which includes only well IW-1, as discussed in Section 6.3. The Rotonda WRF has a very high reclaimed water demand for irrigation and does not typically dispose of reclaimed water except during wet weather when demand is minimal and influent plant flows are high. CCU is very successful with reuse at the Rotonda WRF, historically posting an annual reclaimed water reuse efficiency of over 90 percent. If disposal of reclaimed water is needed, operators at the Rotonda WRF coordinate with the West Port WRF operators to ensure that the DIW at the West Port WRF is able to handle the excess water.

The Rotonda WRF reclaimed water storage facilities include a 3.0-MG GST and a 2.64-MG reclaimed water storage pond. Additionally, the Rotonda WRF has a 5.182-MG lined reject pond that can be used to recycle substandard reclaimed water or as temporary storage for excess flows if the pond is not full.

Figure 6-22 graphs the historical reclaimed water contribution to the MRS from the Rotonda WRF (R-001). As shown, the Rotonda WRF distributes approximately 1.1 MGD of its typical 1.2 MGD daily flow to the MRS on an annual average basis, equal to 10 percent of the total MRS capacity.

Figure 6-22 Rotonda WRF Historical Effluent Flows for R-001



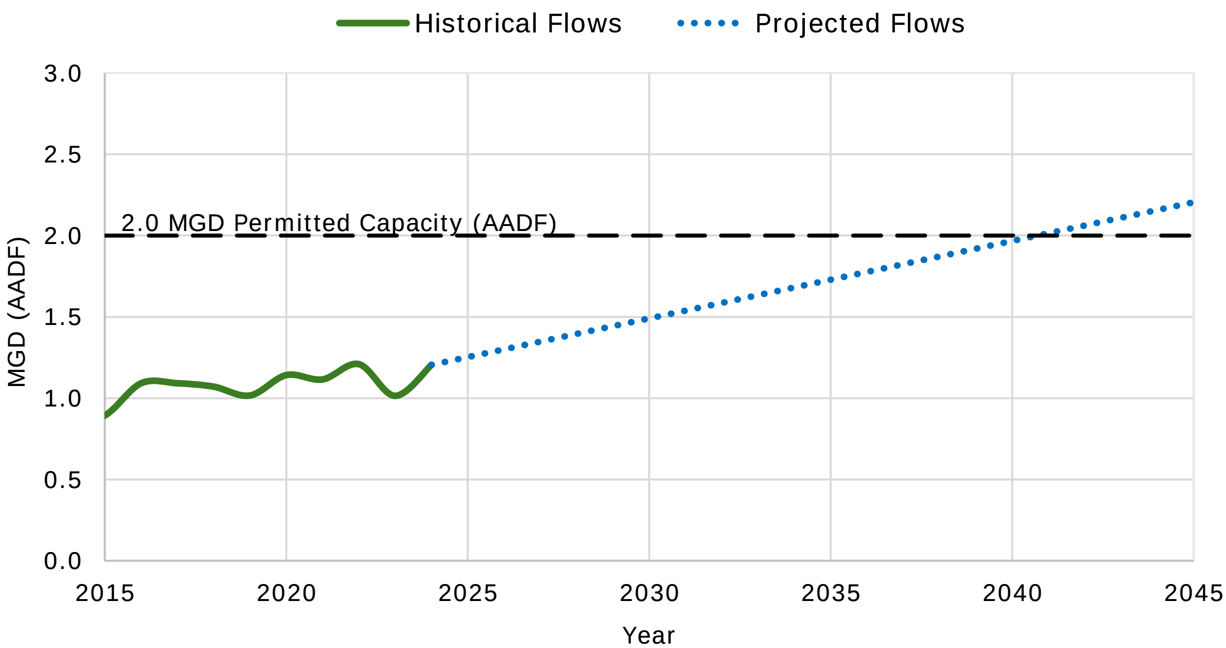
6.4.6 Ongoing Rotonda WRF Improvements

- Headworks Improvement – New mechanical fine screens and grit removal process upgrades to replace aging equipment and improve primary treatment efficiency. Construction is currently ongoing.
- New DIW – The County plans to install a new DIW to remove reliance on the West Port WRF DIW and improve reliability and wet-weather disposal at the Rotonda WRF.
- MBR Membrane Replacement – The County is replacing the BNR treatment membranes because the existing ones are at end of useful life. CCU has been very effective in maintaining the existing membranes, stretching their usage approximately 10 years beyond expected useful life span while still achieving satisfactory treatment efficiency.

6.4.7 ROTONDA WRF FLOW PROJECTIONS

Figure 6-23 displays the historical and projected flows based on the methodology presented in Chapter 5. The permitted treatment capacity of 2.0 MGD AADF is shown for reference.

Figure 6-23 Rotonda WRF Historical and Projected AADFs



The flow projections suggest that the permitted treatment capacity of 2.0 MGD may be exceeded in 2040. However, the following considerations apply:

- The Rotonda WRF service area is nearing capacity with a buildout flow of approximately 2.5 MGD.
- To ensure that adequate capacity is available at the West Port WRF to serve new development and growth, a small amount of flow may need to be temporarily shifted from the West Port WRF service area to the Rotonda WRF until the expansion to 2.5 MGD with AWT is complete. As Chapter 5 discusses, CCU's current sewer collection and transmission system has the ability to shift approximately 0.14 MGD from the West Port WRF to the Rotonda WRF. This flow shift can be increased to 0.2 MGD if minor improvements to the system are made.
- The projections conservatively include the potential for the County to acquire or accept wastewater flow from Sandalhaven Utilities, which would result in approximately 0.2 to 0.25 MGD of additional flow to the Rotonda WRF. As Chapter 3 discusses, Sandalhaven Utilities is currently interconnected to EWD, and the County has been approached regarding the possibility of the County acquiring Sandalhaven Utilities. The progress of this development will have an impact on the timing for expansion at the Rotonda WRF.

Although the Rotonda WRF may not exceed capacity until 2040 or later, the County should stay diligent and prepared by planning to begin design of an expansion in 2035, leaving a 5-year window to complete design and construction. The capacity of the Rotonda WRF was evaluated by HDR and Jones Edmunds as part of the ongoing West Port WRF expansion design project. The evaluation included reviewing the existing site plan and condition and treatment capacity assessments of the existing processes and equipment. The evaluation determined that CCU could accomplish an 'expansion' of the Rotonda WRF by rerating the facility to 2.5 MGD AADF using the existing facilities and improving others where needed.

Because planning and design for additional capacity would not need to occur until 2035, the County should reevaluate the need for a rerate to 2.5 MGD or other expansion as part of the CCU SMP update, which is assumed to occur in 2030 as part of CCU's commitment to updating this plan on a 5-year recurring basis.

6.4.8 Future Rotonda WRF Improvements

6.4.8.1 2030 Improvement Plan

- Design and construct a new DIW at the Rotonda WRF. The County owns an additional piece of land immediately south of the Rotonda WRF that could be used for the well.
- Reevaluate the need for expansion as part of the next SMP update.

6.4.8.2 2035 Improvements

- Begin planning and design for rerate to 2.5 MGD with AWT.

6.4.8.3 2045 Improvements

- Plan for replacement of the BNR membranes.

6.5 Burnt Store WRF – South County

6.5.1 Overview of Burnt Store WRF

The Burnt Store WRF is at 17430 Burnt Store Road, Punta Gorda, and was purchased by Charlotte County in 2003. This WRF operates under FDEP Permit No. FLA014083 with a capacity of 0.5 MGD AADF. This location also houses the Burnt Store Reverse Osmosis (RO) Water Treatment Plant (WTP). The Burnt Store WRF is permitted for three options for reclaimed water reuse and disposal, which are described in greater detail in this section:

- R-001 – 0.25 MGD AADF: Reuse via RIBs.
- R-002 – 0.5 MGD AADF: Reuse via reclaimed water distribution.
- U-001 – 3.44 MGD AADF: Disposal via the DIW system, IW-1 and IW-2.

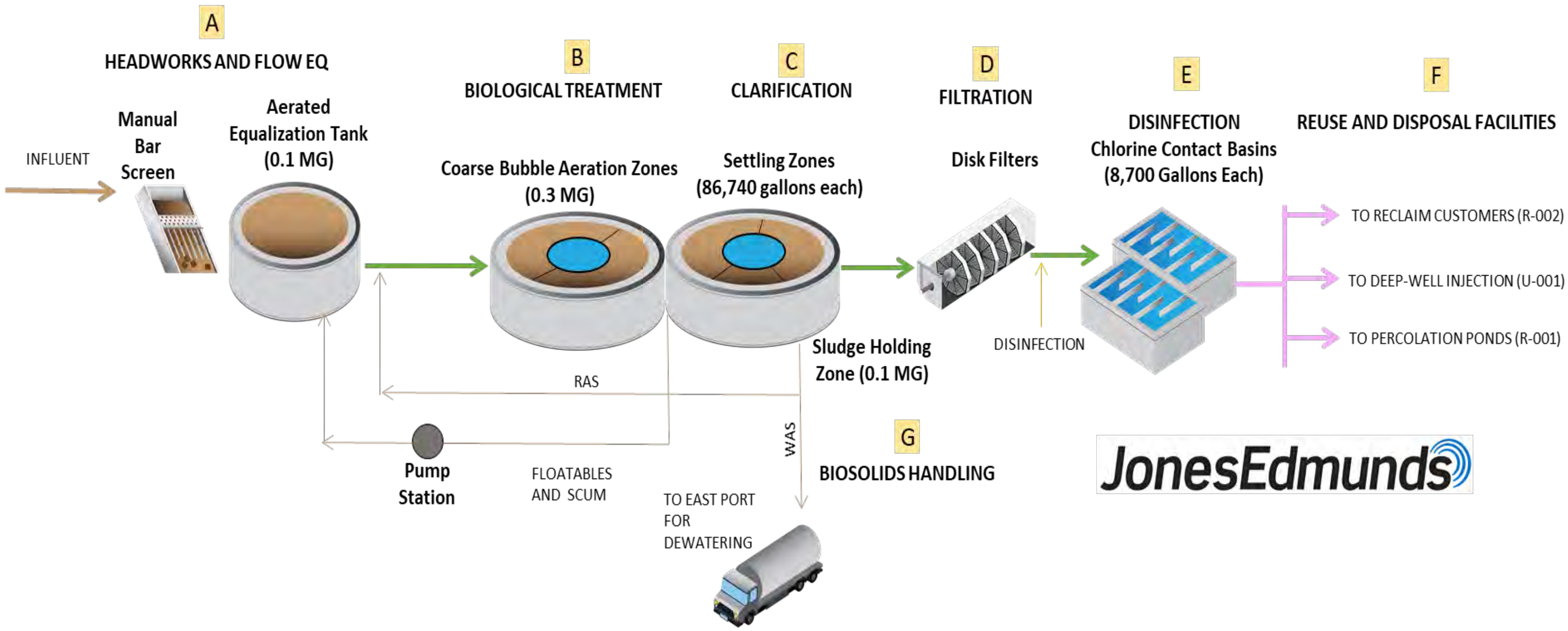
The Burnt Store WRF is permitted to provide irrigation water to the Burnt Store CCU service area as outlined in permit No. FLA014083.

Figure 6-24 shows the Burnt Store WRF process flow diagram. The key components of the Burnt Store processes are described in the following sections.

A. ***Headworks and Flow EQ:*** Raw wastewater from the South County service area collection/transmission system enters the WRF manual bar screen and flows into the EQ tank. Blowers equipped with timers and coarse-bubble diffusers aerate the wastewater and suspend the solids. Internal plant flows from the on-site pump station are also pumped into the EQ tank.

   The EQ transfer pumps are equipped with variable-frequency drives (VFDs) that operators periodically adjust based on season and historical trends. The EQ tank is equipped with ultra-sonic level sensors that turn off the pumps based on a low level setpoint and trigger an alarm condition if the EQ tank level gets above the high-level setpoint.

Figure 6-24 Burnt Store WRF Flow Diagram



B. ***Biological Treatment:*** The activated-sludge treatment occurs in two steel-ring package treatment units. The wastewater from the EQ tank enters the outer ring of a package-type treatment basin equipped with coarse-bubble diffusers where it is combined with RAS flow from the settlers. The Mixed Liquor Suspended Solids (MLSS) are aerated to achieve extended aeration treatment, and the air-flow rate of the diffusers is adjusted to achieve TN removal.

The plant has three Gardner Denver centrifugal blowers – one dedicated to the aeration tanks, one dedicated to the sludge digestion tank, and one on stand-by. A fourth smaller blower provides air to the EQ tank.


Burnt Store WRF Biological Treatment

C. ***Clarification:*** The two steel circular secondary clarifiers are within the center of each package treatment unit for gravity solids separation. The clarifiers are skimmed to remove floatables and scum before clarifier effluent flows over a circumferential weir to the tertiary filters.

Sludge pumps convey settled solids to the activated sludge tank (RAS) or the sludge holding tank (WAS). The RAS pumps turn on 10 minutes before and turn off 10 minutes after the EQ pumps turn on and off. Scum is collected in a scum trough and sent to the plant lift station where it is returned to the EQ tank.

D. ***Filtration:*** Clarified water from the settlers enters four disk Goofilters, each having a 5-micron filter cloth. The disk filter unit is installed in a steel filter tank that allows water to flow from outside the disk filters into a manifold system of the filter unit.

E. ***Disinfection:*** The filtered water can be sent to two CCCs where liquid sodium hypochlorite is introduced for disinfection. Two chemical-feed pumps are controlled by a chlorine analyzer to dose the sodium hypochlorite. A mixing pump is provided at the chemical feed point, and the chambers are baffled and sized to meet disinfection requirements. The chlorine analyzer measures the chlorine concentration at the beginning of the


Burnt Store WRF CCC

CCC and adjusts the chlorine feed rates. A reagent-less analyzer measures the chlorine residual at the CCC discharge weir for compliance with regulatory limits. Sodium hypochlorite is stored in two tanks with a total capacity of 2,200 gallons.

F. ***Reuse and Disposal Facilities:*** Effluent water meeting reclaimed water standards is conveyed through the unrestricted public-access reclaimed water system via an HSPS. The HSPS consists of two large high-service pumps (HSPs) and two smaller jockey pumps. Effluent water not meeting reclaimed water standards is conveyed to two Class I DIWs (IW-1 and IW-2), and four percolation ponds are available for disposal of excess reclaimed water or treated water that does not meet reclaimed water standards.

   IW-2 is currently being used as the primary means of effluent disposal, with the older well, IW-1, maintained as a backup. Currently, a maximum of 380 gpm can be diverted to the DIW system. Effluent flow that exceeds the deep well flow setpoint is diverted to the percolation pond system by way of a splitter mechanism at the CCC. The DIWs are also used for disposal of concentrate from the Burnt Store WTP RO facilities. Flows from the WTP and WRF are combined in a wet well at the injection well pumping station. Two equally sized vertical turbine pumps are used to inject water into the injection well.

G. ***Biosolids Handling:*** Three crescent-shaped sludge-holding tanks are in one steel ring tank, providing a total capacity of nearly 300,000 gallons. Sludge is hauled to the East Port WRF and combined with the sludge from the other CCU WRFs for digestion, dewatering, and final disposal at the compost facility at the Zemel Road Landfill. One blower is dedicated to the sludge-holding/aerobic digestion tank.

The Burnt Store WRF is not currently permitted to serve any large reclaimed water users. Future potential large users pending additional infrastructure improvements and/or execution of reclaimed water agreement with CCU include:

- Heritage Landings
- Burnt Store Marina
- Turn Leaf
- Coral Springs

6.5.2 Burnt Store WRF Historical Flows

Figure 6-25 presents the AADF, MADF, and TMADF for January 2017 through December 2024. In general, the AADF has consistently oscillated between 0.3 and 0.4 MGD based on the time of year. South County has experienced consistent development growth over the past 5 years at Heritage Landing and Tuckers Pointe, but the AADF data do not show an observable increase in AADF flows from the new homes to the plant. The County should further evaluate why the recent developments have not had an observable impact on the Burnt Store WRF AADF influent flows. Examples of causes include an inaccurate plant influent flowmeter or lag in the developments building homes. As of December 2024, the AADF is approximately 0.37 MGD, equating to 74 percent of the permitted capacity of 0.5 MGD. The MADF has recently remained consistent on a yearly basis, typically reaching a maximum of 0.5 MGD. The TMADF data show very similar trend and flow values as the MADF.

Figure 6-25 Historical Influent Flow for Burnt Store WRF

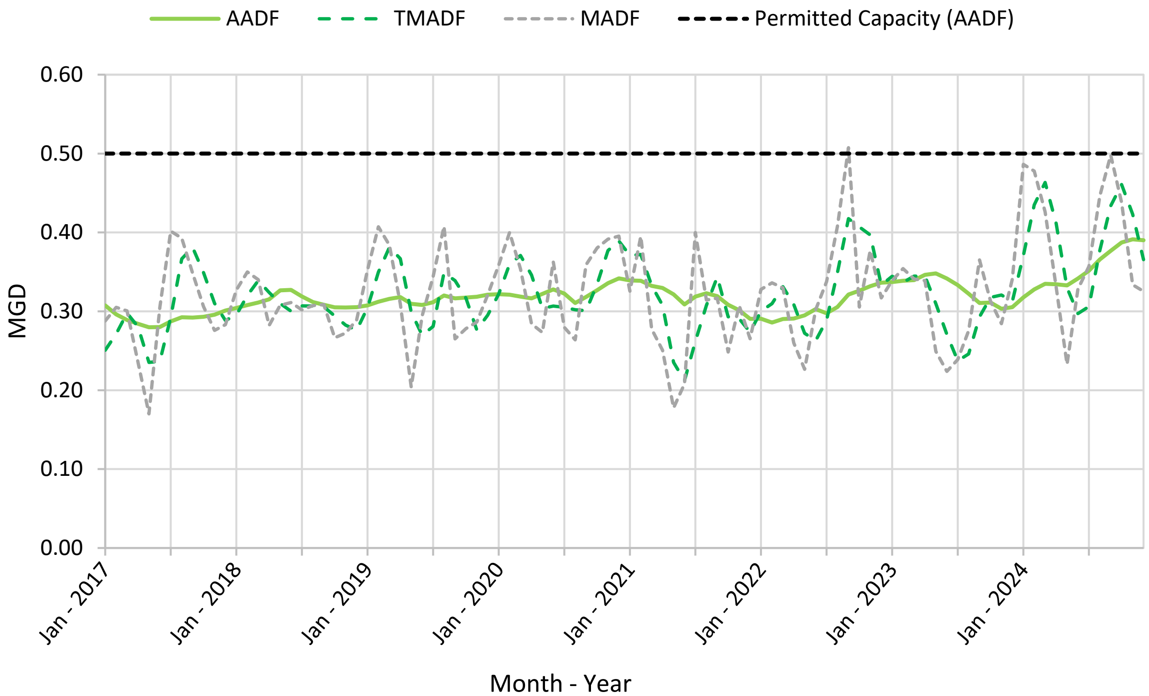


Table 6-11 summarizes the historical flows based on the yearly flows for the Burnt Store WRF for 2020 to 2024, including the percent capacity of AADF to the permitted capacity and the MMADF-to-AADF peaking factors.

Table 6-11 Historical Influent Flow Summary for Burnt Store WRF

Year	AADF (MGD)	MMADF (MGD)	MTMADF (MGD)	Percent Capacity (Actual AADF/ Permitted AADF)	Monthly Peaking Factor (MMADF/AADF)
2020	0.34	0.40	0.36	68 percent	1.2
2021	0.29	0.40	0.36	58 percent	1.4
2022	0.34	0.51	0.43	68 percent	1.5
2023	0.31	0.37	0.38	62 percent	1.2
2024	0.39	0.50	0.47	78 percent	1.3

6.5.3 Burnt Store WRF Historical Loadings

Figure 6-26 displays the historical influent CBOD and TSS concentrations on an average monthly basis. Influent CBOD and TSS average monthly concentrations fluctuate between 200 mg/L in the winter months and 75 mg/L for non-winter resident months. In general, the CBOD and TSS concentrations are within the typical average-strength municipal wastewater with spikes in TSS observed during March 2021 and June 2024.

Figure 6-26 Historical CBOD and TSS Concentrations for Burnt Store

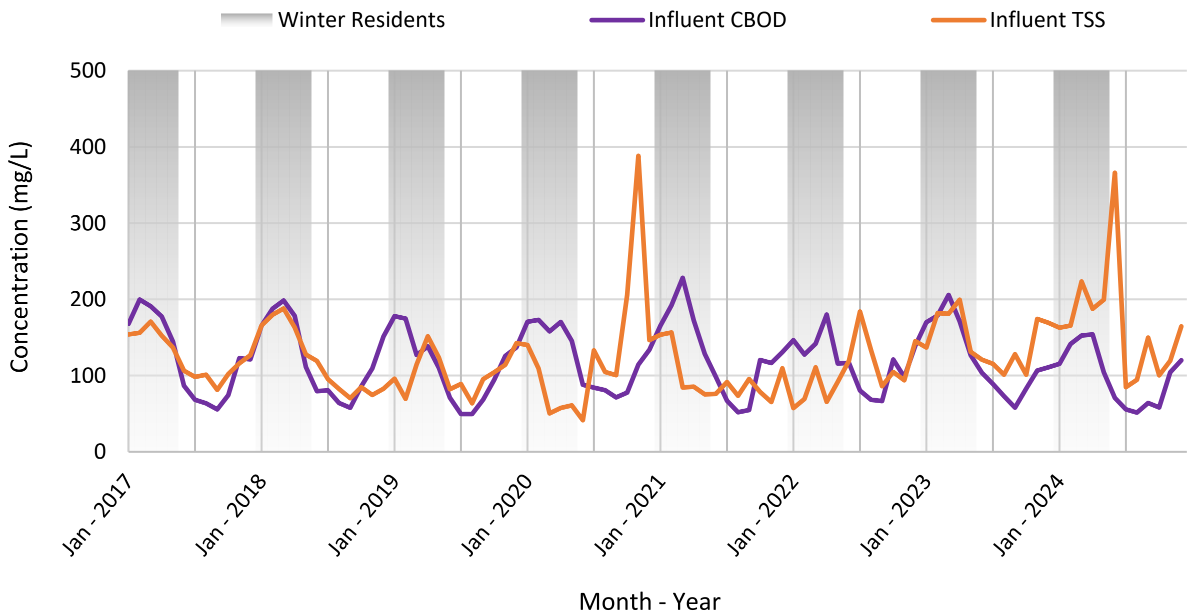


Table 6-12 summarizes the historical influent CBOD and TSS loadings from 2020 to 2024 based on average annual CBOD and TSS concentrations. The annual average influent CBOD concentrations ranged from approximately 120 to 150 mg/L, equating to CBOD loadings of 310 to 430 ppd. Similarly, TSS ranged between concentrations of 150 and 180 mg/L and loadings of 390 to 450 ppd.

Table 6-12 Historical Influent Loadings Summary for Burnt Store WRF

Year	AADF (MGD)	CBOD[1] (mg/L)	CBOD[2] (ppd)	TSS[3] (mg/L)	TSS[2] (ppd)
2020	0.34	150	430	160	450
2021	0.29	140	340	180	440
2022	0.34	130	370	150	430
2023	0.31	120	310	150	390
2024	0.39	150	430	160	450

[1] Typical average-strength municipal wastewater CBOD range is between 120 and 380 mg/L.

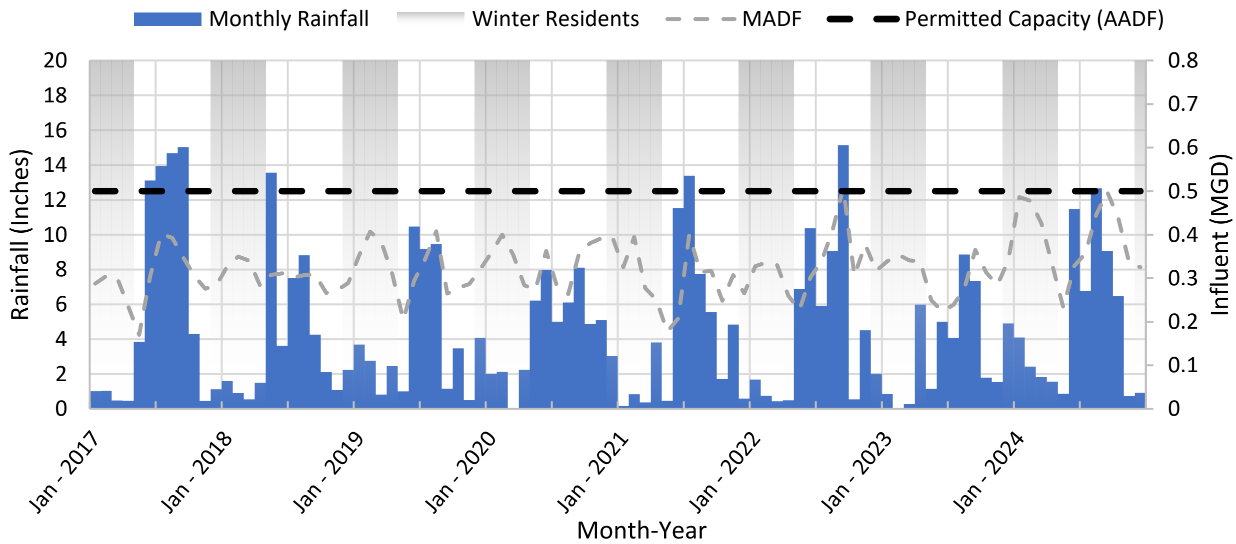
[2] CBOD and TSS Loadings = AADF (MGD) x concentration (mg/L) x 8.34 pounds per gallon.

[3] Typical average-strength municipal wastewater TSS range is between 120 and 370 mg/L.

6.5.4 Burnt Store WRF I&I Impacts

The effects of wet weather and resulting local I&I within the Burnt Store WRF sewer collection system can be estimated using Figure 6-27, which plots total monthly rainfall and MADF at the Burnt Store WRF from January 2017 to December 2024. As the figure shows, a recurring seasonal cycle of MADF occurs, largely driven by winter residents and wet weather. MADF tends to peak in February and October and decrease in December and June.

Figure 6-27 Seasonal and Wet-weather Impacts on Burnt Store WRF



The monthly flow patterns depicted in Figure 6-27 indicate a correlation between the increased flows and the volume of rainfall. Although an increase in MADF occurs during the wetter months, the increase in MADF compared to the winter resident months suggests that the Burnt Store sewer collection system experiences low-to-minimal impact from I&I.

6.5.5 Burnt Store WRF Reuse and Disposal

The Burnt Store WRF is permitted to discharge reclaimed water to the on-site RIBs (R-001) and PAR system for irrigation (R-002) or dispose via the DIW system U-001, IW-1 and IW-2. The DIW system U-001 is also used for disposal of concentrate produced as a byproduct of the RO treatment process at the on-site Burnt Store WTP.

Figure 6-28 compares historical AADFs from R-001 and R-002 to the permitted capacities of 0.25 and 0.5 MGD, respectively:

- R-001 – RIBs: This reuse method is used regularly and contributes to replenishing the groundwater table. However, CCU staff has observed reduced efficiency of the RIBs due to hydrogeology. Additionally, this method cannot be used unless TN of the reclaimed water is 10 mg/L or less. The RIBs have recently been used more frequently, with CCU reporting 0.25 MGD AADF as of December 2023.
- R-002 – Irrigation Water for the General Reuse Service Area: The limited distribution system infrastructure (storage, mains, I&C automation, etc.), limited customer base (no large users), and limited reclaimed water supply (0.35 MGD AADF) are affecting CCU's ability to distribute reclaimed water. Additionally, the Burnt Store WRF is a package plant that is not designed to reliably produce high-quality reclaimed water for distribution, resulting in higher disposal rates and less reclaimed water distribution.

Figure 6-28 Historical Effluent Flows for R-001 and R-002 for Burnt Store WRF

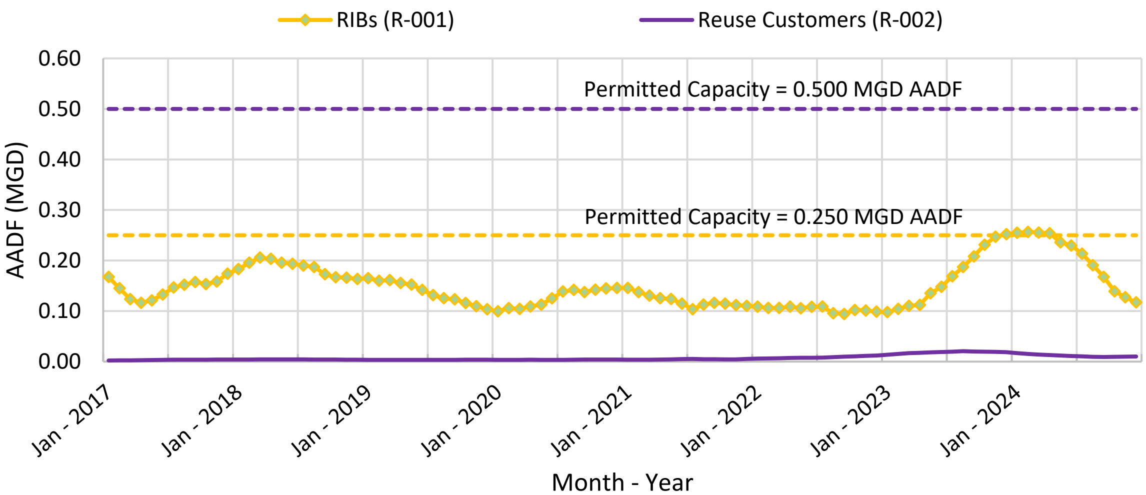
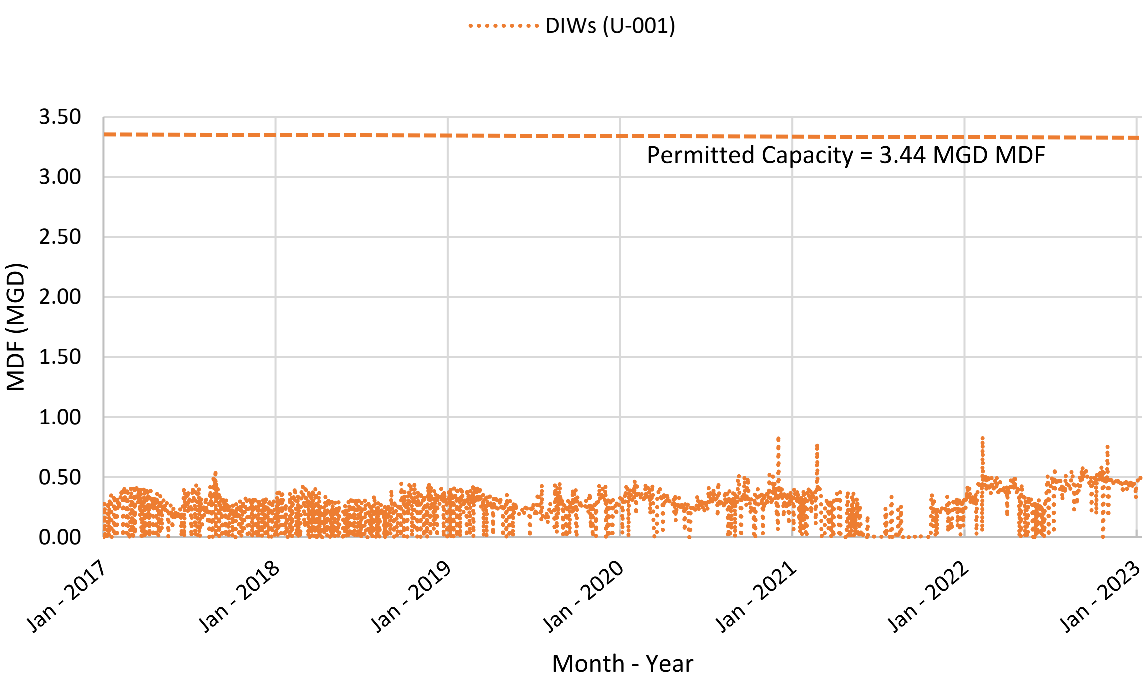


Figure 6-29 depicts the historical reclaimed water disposal via the DIW system U-001, comprised of IW-1 and IW-2, which are individually permitted through FDEP's UIC department. The DIW system is permitted for a combined 3.44 MGD AADF. The data show that the DIW system wells have adequate capacity for current and future flows.

Figure 6-29 Historical Effluent Flows for U-001 for the Burnt Store WRF



6.5.6 Ongoing Burnt Store WRF Improvements

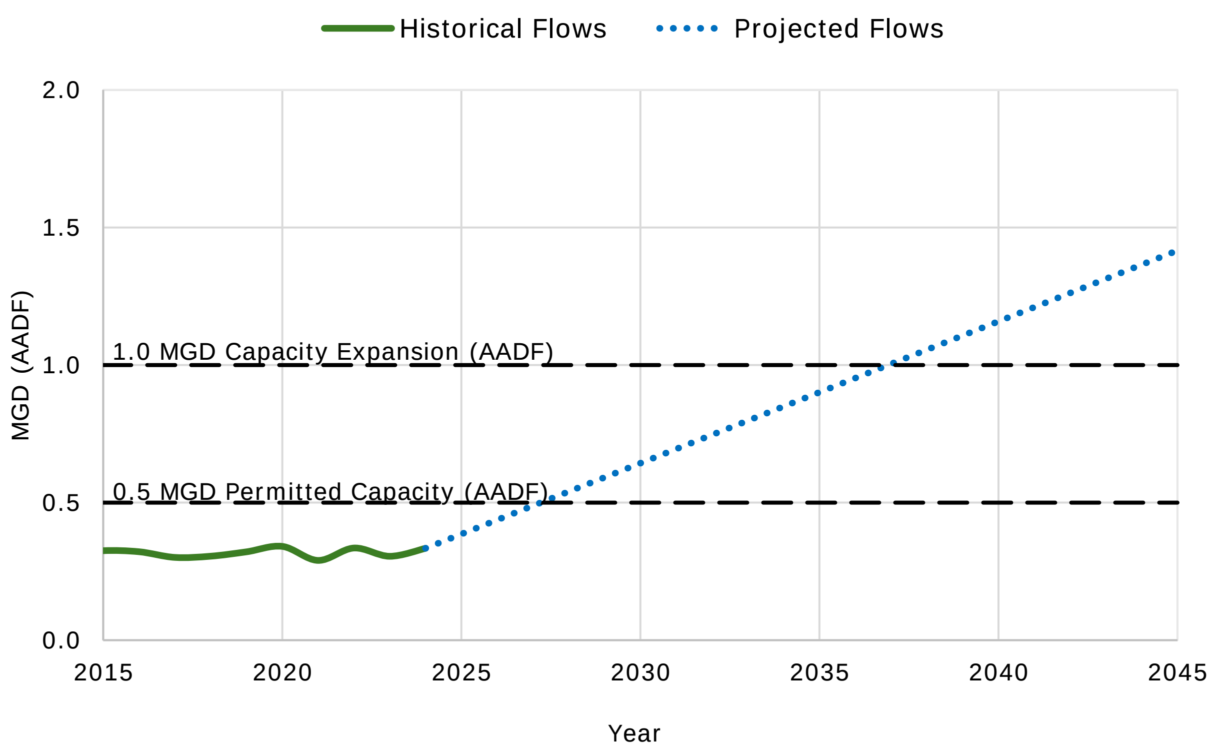
- Design and Construct Facility Expansion: The County completed design and permitting for expansion to 2.5 MGD AADF with AWT (McKim & Creed and Jones Edmunds); however, the project bid for construction was never awarded due to only a single bidder likely due to exorbitantly high construction costs. CCU is evaluating interim WRF improvements that can be implemented to increase the capacity of the WRF to 1.0 MGD with the goal of having those improvements implemented by the end of 2026. A Request for Proposals for these interim WRF improvements was issued in September 2024.

- The plans for the completed 2.5-MGD-AADF expansion highlight many improvements that the County should consider in their expansion efforts:
  - New plant headworks.
  - Flow EQ.
  - New BNR treatment process.
  - Secondary clarifiers.
  - Filter improvements.
  - New CCC.
  - New reclaimed water pump station with storage.
  - Sludge-holding tank improvements.
  - New electrical building.

6.5.7 Burnt Store WRF Flow Projections

Figure 6-30 displays the historical and projected flows based on the methodology presented in Chapter 5. The permitted and future treatment capacities of 0.5 and 1.0 MGD AADF, respectively, are shown for reference.

Figure 6-30 Burnt Store WRF Historical and Projected AADFs



The flow projections suggest that the permitted capacity of 0.5 MGD AADF may be exceeded in 2027. However, the following considerations apply:

- As Chapter 5 discusses, the flow projections for the Burnt Store service area assumed to have little to no impact from utility acquisitions and S2S projects through 2045.

- Planned development is rapidly occurring in South County and can accelerate the need for treatment capacity at the Burnt Store WRF. Between now and 2030, phasing of major developments accounts for additional significant flow:

  - Heritage Landing (additional flow due to new and available units).
  - Tuckers Point Community Development District, for which the site plan includes 1,700 residential units, a 400-room hotel, and nearly 400,000 square feet of commercial space, is estimated to add up to 0.4 MGD by 2030.

CCU should continue with design and construction for expansion, completing as soon as possible to ensure development connections can be serviced by Burnt Store WRF. CCU must closely monitor plant flows and investigate the impacts from ongoing development construction and occupancy to better determine the expansion needs. Based on Figure 6-30, flow projections suggest that the future treatment capacity of 1.0 MGD may be exceeded in 2037 with a capacity of 1.4 MGD needed by 2045.

In planning efforts for all future expansions, the County should consider a higher capacity than needed to take advantage of economy-of-scale price reductions since the buildout flow for the area is projected to be 7.0 MGD AADF.

6.5.8 Future Burnt Store WRF Improvements

6.5.8.1 Existing (2025) Improvement Plan

- Complete design and construction to expand the treatment capacity at Burnt Store WRF to 1.0 MGD AADF. The project will be accelerated using the construction manager at risk (CMAR) project delivery method to meet an 18-month schedule.
- Establish a plan that evaluates and details the WRF influent flows, lift station contributions, and ongoing development construction and occupancy impacts. The data should be routinely reviewed and updated until a plant expansion is complete.

6.5.8.2 2030 Improvements

- Burnt Store WRF will be expanded to 2.5 MGD with AWT modifications. CCU completed design for the 2.5-MGD expansion with AWT in 2024. However, the project could not be awarded for construction because the sole contractor bid was not economically feasible for the County. Design and construction should be completed before 2037.

6.6 Biosolids Management and Disposal

This section summarizes the regulatory requirements related to biosolids; CCU's existing biosolids storage capacity, production, and disposal practices; and projections and options for long-term biosolids management.

6.6.1 WRF Expansion Biosolids Impacts

Charlotte County is committed to upgrading all WRFs to meet AWT standards in accordance with Florida's water quality objectives.

Table 6-13 summarizes the current and future WRF capacities and planned improvements with known impacts to biosolids production and handling.

Table 6-13 WRF Planned Improvements

WRF	Permitted Capacity (MGD AADF)	Future Capacity (MGD AADF)	Buildout Capacity (MGD AADF with AWT)	Planned Improvements
East Port	6.0	9.0 w/AWT	18.0	▪ Expand to 9.0 MGD w/AWT by 2027. ▪ Includes new screw presses to increase solids concentration from 16% to 18%.
West Port	1.2	2.5 w/AWT	10.0	▪ Expand to 2.5 MGD with AWT by 2032.
Rotonda	2.0	2.5 w/AWT	2.5	▪ Re-rate WRF from 2.0 to 2.5 MGD w/AWT on hold.
Burnt Store	0.5	1.0 2.5 w/AWT	7.0	▪ Expand to 1.0 MGD (no AWT) by 2027. ▪ Future expansion to 2.5 MGD w/AWT.

6.6.2 Biosolids Quantity Projections

Projecting future biosolids production uses flow and biosolids transfer data from Part A of the DMRs. The historical period from January 2024 to December 2024 was selected to project future biosolids quantities.

Figure 6-31 and Table 6-14 show the historical biosolids production at the West Port, Rotonda, and Burnt Store WRFs, and the total biosolids sent to the Charlotte County Bio-Recycling Center (CCBRC) from the East Port WRF. The tonnage produced by the East Port WRF is not reported monthly and cannot be estimated by subtracting the total received at the East Port WRF from the total sent to the CCBRC.

Figure 6-31 Annual Biosolids (Dry Tons) Produced at Each WRF (2024)

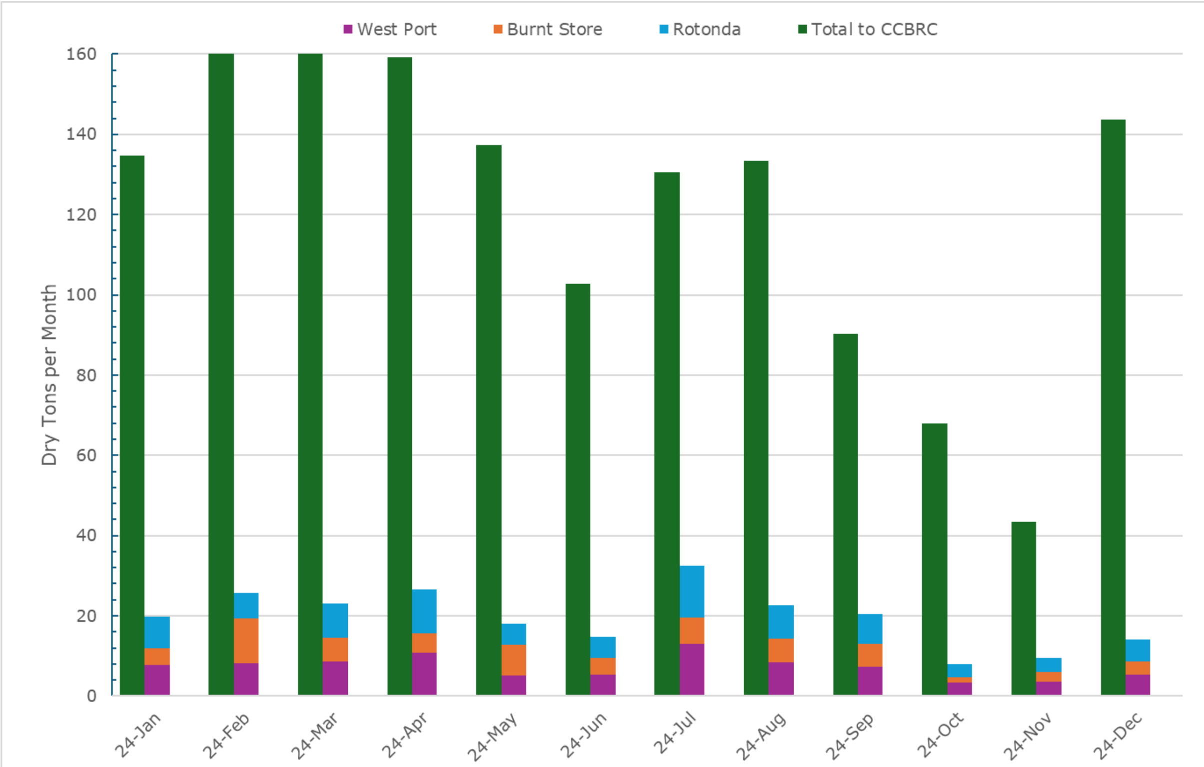


Table 6-14 WRF Biosolids Totals

Date	West Port (Dry Tons)	Rotonda (Dry Tons)	Burnt Store (Dry Tons)	Total Sent from East Port to CCBRC (Dry Tons)
Jan-24	7.8	7.8	4.1	135
Feb-24	8.1	6.4	11.3	160
Mar-24	8.6	8.6	5.9	163
Apr-24	10.8	10.8	4.9	159
May-24	5.2	5.2	7.6	137
Jun-24	5.4	5.2	4.2	103
Jul-24	12.9	12.9	6.7	131
Aug-24	8.4	8.4	5.9	133
Sep-24	7.3	7.3	5.8	90
Oct-24	3.4	3.4	1.2	68
Nov-24	3.6	3.6	2.4	43
Dec-24	5.3	5.3	3.4	144
Average Dry Tons	**7.2**	**7.1**	**5.3**	**122.2**

Table 6-15 shows the flow projections in AADF discussed previously in this chapter for 2025 through 2045. These values were used to determine the biosolids production at each WRF for 2025 through 2045.

Table 6-15 Projected AADF (MGD) for each Facility

Year	East Port	West Port	Rotonda	Burnt Store
2024[1]	5.62	0.73	1.13	0.31
2025	5.8	0.84	1.31	0.47
2030	6.7	1.57	1.57	0.78
2035	7.2	2.10	1.83	0.78
2040	7.7	2.73	1.92	0.78
2045	8.2	2.94	2.01	0.85

[1] Flows are from fiscal year 2024.

Table 6-16 compares the total projected biosolids for the West Port, Rotonda, and Burnt Store WRFs, and the total sent to the CCBRC from the East Port WRF. A conservative 20-percent increase (Metcalf & Eddy, Inc.; 2014) in annual biosolids production was included to account for converting the WRFs to AWT in 2030. CCU has delivered a rolling annual average of over 9,000 wet tons to the CCBRC as of June 2024. The data in the table demonstrate that by 2030, CCU is expected to exceed the CCBRC contract threshold of 10,000 wet tons per year, which will then increase CCU's biosolids disposal costs as discussed in the next section.

Table 6-16 Projected Biosolids Production (2025–2045)

Year	West Port (Dry Tons)	Rotonda (Dry Tons)	Burnt Store (Dry Tons)	Total Sent to CCBRC (Dry Tons)	Total Sent to CCBRC (Wet Tons)[2]
2024	87	85	63	1,467	9,167[3]
2025	104	90	62	2,058	9,528
2030	234[1]	130[1]	123[1]	2,367	13,149
2035	312	152	123	2,573	14,292
2040	405	159	123	2,744	15,245
2045	436	166	136	2,916	16,198

[1] Year expected to be treating to AWT standards.

[2] 18-percent total solids assumed.

[3] 16-percent total solids assumed for 2023 because BFPs are used to dewater.

As mentioned previously, AWT treatment will yield a higher biosolids volume versus non-AWT treatment. In other words, until the West Port WRF, Rotonda WRF, and/or Burnt Store WRF are improved to meet AWT standards, CCU can expect a lower projected biosolids yield than what is presented in Table 6-16.

6.6.3 Biosolids Disposal Alternatives Evaluation

To assist CCU in planning for its future biosolids disposal needs, Jones Edmunds evaluated several options available. In identifying viable alternatives, Jones Edmunds eliminated the option of using land application to dispose of biosolids. The latest FDEP Rule Revision to

Chapter 62-640, FAC, became effective June 21, 2021, when HB 1320 was signed into law. The biosolids disposal rules regarding land application were developed to minimize the migration of nutrients into waterbodies to prevent impairments to waterbodies. The resulting rules have limited the number of feasible and permittable land application sites in Florida. In addition, the current regulations essentially require any land-applied sludge to meet Class B standards for vector and pathogen reductions, and the CCU WRFs are not sized or operated to allow the WRFs to achieve the required Class B standards. For these reasons, no further consideration is warranted for any land-application disposal option.

The biosolids options considered for further evaluation include:

1. Renegotiate the CCBRC contract and continue operating under the current agreement with Synagro.
2. Haul biosolids to an alternative residuals management facility (RMF).
3. Dispose of all biosolids directly in the Zemel Road Landfill.

Each of these alternatives is discussed below. Jones Edmunds further evaluated two of these alternatives to manage biosolids produced at the WRFs.

6.6.3.1 Renegotiate the Contract and Continue Operations Under Agreement with CCBRC (Synagro)

The first alternative is for the County to continue to dispose of biosolids at CCBRC under the existing agreement. The contract rate that CCU pays to CCBRC is highly advantageous for CCU, since it is well below the rates that other RMFs similar to CCBRC charge. The one aspect of continuing under this agreement that CCU needs to fully evaluate is how their costs will increase in the future. Two factors will impact CCU. As Table 6-17 shows, the contract rate will begin to increase annually based on the CPI. However, as discussed previously, even with the annual increases in the contract rate, CCU will continue to benefit from a highly favorable disposal rate per dry ton.

The second factor that will impact CCU's biosolids disposal costs occurs once the CCU biosolids production levels increase beyond 10,000 wet tons per year. Table 6-17 also shows that CCU's biosolids production is estimated to exceed 10,000 wet tons per year in 2026. Once production exceeds 10,0000 wet tons, CCU will be charged the average tipping rate that CCBRC charges to other entities. This rate would only apply to the volume above 10,000 wet tons in a contract year. Jones Edmunds was unable to obtain the current average tipping fee; however, for reference, the City of Venice is currently charged $72.54 per wet ton, and such gate rates would be expected to increase in the future by the CPI factor.

Table 6-17 summarizes the projected annual biosolids costs at CCBRC for CCU through 2045. The table separately presents the costs associated with the first 10,000 wet tons and volumes greater than 10,000 wet tons. For this comparison, we assumed an average gate rate of $40 per wet ton, which is essentially equivalent to the current tipping fee for the Zemel Road Landfill. This table demonstrates that as the CCU biosolids volume continues to increase beyond 10,000 wet tons, the cost associated with the volume over 10,000 wet tons could approach nearly 60 percent of the overall annual costs, although those volumes represent less than 40 percent of the overall biosolids volume.

Table 6-17 CCBRC Biosolids Disposal Costs

Year	CCU Total Biosolids Generated (Wet Tons)	Total Biosolids at Contract Rate (Wet Tons)	Biosolids Above 10,000 Wet Tons	Percent of Total Over 10,000 Wet Tons (%)	CCBRC Contract Rate[1]	Cost of Contract Rate Biosolids ($/yr)	CCBRC Gate Rate Applied to Excess[2]	Cost of Excess Biosolids ($/Yr)	Total Annual Biosolids Cost	Percent of Total Cost for Volumes Over 10,000 Wet Tons (%)
2025	9,528	9,951	0	0	$18.00	$179,118.00	$40.00	$ 0	$179,118.00	0
2030	13,149	10,000	3,149	24	$20.87	$208,700.00	$46.37	$146,019.46	$354,719.46	41
2035	14,292	10,000	4,292	30	$24.19	$241,900.00	$53.76	$230,759.38	$472,659.38	49
2040	15,245	10,000	5,245	34	$28.04	$280,400.00	$62.32	$326,882.47	$607,282.47	54
2045	16,198	10,000	6,198	38	$32.51	$325,100.00	$72.24	$447,747.30	$772,847.30	58

[1] Contract rate of $18 per wet ton inflated by the annual CPI applicable to first 10,000 wet tons.

[2] Gate rate inflated by the annual CPI applicable to volumes above 10,000 wet tons.

The costs presented in Table 6-17 clearly demonstrate that to continue its current biosolids management program with CCBRC, the County's should pursue the feasibility of renegotiating the terms of the agreement with CCBRC. Jones Edmunds recommends that CCU seek to renegotiate the agreement to increase the contract wet tonnage rate from 10,000 wet tons to 16,500 wet tons. This would eliminate the possibility of tonnages above 10,000 from being charged at the average tipping fee for other entities and allow CCU to continue its current biosolids management program beyond 2045, considering the most conservative biosolids projections. Ideally, the renegotiated rate would ensure that the rate always remains below the tipping fee at the landfill.

6.6.3.2 Haul to a Permitted Residuals Management Facility

As an alternative to using the CCBRC facility, CCU could pursue an option to haul its biosolids to an RMF other than the CCBRC. Jones Edmunds identified one potential RMF in Charlotte County, Essential Earth Compost at 42811 Neal Road, Punta Gorda, approximately 22 miles from the East Port WRF. The Essential Earth Compost facility operates in a manner similar to the CCBRC, mixing biosolids with green yard waste to produce Class AA compost. The facility is slightly smaller than CCBRC and is permitted to receive up to 9,360 dry tons per year of biosolids. Jones Edmunds contacted Essential Earth Compost and learned that the facility is at capacity and is expecting to expand next year. When contacted to obtain pricing, Essential Earth Compost was unwilling to share their current tipping fees. Instead, they expressed that they have a backlog of new users and are unable to keep up with increasing demand for composting services. Given this situation, Essential Earth Compost does not represent a viable alternative for CCU.

A second RMF considered was the Florida Green Class AA solar drying facility operated by Merrill Brothers in Pasco County, approximately 145 miles from the East Port WRF. This facility offers turnkey biosolids transportation and management services and is more than twice the size of CCBRC. The facility is permitted to handle 26,000 dry tons per year. The most recent pricing information Jones Edmunds has available for the Florida Green facility is approximately $55 per wet ton in 2020 dollars. Escalating that fee to 2024 dollars at an average CPI of 3 percent results in a tipping fee of $61.90. However, that fee does not include the cost of hauling materials from Charlotte County to the processing site in Pasco County. Such costs would be expected to increase the overall fee to more than $70 per wet ton.

Based on a simple comparison of this tipping fee to the current contract rate that CCU pays to CCBRC, the cost for CCU to use the Florida Green facility for biosolids disposal would be nearly four times the cost.

6.6.3.3 Disposal of Biosolids at Zemel Road Landfill

The final disposal alternative evaluated was disposal of all biosolids in the Zemel Road Landfill. The landfill disposal is currently the CCU's back-up option to the CCBRC facility, with biosolids used as interim daily cover material for the landfill cells. The current tipping fee for materials disposed of at the landfill is $39.28 per ton. Using the biosolids volume projections previously presented and assuming the landfill tipping fee will be subject to annual CPI adjustments of 3 percent, annual disposal costs through 2045 were calculated and are presented in Table 6-18. Since the landfill is co-located with the CCBRC, no additional trucking costs above those currently required would be incurred.

Table 6-18 Biosolids Disposal Cost at Zemel Road Landfill

Year	Biosolids Volume (Wet Tons)	Tipping Fee ($/Ton)[1]	Total Annual Disposal Cost
2025	9,528	$39.28	$374,270
2030	13,149	$45.53	$598,674
2035	14,292	$52.78	$754,353
2040	15,245	$61.19	$932,855
2045	16,198	$69.22	$1,121,229

[1] Tipping fee inflated by an annual CPI increase of 3 percent starting in 2026.

A potential issue with this alternative is to confirm with the Charlotte County Solid Waste Division that the expected long-term biosolids generation rates are factored into the landfill capacity and operations. The proposed biosolids for landfill disposal are 18- to 20-percent total solids (80- to 82-percent water) and the solids are approximately 65- to 70-percent volatile solids, meaning that they break down during the anaerobic conditions within the landfill. Biosolids take very little if any “air space” or landfill capacity and provide moisture, which helps promote decomposition, landfill gas production, and landfill gas reuse.

Landfill operations staff sometimes have issues when too much biosolids material is delivered and dumped since it creates slippery surfaces for the front-end loaders that compact the solid waste. However, this issue could be managed by coordinating deliveries with landfill staff and developing improved operation strategies for proper mixing of solid waste and biosolids.

Regardless of these issues, the calculated cost to dispose of all CCU biosolids at the landfill is significantly higher than continuing to use the CCBRC, even with the extra cost associated with biosolids volumes greater than 10,000 wet tons per year.

6.6.4 Conclusions and Recommendations

Biosolids reuse and disposal regulations have become increasingly restrictive and now prohibit land application in areas such as first magnitude springsheds, watersheds associated with impaired waterbodies such as Charlotte Harbor, and watersheds with BMAPs that restrict or limit biosolids disposal. For this reason, increasingly more biosolids generators are being forced to turn to RMFs or landfills as their disposal option.

CCU is in the unique position of having a licensed RMF co-located with the County’s Class I landfill. This places CCU in a strong position to not only comply with biosolids regulations, but also to control its costs associated with long-term biosolids disposal. The current agreement that the County has with the CCBRC provides CCU with an economical biosolids management plan through 2045. If operational issues arise with the CCBRC, CCU would be able to dispose of its biosolids at the Zemel Road Landfill with no added hauling costs.

The cost savings associated with this biosolids management plan are unmatched. As Table 6-17 shows, even at the end of the full agreement term in 2045, the expected tipping fee at CCBRC will be approximately $32.51 per wet ton. This rate is more than 50-percent lower than the City of Venice is currently paying to dispose of biosolids at the CCBRC.

The main consideration for CCU is managing its biosolids costs as its annual generation rate begins to exceed the limit of 10,000 wet tons for which the contract rate applies. The public-private partnership between Charlotte County and the CCBRC is mutually beneficial for both parties. That partnership provides incentive for both parties to continue the relationship. To that end, Jones Edmunds recommends that Charlotte County pursue the potential to renegotiate the terms of their agreement to increase the amount of biosolids accepted at the contract rate from 10,000 wet tons annually to 16,500 wet tons annually. In doing so, CCU would be ensured of controlled biosolids disposal expenses through the end of the existing agreement term in 2045.

Given that other facilities like Essential Earth Compost are experiencing long wait-times for new customers and are expanding to meet the spike in demand, having an agreement with set costs for all of the biosolids it generates through 2045 would be highly advantageous for CCU. To that end, an additional goal of renegotiating with the CCBRC should be to clearly preserve capacity at the facility for CCU's future biosolids volumes, ensuring that the County continues to be the principal entity using the CCBRC for the term of the agreement. As noted, CCBRC currently serves 22 other communities besides CCU. Furthermore, the CCBRC will likely continue to expand its list of customers. To put this into perspective, Jones Edmunds obtained copies of the DMRs for CCBRC for 2024.

Table 6-19 summarizes the total biosolids reported by CCBRC received from CCU and all other entities. CCU has represented an average of only 16.4 percent of the total volume of biosolids received by CCBRC in 2024.

Table 6-19 2024 Biosolids Received at the CCBRC

Month	Total In (Dry Tons/Year)	From CCU (Dry Tons/Year)	CCU Percent of Total	Biosolids from Other Entities (Dry Tons/year)
January	813	135	17	678
February	719	160	22	559
March	996	163	16	833
April	890	159	18	731
May	825	137	17	688
June	604	103	17	501
July	727	131	18	596
August	742	133	18	609
September	553	90	16	463
October	493	68	14	425
November	741	43	6	698
December	809	144	18	665

A final factor that CCU should consider in any renegotiation with CCBRC is the host fees that CCBRC pays to Charlotte County. Essentially, CCBRC currently pays Charlotte County $3 for every wet ton of biosolids it receives from entities other than CCU. A full year results in a total of 8,913 dry tons. At an assumed solids percentage of 18 percent, this equates to

49,516 wet tons for the year. Therefore, the annual host fee paid by CCBRC to Charlotte County is $148,550.

Additionally, from a negotiation standpoint, unlike the contract rate CCU pays to CCBRC, the host fee is not tied to the CPI; rather, it is set at $3 for the duration of the agreement, commencing in Contract Year 11.

An additional host fee that CCBRC pays to Charlotte County is $1 per ton of yard/green waste received from out-of-County sources. Unfortunately, the volume of such waste is not required to be reported on the CCBRC DMRs, so Jones Edmunds has no information on these volumes. However, similar to the $3-per-wet-ton host fee for outside biosolids, the $1-per-ton fee for yard/green waste has no contractual escalators like the contract rate for CCU.

Although the host fees paid by CCBRC are recognized as revenue for the Charlotte County landfill (General Ledger Account 4011) and do not directly impact the operating budget for CCU, adjustments to these fees should be considered as part of any negotiations with CCBRC.

6.6.5 Regulatory Requirements

This section summarizes the available information on current and expected regulations that impact biosolids handling and disposal for the CCU WRFs. Depending on the alternative selected by CCU to accommodate future biosolids production, the regulations discussed below may or may not apply.

6.6.5.1 FDEP Chapter 62-640, FAC – *Biosolids*

Chapter 62-640, FAC, regulates the management, use, and land application of biosolids to ensure the protection of the environment and public health. Requirements in this Chapter apply to domestic WWTFs and biosolids management facilities that generate, treat, or manage biosolids.

The requirements provide for treating and managing biosolids and septage applied to land or distributed and marketed, establish land-application criteria, and define requirements for agricultural operations that have received or will receive biosolids or septage.

This Chapter also establishes the minimum requirements for septage that will be treated at facilities permitted by FDEP and will be applied to land for agricultural purposes or land reclamation.

This Chapter intends to minimize the migration of nutrients, specifically phosphorus, to prevent impairment of waterbodies. The Chapter requires domestic WWTFs and biosolids treatment facilities to routinely monitor for water-extractable phosphorus.

6.6.5.2 40 CFR Part 503 – *Standards for the Use or Disposal of Sewage Sludge*

The 40 CFR 503 regulations establish standards, general requirements, pollutant limits, management practices, and operational standards for the final use or disposal of sewage sludge generated during the treatment of domestic sewage. The standards are applicable for land-applied sewage sludge, sludge placed on a surface disposal site, or sludge fired in a sewage sludge incinerator.

Chapter 62-640, FAC, regulates the management of wastewater biosolids (also known as domestic wastewater residuals or sewage sludge). The FAC rules follow the 40 CFR Part 503 regulations for classifying biosolids stabilization in terms of pathogens reduction, Vector-Attraction Reduction (VAR), and heavy metal concentrations as Class AA, Class A, or Class B, as defined below:

- Class AA biosolids means biosolids that meet:
  - One of the pathogen-reduction requirements described in 40 CFR 503.32(a)(3), (4), (5), (7), and (8) and Section 62-640.600(1)(a), FAC.
  - One of the VAR requirements described in 40 CFR 503.33(b)(1) through (8) and in Section 62-640.600(2)(b), FAC.
  - The parameter concentrations described in Sections 62-640.700(5)(a) and (b), FAC.
- Class A biosolids means biosolids that meet:
  - One of the pathogen-reduction requirements described in 40 CFR 503.32(a)(3), (4), (5), (7), and (8) and Section 62-640.600(1)(a), FAC.
  - One of the VAR requirements described in 40 CFR 503.33(b)(1) through (10) and in Section 62-640.600(2)(a), FAC.
  - The parameter concentrations described in Section 62-640.700(5)(a), FAC.
- Class B biosolids means biosolids that meet:
  - One of the pathogen-reduction requirements described in 40 CFR 503.32(b) and Section 62-640.600(1)(b), FAC.
  - One of the VAR requirements described in 40 CFR. 503.33(b)(1) through (10) and in Section 62-640.600(2)(a), FAC.
  - The parameter concentrations described in Section 62-640.700(5)(a), FAC.

Table 6-20 summarizes the biosolids VAR requirements in accordance with 40 CFR Part 503.33. Subsections (1) through (8) apply to facilities generating Class AA biosolids. Subsections (1) through (10) apply to facilities generating Class A and Class B biosolids. Currently, CCU's biosolids production is not regulated by Chapter 62-640, FAC, because biosolids are not produced for land application. These regulations would become pertinent if CCU elects to produce land-applied biosolids to account for the difference in biosolids production and the permitted Synagro volume.

Table 6-20 Biosolids VAR Requirements per 40 CFR Part 503.33

Section	Description
503.32 (b)(1)	A minimum of 38-percent volatile solids reduction (VSR) shall be met.
503.32 (b)(2)	For anaerobically digested biosolids, when 38-percent VSR cannot be met, VAR can be demonstrated by achieving an additional 17-percent VSR when anaerobically digesting a portion of the previously digested sludge in a bench-scale digester for 40 days at a temperature between 30°C and 37°C.

Section	Description
503.32 (b)(3)	For aerobically digested biosolids with solids content of 2 percent or less, when 38-percent VSR cannot be met, VAR can be demonstrated by achieving an additional 15-percent VSR when aerobically digesting a portion of the previously digested sludge in a bench-scale digester for 30 days at 20°C.
503.32 (b)(4)	For aerobically digested sludge, the specific oxygen uptake rate (SOUR) shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total dry solids at a temperature of 20°C.
503.32 (b)(5)	Sewage sludge shall be treated in an aerobic process for 14 days or longer at a temperature higher than 40°C, with an average temperature higher than 45°C.
503.32 (b)(6)	The pH of sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 2 hours and then at 11.5 or higher for an additional 22 hours.
503.32 (b)(7)	The percent solids of sewage sludge that do not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 75 percent based on the moisture content and total solids before mixing with other materials.
503.32 (b)(8)	The percent solids of sewage sludge that contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90 percent based on the moisture content and total solids before mixing with other materials.
503.32 (b)(9)[1]	(i) Sewage sludge shall be injected below the surface of the land. (ii) No significant amount of the sewage sludge shall be present on the land surface within 1 hour after the sewage sludge is injected. (iii) When the sewage sludge that is injected below the surface of the land is Class A with respect to pathogens, the sewage sludge shall be injected below the land surface within 8 hours after being discharged from the pathogen treatment process.
503.32 (b)(10)[1]	(i) Sewage sludge applied to the land surface or placed on an active sewage sludge unit shall be incorporated into the soil within 6 hours after application to or placement on the land, unless otherwise specified by the permitting authority. (ii) When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within 8 hours after being discharged from the pathogen treatment process.

[1] Subsections (9) and (10) are not applicable for Class AA biosolids.

6.6.5.3 FDEP Chapter 62-296, FAC – *Stationary Sources – Emission Standards*

Chapter 62-296, FAC, includes emissions limitations for specific categories of facilities and emissions units and establishes reasonably available control technology requirements. Where work practice standards, including requirements for specific types of pollution-control equipment, are provided for in this Chapter, such standards shall be of the same force and effect as emissions-limiting standards.

This Chapter indicates that "…no person shall cause, suffer, allow or permit the discharge of air pollutants, which cause or contribute to an objectionable odor."

This regulation applies to biosolids storage and landfill odors. The regulation may also apply if incineration is considered for biosolids disposal.

6.6.5.4 Chapter 62-701, FAC – *Solid Waste Management Facilities*

Disposal of biosolids, septage, and "other solids" in a solid waste disposal facility or disposal by placement on land for purposes other than soil conditioning or fertilization, such as at a monofil, surface impoundment, waste pile, or dedicated site, shall be in accordance with Chapter 62-701, FAC. For biosolids to be disposed of in a landfill, the biosolids must be sufficiently dewatered so that no free liquids remain as defined by EPA Method 9095B (Paint Filter Liquids Test), as described in *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods* (EPA Pub. No. SW-846; 2024) in accordance with Chapter 62-701, FAC. This regulation applies to all biosolids sent to the Zemel Road Landfill.

6.6.5.5 Clean Waterways Act

In 2020, the Florida Legislature passed FS 403.0855 regarding the management of biosolids to minimize the migration of nutrients that impair water bodies. Regarding the permitting process, the law sets site-specific application conditions, inspection rates, and groundwater and surface water monitoring protocols; prohibits land application of biosolids when groundwater is within 6 inches of the ground surface; and includes provisions for nutrient management research to improve biosolids management and assist in protecting the state’s water resources and water quality.

6.6.5.6 Pending PFAS Regulations

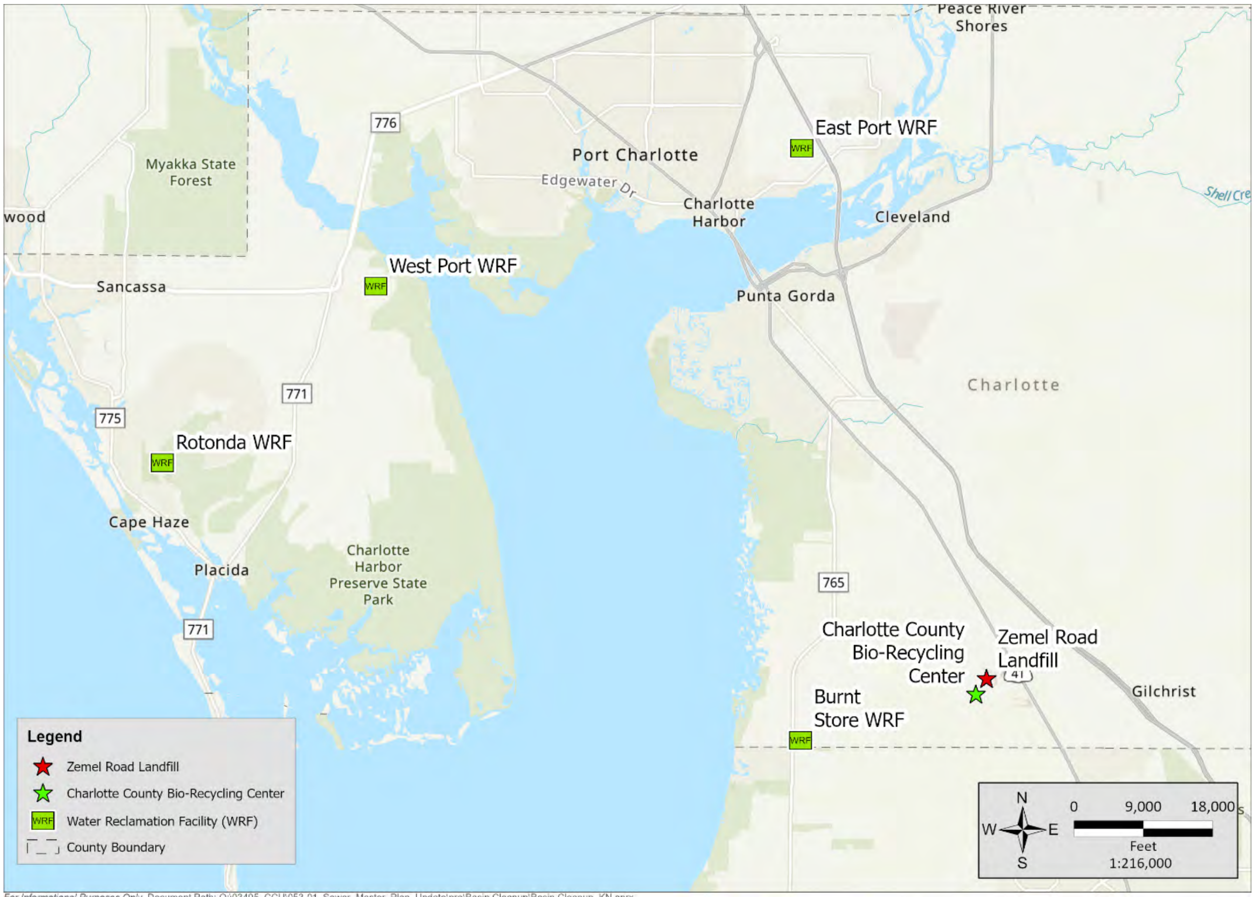
Per- and polyfluoroalkyl substances (PFAS) are widely used substances that break down slowly over time. Exposure to certain PFAS may present a substantial danger to the public health, welfare, or environment when released. On May 8, 2024, EPA published in the Federal Register the final rule designating perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), including their salts and structural isomers, as “hazardous substances” under Section 102(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The final Rule was effective July 8, 2024. In general, EPA will clean up a contaminated site and seek damages from the owner or responsible party.

Currently, utilities are not required to monitor for PFAS in their biosolids. EPA has conducted a risk assessment of PFAS in biosolids and is expected to publish the results in late 2024 or early 2025. Until regulations and limits are set for concentrations in biosolids, CCU is not expected to monitor or report concentrations in its biosolids. Furthermore, EPA released the *PFAS Enforcement Discretion and Settlement Policy Under CERCLA* memorandum stating that “EPA does not intend to pursue, based on equitable factors, PFAS response actions or costs under CERCLA against… community water systems and publicly owned treatment works.” Appendix M includes a copy of the memorandum for full-context reference.

6.6.5.7 Existing Biosolids Handling System and Storage

CCU manages biosolids from their four WRFs and the CCBRC, shown in Figure 6-32, using aerated sludge-holding tanks and on-site decant thickening. The aerated sludge-holding tanks at each facility are designed to provide sludge storage and thickening. The tanks are designed and operated to reduce sludge volume and minimize liquid hauling costs.

Figure 6-32 Charlotte County WRFs and CCBRC Locations



For Informational Purposes Only Document Path: Q:\03405_CCU\053-01_Sewer_Master_Plan_Update\pro\Basin Cleanup\Basin Cleanup_KN.aprx

Table 6-21 lists each facility's sludge-holding capacity and permitted flow and if the facility has any planned improvements.

Table 6-21 WRF Sludge-Holding Capacity and Permitted Flow

WRF	Sludge Holding Capacity (gallons)	Permitted Capacity (MGD)	Planned Improvements (yes/no)
East Port	2,000,000	6.0	Yes
West Port	800,000	1.2	Yes
Rotonda	85,000	2.0	Yes
Burnt Store	300,000	0.5	Yes

Sludge from the West Port, Rotonda, and Burnt Store WRFs is hauled to the East Port WRF for additional gravity thickening and dewatering using two BFPs. Dewatered solids are hauled from the East Port WRF to the Zemel Road Landfill where CCU has two options for disposal:

- Transfer biosolids to Synagro's CCBRC for production of Class AA compost.
- Transfer biosolids to the Zemel Road Landfill for disposal.

6.6.5.8 Charlotte County Bio-Recycling Center

The CCBRC (FDEP Domestic Wastewater Facility Permit ID No. FLA779466) is owned and operated by Synagro and produces Class AA compost for unrestricted distribution and marketing to the public. The current CCBRC operating permit expires May 16, 2032. Under a public-private partnership between Synagro and Charlotte County, Synagro leases the land for the CCBRC at the Zemel Road Landfill. An agreement between CCU and the CCBRC (Contract No. 2011000278) was executed on January 12, 2012, and has an initial term of 20 years that did not commence until January 1, 2015, when the CCBRC was fully operational. Two additional 5-year extensions to the contract are available to both parties. Therefore, CCU has an established biosolids disposal methodology contractually in place for the CCBRC until January 1, 2045.

The agreement between Charlotte County and the CCBRC establishes the contract rate that CCU pays to the CCBRC per wet ton of biosolids. The current contract rate is $18.00 per wet ton adjusted annually by the Consumer Price Index (CPI) beginning in Contract Year 11 or 2026. To project future contract rates, Jones Edmunds reviewed historical CPI data. Over the last 10 years, the annual percentage increase in the CPI has averaged 2.74 percent. Therefore, assuming a 3-percent annual increase in the CPI, Jones Edmunds calculated the projected biosolids disposal contract rates with CCBRC over the next 20 years. Table 6-22 presents these rates.

Table 6-22 Projected Biosolids Contract Rates with CCBRC

Year	Contract Disposal Rate (per dry ton)[1]
Current	$18.00
2026	$18.54
2030	$20.87
2035	$24.19
2040	$28.04
2045	$32.51

[1] Assumes 3-percent annual increase in CPI.

The contract rate for CCU applies only to the first 10,000 wet tons per contract year. If CCU delivers more than 10,000 wet tons within any year, the volume exceeding 10,000 wet tons will be accepted and processed by the CCBRC at a per-wet-ton rate equivalent to the then-current average “gate rate” (tipping fee) charged by CCBRC for receipt of biosolids from entities other than CCU. Jones Edmunds was not able to obtain information on the average tipping fee that the CCBRC charges to other entities; however, we confirmed that the City of Venice currently pays $72.54 per dry ton. This rate is significantly higher than the current or future projected contract rate that CCU pays or will pay to dispose of biosolids at CCBRC. Furthermore, the average tipping fee paid by other entities is likely to increase at a rate similar to or greater than CCU’s contract rate.

For planning purposes, CCU would be prudent to consider its long-term commitment with CCBRC. The CCBRC operating permit allows the CCBRC to process up to 11,000 dry tons per year of biosolids. At an average solids content of 18 percent for biosolids, this equates to roughly 61,100 wet tons per year. These values are far greater than the biosolids generated by CCU. However, CCU is not the only facility using the CCBRC for biosolids disposal. When the CCBRC was first permitted, CCU was the only facility identified as contributing biosolids to the CCBRC facility, but the permit allows CCBRC to accept biosolids from other entities. However, the agreement between Chalotte County and the CCBRC establishes that the CCBRC has a processing obligation to the County. Specifically, CCBRC agrees to process all County biosolids that are provided to the CCBRC during the term of the agreement. Currently, the CCBRC has agreements to accept biosolids from 22 other biosolids generators throughout southwest Florida. Based upon operational data for 2017 to 2022 submitted by CCBRC to FDEP, CCU represented only 20 percent of the overall volume of biosolids delivered to the CCBRC.

6.6.5.9 Zemel Road Class I Municipal Landfill

The Zemel Road Landfill (FDEP Permit No. 77017-008-SO/01) is a Class I landfill owned and operated by Charlotte County. The landfill footprint is 108 acres, and the landfill is estimated to have 22 years of remaining use. A 194.25-acre expansion is being considered for future intake of waste materials. Relative to the biosolids hauled from the East Port WRF, the landfill serves two purposes:

- Receive dewatered biosolids for disposal in accordance with Chapter 62-701, FAC.
- Receive composted biosolids from CCBRC that do not meet pathogen and/or VAR requirements as part of CCBRC's contingency plan.

The current tipping fee for disposal of waste at the landfill is $39.28 per ton. This is more than double the cost that CCU currently pays to dispose of biosolids at CCBRC.

7 CAPITAL IMPROVEMENT PROJECTS

OVERVIEW

This chapter summarizes project recommendations to be considered by CCU for Charlotte County's CMP and CIP based on discussions throughout this report. The CIP includes project planning for the next 20 years. Charlotte County's CIP includes the Capital Improvement Program, which covers the first 6 years, and the Capital Needs Assessment (CNA), which covers years 7 to 20. The recommendations included herein are organized in 5-year increments to inform timing and provide flexibility with each improvement. The projects are intended to align with the County's CIP and CNA, with the general understanding that CCU has completed most of the planning for the projects to be budgeted and completed within the 6-year CIP window.

7.1 Capital Maintenance Programs

CMPs are important planning mechanisms for budgeting and implementing O&M strategies. O&M is an essential component for utilities in meeting the expected life of assets and equipment; therefore, preventive maintenance is critical. Utilities that implement successful O&M strategies typically experience an overall reduction in R&R costs. The recommendations were developed to enhance CCU operations to meet industry best management practices and to comply with local ordinances and regulations. The following CMPs should be considered for development or expansion and are assumed to be conducted on an annually recurring basis:

- CAP – Continue to evaluate the WWCS to identify areas with excessive I&I warranting further inspection and cleaning to define I&I sources. The County should select additional WWCS areas to evaluate each year using the decision matrix and lift station SCADA data methodology presented herein. An objective of 5 percent of the system should be evaluated annually to accomplish 25 percent every 5 years and meet regulatory requirements. The County may opt to evaluate internally or outsource the effort. This CMP budgets for CCU to outsource continuation of the program.
- Collection System Cleaning and Inspection – The CAP evaluated 7 percent of the WWCS from a high level, meeting the criteria of 5 percent per year for the new FDEP regulation and outlining a roadmap for CCU to continue to meet the regulation moving forward. However, the program identified specific areas that warrant further field investigation and remedial actions to restore system capacity. According to the initial results of the CAP, field inspection of LS-9, LS-15, and LS-16 should be completed first. This CMP budgets for CCU to outsource field inspection, including pipe cleaning and CCTV, at a rate of approximately 5-percent annually (20 miles of gravity pipe and associated

manholes per year). Alternatively, CCU could hire additional staff and use internal resources to complete these efforts.

- Collection System Relining and Repair – As a result of WWCS cleaning and inspection, the County may deem it necessary to initiate relining, repairing, and/or replacing a portion of the inspected gravity pipe. This CMP allows CCU to budget a portion of funds for relining or repair resulting from the field inspections and is based on an assumed pipe diameter; therefore, actual costs may vary. Full-pipe replacement is expected to be funded as a new CIP project and is not budgeted under this CMP.

7.2 CIP PROJECTS

CIP projects can be differentiated from CMP projects in that CIP projects typically involve new construction that increases the overall value of the system. The CIP projects were presented in the recommendations from earlier chapters and include projects to address potential deficiencies identified for the sewer collection and transmission systems in Mid County, West County, and South County.

The CIP projects outlined herein are associated with improving the performance of the sewer collection and transmission system and are significantly impacted by growth patterns and S2S conversion projects. Therefore, CCU should review and evaluate the recommendations to determine the timing and need for each improvement.

Each CIP project has been given an identifier that indicates the suggested priority order for CCU to implement each project (1 = highest priority, 19 = lowest priority), the area of the project (M = Mid County, W = West County, S = South County), and the type of project (FM = Force Main, LS = Lift Station, MLS = Master Lift Station). For example, CIP project 1-M-LS refers to the highest-priority project, which is in Mid County and pertains to a lift station. This information is intended to provide CCU with a general order of operations and timeframe to evaluate and/or implement each CIP recommendation. The priority of the S2S project areas should be evaluated as part of the engineering design for each area. The project priorities beyond the 6-year CIP window are subject to change and should be re-evaluated as part of the next SMP update.

7.3 OVERALL IMPROVEMENT PLAN

Table 7-1 and Table 7-2 summarize project recommendations and associated project cost for the near-term (6-year CIP; 2024–2030), 2030, 2035, and 2040 (5-year CIPs) improvement periods. Table 7-1 shows project cost in present dollars, and Table 7-2 shows project costs in future dollars, assuming an annual price index increase of 3-percent per year. Refer to Section 4.6 and 8.2 for additional information on sewer system project costs. Each S2S project has a 25-percent construction contingency, and a 10-percent professional design fee is included in the cost estimate.

The funding plans provide the required amounts needed to fund the projects outlined in each 5-year plan before planning and construction for the project can commence. This is designed to provide CCU with general timing recommendations for planning and budgeting but also allows practical flexibility for the County to re-evaluate projects based on funding and need for each project.

Figure 7-1 displays the County-wide CIP location map including the size and route of the recommended pipeline and lift station upgrades based on hydraulic modeling and S2S project implementation. Figure 7-2 displays the phasing for each improvement for the near-term and longer-term improvement periods. Phasing for the projects may be accelerated or deferred as required to account for changes in development schedules, availability of land or right-of-way for construction, and other external considerations. Appendix I includes additional details for each study, CMP, and CIP project.

Table 7-1 Capital Maintenance and Improvement Projects – Present Dollars

Project Type and Projects	Present-2030	2031-2035	2036-2040	2041-2045	Total
CMP - Annually Recurring	$3,250,000	$3,250,000	$3,250,000	$3,250,000	$13,000,000
Capacity Analysis Program	$50,000 per year ($250k total)	$50,000 per year ($250k total)	$50,000 per year ($250k total)	$50,000 per year ($250k total)	$1,000,000
Collection System Cleaning and Inspection	$250,000 per year ($1.25M total)	$250,000 per year ($1.25M total)	$250,000 per year ($1.25M total)	$250,000 per year ($1.25M total)	$5,000,000
Collection System Repair/Relining Program	$350,000 per year ($1.75M total)	$350,000 per year ($1.75M total)	$350,000 per year ($1.75M total)	$350,000 per year ($1.75M total)	$7,000,000
Reports/Studies	**$200,000**				**$200,000**
Odor Control and Corrosion Study	$200,000				$200,000
Facilities	**$1,250,000**	**$630,000**	**$1,080,000**	**$20,900,000**	**$23,860,000**
5-M-LS – Judd Lift Station SCADA Installation	$50,000				$50,000
1-M-LS - Woodbury Pump Station Upgrade	$1,200,000				$1,200,000
9-S-LS – Prada Pump Station Upgrade		$630,000			$630,000
10-W-LS – Placida Bay Pump Station Upgrade			$630,000		$630,000
11-W-LS – Silage Pump Station Upgrade			$450,000		$450,000
18-M-LS – Aswan Way Pump Station Upgrade				$900,000	$900,000
19-M-MLS – Peachland Boulevard Master Lift Station				$20,000,000	$20,000,000
Pipeline	**$27,590,000**	**$60,000**	**$0**	**$6,810,000**	**$34,460,000**
2-M-FM – 8,100 LF of 16-inch and 3,100 LF of 24-inch FM from Altoona (LS-137) to Wawa (LS-93).	$6,300,000				$6,300,000
3-M-FM – 16,030 LF of 20-inch FM along Cochran, Lake View, and Toledo Blade Blvd from El Jobean Road to Midway Blvd.	$9,620,000				$9,620,000
4-W-FM – 500 LF of 12-inch FM from Rotonda Blvd West (LS-816) to Boundary Blvd.	$200,000				$200,000
6-W-FM – 45 LF of 8-inch FM from White Marsh-Boundary #1 (LS-852) discharge pipe.		$20,000			$20,000
7-W-FM – 200 LF of 6-inch FM from Landings (LS-868) to SR-776.		$40,000			$40,000
8-M-FM – 4,250 LF of 12-inch FM along Toledo Blade Blvd from Tamiami Trail to El Jobean Road.	$1,700,000				$1,700,000
12a-W-FM – 2,500 LF of 16-inch FM and 11,500 LF of 20-inch FM along SR-776 from SR-771 to Oceanspray Blvd.	$8,150,000				$8,150,000
12b-W-FM – 5,390 LF of 8-inch FM along SR-776 from Sunnybrook Blvd to Spinnaker Blvd.	$1,620,000				$1,620,000
13-W-FM – 1,160 LF of 8-inch FM from Long Meadow Road to Parade Circle.				$350,000	$350,000
14-W-FM – 2,030 LF of 16-inch FM from Field (LS-801) to Rotonda WRF.				$1,020,000	$1,020,000
15-M-FM – 1,250 LF of 16-inch FM along the east side of Franz Ross Park to Quesada (LS-37).				$630,000	$630,000
16-M-FM – 4,770 LF of 16-inch FM along El Jobean Road from Centennial Blvd to Toledo Blade Blvd.				$2,390,000	$2,390,000
17-M-FM – 4,830 LF of 16-inch FM from Tamiami Trail to South Port (LS-65)				$2,420,000	$2,420,000
Septic-to-Sewer Conversions	**$129,400,000**	**$174,800,000**	**$219,100,000**	**$351,900,000**	**$875,200,000**
Lake View - Midway Project Areas	**$129,400,000**				**$129,400,000**
M61 – Seacrest	$22,700,000				$22,700,000
M62 – Hurtig	$22,300,000				$22,300,000
M63 – Beaumont	$19,900,000				$19,900,000
M64 – Abhenry	$9,300,000				$9,300,000
M67 – Crestview Circle	$3,400,000				$3,400,000
M68 – Lake View Corridor	$24,500,000				$24,500,000
M69 – Seabold	$18,400,000				$18,400,000
M70 – Ellicott Circle	$8,900,000				$8,900,000

Project Type and Projects	Present-2030	2031-2035	2036-2040	2041-2045	Total
Little Alligator Basin Phase 1 Project Areas		**$117,900,000**			**$117,900,000**
M47 – Cedarwood		$31,000,000			$31,000,000
M51 – Windswept		$13,900,000			$13,900,000
M52 – Auburn		$21,900,000			$21,900,000
M59 – Cannolot		$29,500,000			$29,500,000
M60 – Placid		$21,600,000			$21,600,000
Little Alligator Basin Phase 2 Project Areas		**$56,900,000**			**$56,900,000**
M78 – Nimwod		$28,500,000			$28,500,000
M79 – Blaine		$28,400,000			$28,400,000
M80 – Yorkshire Phase II			$14,600,000		$14,600,000
M81 – Yorkshire Phase I			$23,300,000		$23,300,000
M82 – Danley			$10,200,000		$10,200,000
M83 – Hayworth			$15,100,000		$15,100,000
M84 – Kensington			$17,900,000		$17,900,000
M86 – Birchcrest Phase I			$18,600,000		$18,600,000
W17 – Gunther			$31,500,000		$31,500,000
W18a – Ebro			$22,000,000		$22,000,000
W18b – Seabrook			$21,700,000		$21,700,000
W20a – Del Ray Phase I			$10,400,000		$10,400,000
W20b – Del Ray Phase II			$26,500,000		$26,500,000
W3 – Cape Haze			$7,300,000		$7,300,000
M85 – Snowden				$13,000,000	$13,000,000
M87 – Birchcrest Phase II				$21,900,000	$21,900,000
M89 – Fitzsimmons				$16,600,000	$16,600,000
M90 – Presque Lake				$22,900,000	$22,900,000
M91 – State				$28,100,000	$28,100,000
M92 – Laika				$26,900,000	$26,900,000
M93 – Tandy				$8,900,000	$8,900,000
M94 – Ruby				$15,900,000	$15,900,000
M113 – Dover				$30,300,000	$30,300,000
M114 – S. Whidden Bay				$29,400,000	$29,400,000
W19a – Carnegie				$24,900,000	$24,900,000
W19b – Peacock				$16,800,000	$16,800,000
W33b – Dayton Pond				$29,800,000	$29,800,000
W34a – Venus				$31,300,000	$31,300,000
W34b – Ulysses				$35,200,000	$35,200,000
Total (without Septic-to-Sewer Conversions)	**$32,290,000**	**$3,940,000**	**$4,330,000**	**$30,960,000**	**$71,520,000**
Total (Septic-to-Sewer Conversions)	**$129,400,000**	**$174,800,000**	**$219,100,000**	**$351,900,000**	**$875,200,000**
Grand Total	**$161,690,000**	**$178,740,000**	**$223,430,000**	**$382,860,000**	**$946,720,000**

Note: The values shown above have been rounded.

Table 7-2 Capital Maintenance and Improvement Projects – Future Dollars (Applies Beyond 2030)

Project Type and Projects	Present-2030	2031-2035	2036-2040	2041-2045	Total
CMP - Annually Recurring	**$3,250,000**	**$4,475,000**	**$5,150,000**	**$5,950,000**	**$18,825,000**
Capacity Analysis Program	$50,000 per year ($250k total)	$70,000 per year ($350k total)	$80,000 per year ($400k total)	$90,000 per year ($450k total)	$1,450,000
Collection System Cleaning and Inspection	$250,000 per year ($1.25M total)	$350,000 per year ($1.75M total)	$400,000 per year ($2M total)	$450,000 per year ($2.25M total)	$7,250,000
Collection System Repair/Relining Program	$350,000 per year ($1.75M total)	$475,000 per year ($2.4M total)	$550,000 per year ($2.75M total)	$650,000 per year ($3.25M total)	$10,125,000
Reports/Studies	**$200,000**				**$200,000**
Odor Control and Corrosion Study	$200,000				$200,000
Facilities	**$1,250,000**	**$850,000**	**$0**	**$37,760,000**	**$41,156,000**
5-M-LS – Judd Lift Station SCADA Installation	$50,000				$50,000
1-M-LS - Woodbury Pump Station Upgrade.	$1,200,000				$1,200,000
9-S-LS - Prada Pump Station Upgrade.		$850,000			$850,000
10-W-LS - Placida Bay Pump Station Upgrade.			$990,000		$990,000
11-W-LS - Silage Pump Station Upgrade.			$710,000		$710,000
18-M-LS - Aswan Way Pump Station Upgrade.				$1,630,000	$1,630,000
19-M-MLS - Peachland Boulevard Master Lift Station.				$36,130,000	$36,130,000
Pipeline	**$27,590,000**	**$90,000**	**$0**	**$12,330,000**	**$40,010,000**
2-M-FM – 8,100 LF of 16-inch and 3,100 LF of 24-inch FM from Altoona (LS-137) to Wawa (LS-93).	$6,300,000				$6,300,000
3-M-FM – 16,030 LF of 20-inch FM along Cochran, Lake View, and Toledo Blade Blvd from El Jobean Road to Midway Blvd.	$9,620,000				$9,620,000
4-W-FM – 500 LF of 12-inch FM from Rotonda Blvd West (LS-816) to Boundary Blvd.	$200,000				$200,000
6-W-FM – 45 LF of 8-inch FM from White Marsh-Boundary #1 (LS-852) discharge pipe.		$30,000			$30,000
7-W-FM – 200 LF of 6-inch FM from Landings (LS-868) to SR-776.		$60,000			$60,000
8-M-FM – 4,250 LF of 12-inch FM along Toledo Blade Blvd from Tamiami Trail to El Jobean Road	$1,700,000				$1,700,000
12a-W-FM – 2,500 LF of 16-inch FM and 11,500 LF of 20-inch FM along SR-776 from SR-771 to Oceanspray Blvd.	$8,150,000				$8,150,000
12b-W-FM – 5,390 LF of 8-inch FM along SR-776 from Sunnybrook Blvd to Spinnaker Blvd.	$1,620,000				$1,620,000
13-W-FM – 1,160 LF of 8-inch FM from Long Meadow Road to Parade Circle.				$640,000	$640,000
14-W-FM – 2,030 LF of 16-inch FM from Field (LS-801) to Rotonda WRF.				$1,850,000	$1,850,000
15-M-FM – 1,250 LF of 16-inch FM along the east side of Franz Ross Park to Quesada (LS-37).				$1,140,000	$1,140,000
16-M-FM – 4,770 LF of 16-inch FM along El Jobean Road from Centennial Blvd to Toledo Blade Blvd.				$4,320,000	$4,320,000
17-M-FM – 4,830 LF of 16-inch FM from Tamiami Trail to South Port (LS-65).				$4,380,000	$4,380,000
Septic-to-Sewer Conversions	**$129,400,000**	**$235,300,000**	**$341,900,000**	**$636,200,000**	**$1,342,800,000**
Lake View - Midway Project Areas	**$129,400,000**				**$129,400,000**
M61 – Seacrest	$22,700,000				$22,700,000
M62 – Hurtig	$22,300,000				$22,300,000
M63 – Beaumont	$19,900,000				$19,900,000
M64 – Abhenry	$9,300,000				$9,300,000
M67 – Crestview Circle	$3,400,000				$3,400,000
M68 – Lake View Corridor	$24,500,000				$24,500,000
M69 – Seabold	$18,400,000				$18,400,000
M70 – Ellicott Circle	$8,900,000				$8,900,000

Project Type and Projects	Present-2030	2031-2035	2036-2040	2041-2045	Total
Little Alligator Basin Phase 1 Project Areas		**$158,700,000**			**$158,700,000**
M47 – Cedarwood		$41,700,000			$41,700,000
M51 – Windswept		$18,700,000			$18,700,000
M52 – Auburn		$29,500,000			$29,500,000
M59 – Cannolot		$39,700,000			$39,700,000
M60 – Placid		$29,100,000			$29,100,000
Little Alligator Basin Phase 2 Project Areas		**$76,600,000**			**$76,600,000**
M78 – Nimwod		$38,400,000			$38,400,000
M79 – Blaine		$38,200,000			$38,200,000
M80 – Yorkshire Phase II			$22,800,000		$22,800,000
M81 – Yorkshire Phase I			$36,400,000		$36,400,000
M82 – Danley			$15,900,000		$15,900,000
M83 – Hayworth			$23,600,000		$23,600,000
M84 – Kensington			$27,900,000		$27,900,000
M86 – Birchcrest Phase I			$29,000,000		$29,000,000
W17 – Gunther			$49,100,000		$49,100,000
W18a – Ebro			$34,300,000		$34,300,000
W18b – Seabrook			$33,900,000		$33,900,000
W20a – Del Ray Phase I			$16,300,000		$16,300,000
W20b – Del Ray Phase II			$41,300,000		$41,300,000
W3 – Cape Haze			$11,400,000		$11,400,000
M85 – Snowden				$23,500,000	$23,500,000
M87 – Birchcrest Phase II				$39,600,000	$39,600,000
M89 – Fitzsimmons				$30,000,000	$30,000,000
M90 – Presque Lake				$41,400,000	$41,400,000
M91 – State				$50,800,000	$50,800,000
M92 – Laika				$48,600,000	$48,600,000
M93 – Tandy				$16,100,000	$16,100,000
M94 – Ruby				$28,800,000	$28,800,000
M113 – Dover				$54,800,000	$54,800,000
M114 – S. Whidden Bay				$53,100,000	$53,100,000
W19a – Carnegie				$45,000,000	$45,000,000
W19b – Peacock				$30,400,000	$30,400,000
W33b – Dayton Pond				$53,900,000	$53,900,000
W34a – Venus				$56,600,000	$56,600,000
W34b – Ulysses				$63,600,000	$63,600,000
Total (without Septic-to-Sewer Conversions)	**$32,290,000**	**$5,415,000**	**$6,850,000**	**$56,040,000**	**$100,600,000**
Total (Septic-to-Sewer Conversions)	**$129,400,000**	**$235,300,000**	**$341,900,000**	**$636,200,000**	**$1,342,800,000**
Grand Total	**$161,690,000**	**$240,715,000**	**$348,750,000**	**$692,240,000**	**$1,443,400,000**

Note: The values shown above have been rounded.

Figure 7-1 Capital Improvement Project Map

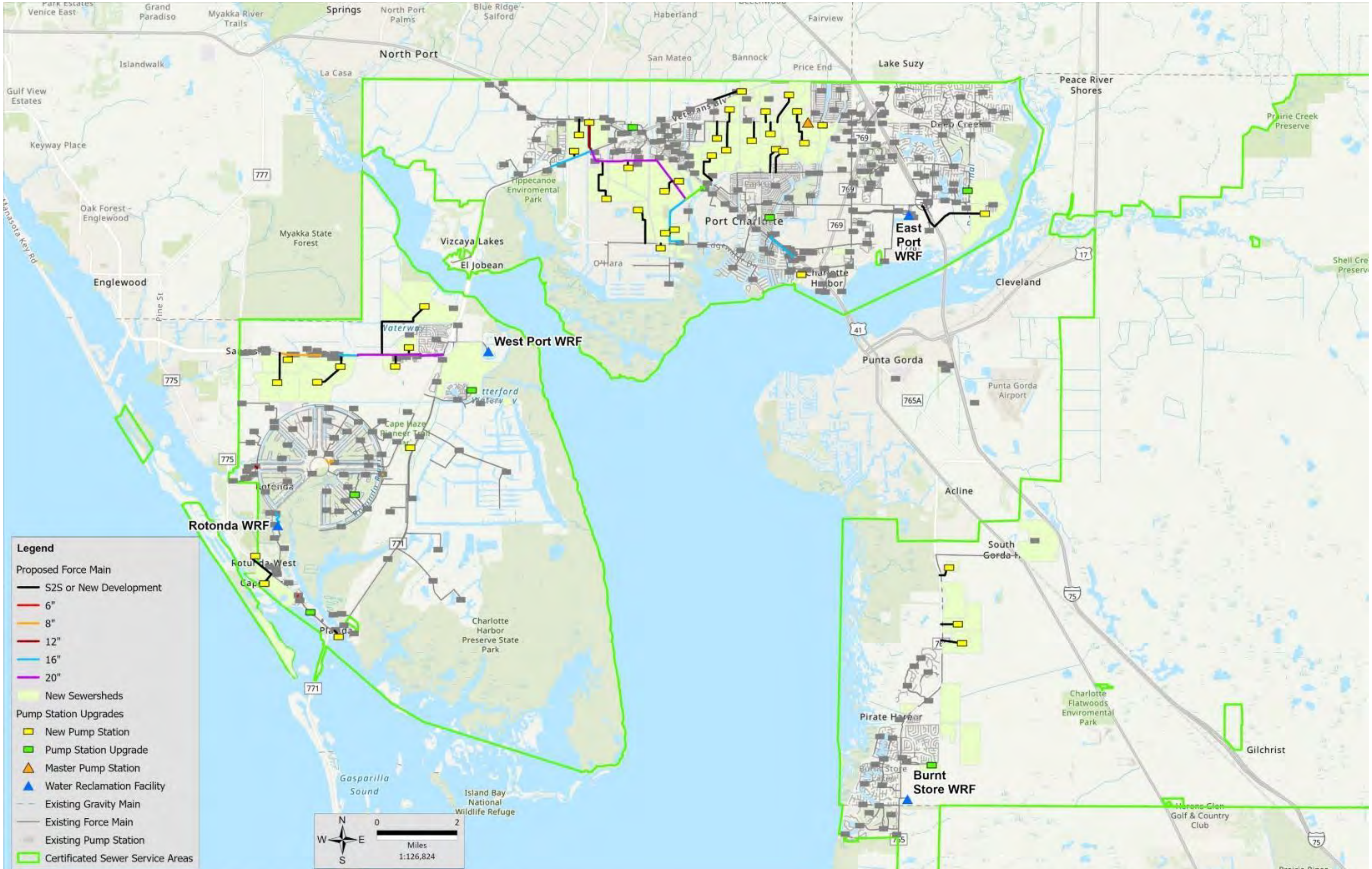


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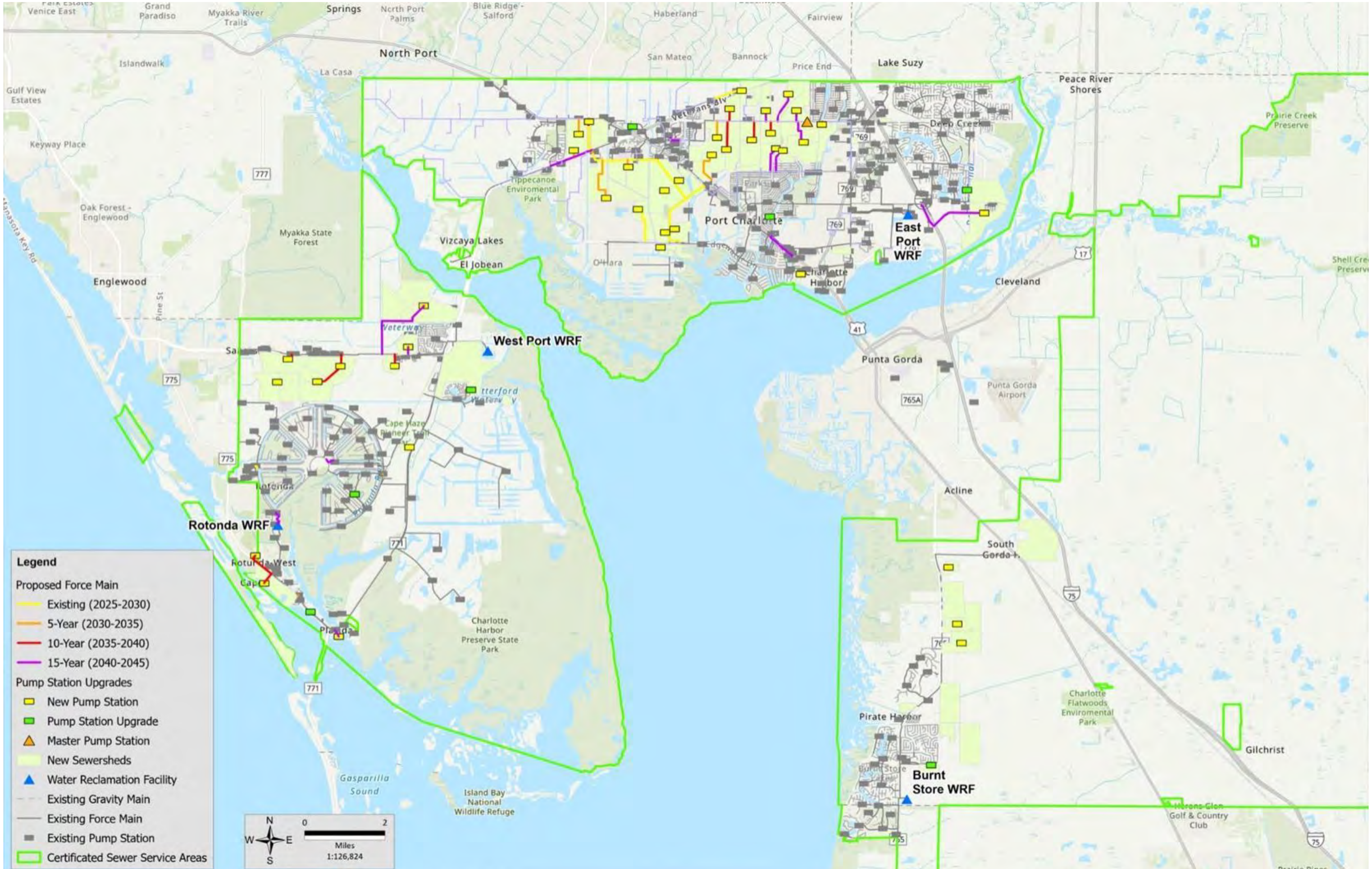
Figure 7-2 Capital Improvement Project Phasing



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Note: Each project's proposed construction year is subject to change based on CCU's preference with future evaluations.

8 FINANCING AND FUNDING OPTIONS

OVERVIEW

One objective of the SMP is to develop an affordable and realistic funding strategy that apportions just, equitable, and affordable costs to property owners while not having an adverse effect on existing CCU ratepayers. This chapter develops a funding plan and roadmap based on the County's service area characteristics. The constraints of this goal include uncertainty of outside funding sources, construction cost schedules, and public acceptance.

8.1 AFFORDABILITY

The water industry has made various attempts to define the concept of affordability. The industry literature generally links water and sewer bills to median household income (MHI) statistics. Although this is an imperfect method, it provides a framework from which to begin judging the cost of providing water and sewer service. When discussing affordability, other factors to be considered are income, property value, local cost of living, and economic conditions.

The industry literature on affordability typically views water and sewer bills as a percentage of local MHI statistics. This methodology standardizes affordability comparisons across regions and gauges a utility's "all-in" costs to ratepayers. The all-in utility payments described herein include monthly water and sewer service bills, property assessments, and other methods used to collect utility revenues. For water and sewer services, the benchmark for affordability has historically been set at 4.5 percent of MHI (EPA, 2024). Due to the relatively higher treatment and disposal costs of wastewater compared to the acquisition and treatment of potable water, 2.5 percent of the total 4.5 percent affordability allowance has been allocated to the sewer portion of CCU costs. This is the standard benchmark for affordability used by the US Rural Development Agency and EPA for their grant and loan assistance programs. Under this methodology, CCU would begin with an MHI in Charlotte County of $66,154 (US Census, 2023). In dollars, 2.5 percent of the Charlotte County average MHI is equivalent to $1,654 annually, or $138 monthly.

Historical wastewater billing data were provided by CCU. The average monthly sewer bill, based on a typical wastewater service of 4,000 gallons in 2024, equates to approximately $68 per month ($808 annually). The average monthly sewer utility bill of $68 represents approximately half of the calculated $138 sewer affordability allowance. The remainder, or $70 per month, is essentially what could be applied as an S2S sewer assessment.

Note that the 4.5 percent of the MHI affordability metrics (2 percent for water, 2.5 percent for sewer) were developed for the entire United States, and other states have much greater tax burdens that limit the affordability of user fees. Other factors should be considered in this affordability discussion, including:

- **Property Value:** Central sewer adds value not only to developed properties but also to undeveloped properties. In certain situations, septic tank development within neighborhoods can be limited based on proximity to potable drinking water wells on adjacent lots. These limitations inhibit the ability to construct on these lots and can essentially render them undevelopable, severely reducing the properties' values. Centralized sewers eliminate these limitations, and property values across the neighborhood are increased.
- **Septic Tank Drain Field Maintenance and Replacement:** Another consideration is the cost avoidance from owning and operating a septic tank along with alleviating risks associated with a septic tank failure. Septic tanks have a limited lifespan and can be costly to repair or replace (well above 10 percent of annual gross income), especially when put in terms of those living below the MHI level established above.
- **Environmental Implications:** Another primary factor to consider is the future environmental implications of the current number of septic tanks and the expected additional septic tanks from future infill due to lack of central sewer in many existing platted areas of Charlotte County. With a growing population and an already environmentally strained natural waterway system, the County will only be able to manage environmental impacts associated with growth and future wastewater treatment by making centralized sewers available to most of the service area.

8.2 Sewer System Costs

The following section summarizes the current value costs of constructing sewer systems under the County's 5-Year, 10-Year, and 15-Year Improvement Plans. Chapters 4 and 7 present the cost assumptions, development, and individual project area estimates.

Table 8-1 shows the cost and connection breakdown for the 5-Year, 10-Year, and 15-Year S2S Improvement Plans. The project costs are conservative costs based on the recent bid award for construction of Ackerman Zones 3, 4, and LPS. Each future S2S project area will undergo a preliminary engineering planning process where the specific needs of the project and site are evaluated to compare various collection system types, identify infrastructure needs, and determine the most economically feasibility option. Cost will vary across different projects in different areas. See Table 4-3 for the general range of costs for S2S projects based on the various collection system types. Note vacuum systems become more economically feasible once 750 or more lots can be introduced to a single vacuum pump station.

Table 8-1 5-Year, 10-Year, and 15-Year Improvement Plan Connections and Project Costs

Improvement Plan	Initial Connections	Buildout Connections	Project Costs
Near-Term/5-Year	5,310	8,171	$304,000,000
10-Year	4,005	5,965	$219,000,000
15-Year	4,597	9,464	$352,000,000
Totals	13,932	23,600	$875,000,000

Note: The connections and costs of private utilities are excluded from the 5-Year Plan. The project costs are presented in 2025 Dollars.

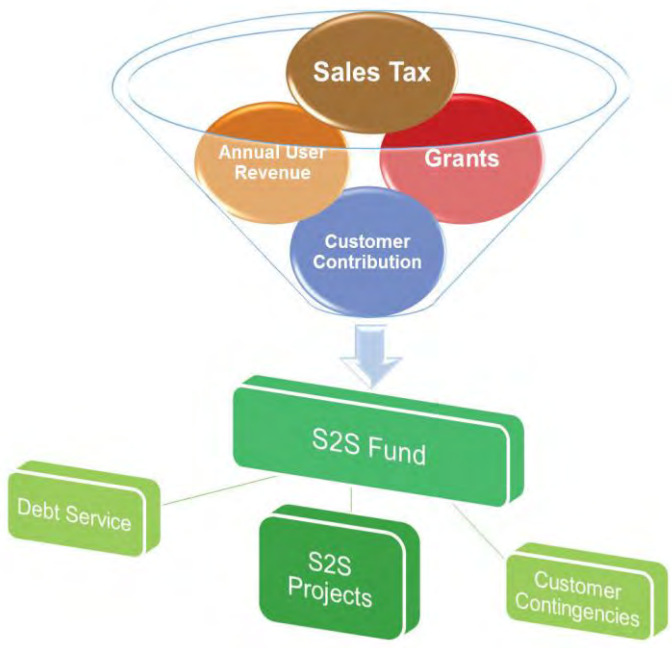
8.3 FUNDING ELEMENTS

Funding for central sewers includes two distinct elements:

- The funding of infrastructure improvements by the County/CCU and associated planning, design, and project management.
- The methods by which any borrowed funds for such infrastructure are repaid by property owners, end users, and/or other future revenue streams.

CCU is constantly exploring funding opportunities as these sources become available. The funding sources for the initial cost of projects include loans, bonds, grants, etc., and recouperation of initial costs include assessments, loan installments, rates, and taxes that support the repayment of debt obligations. This section discusses several funding sources starting with the infrastructure funding and followed by the future revenue streams to support debt repayment.

S2S Project Funding



8.3.1 State Appropriation

The State Legislature and the Governor's Office have had significant interest in the impact of septic tanks on the state's sensitive water bodies such as springs and coastal areas like Charlotte Harbor and the Indian River Lagoon. FDEP recognizes the financial magnitude of the need for S2S conversions in Florida and the support that will be required to address this issue throughout the state. With proactive lobbying efforts, Charlotte County should seek legislative appropriations to lessen the local burden of funding central sewers. For instance, Charlotte County successfully procured a legislative appropriation of $2M for the El Jobean S2S Project. The County should actively continue to pursue future legislative appropriations to aid in funding additional S2S projects, especially those within the Little Alligator Basin permit compliance area and any future established Reasonable Assurance Plan (RAP) areas (previously discussed in Chapters 1 and 4).

8.3.2 Grants

One such grant that the County is pursuing is funding from the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act; Subtitle F of Public Law 112-141). Under the Federal Water Pollution Control Act, civil penalties in connection with the Deepwater Horizon oil spill were deposited into the Gulf Coast Restoration Trust Fund. A portion of the fund was made available for programs, projects, and activities that restore and protect the environment and economy of the Gulf Coast region. These funds are managed by the Gulf Coast Ecosystem Restoration Council, which includes members from six federal agencies or departments and the five gulf coast states. The Council directs these funds to projects and programs to restore the gulf coast region, pursuant to a comprehensive plan developed by the Council. The federal and state entities that administer grants under the Act are primarily responsible for overseeing compliance with the terms of their award agreements, including administrative requirements common to federal grant programs. In addition, the Treasury Inspector General is authorized to conduct, supervise, and coordinate audits and investigations of projects, programs, and activities funded under the Act. Grant recipients under the RESTORE Act need to comply with the Federal Office of Management and Budget guidance (US Department of the Treasury, 2016; Fl-counties.com, 2017; Fl-counties.com, 2016). Another grant program, known as the FDEP Water Quality Improvement Grant Program specifically helps fund S2S projects. However, to be eligible for funding, a project must improve the quality of waters that meet one of the following criteria:

- Are not meeting nutrient or nutrient-related standards;
- Have an established total maximum daily load (TMDL); or
- Are within a Basin Management Action Plan (BMAP) area, a RAP area adopted by final order, an accepted alternative restoration plan area, or a rural area of opportunity.

Currently, none of these criteria apply to Charlotte Harbor. However, the County is actively pursuing the development of an RAP for Charlotte Harbor or an alternative restoration plan for individual waterways or drainage basins that are contributing to Charlotte Harbor. EPA regulations allow states to place certain impaired water bodies into Category 4b of the Integrated Report Categories instead of Category 5 – Impaired and needs a Total Maximum Daily Load (TMDL). The Florida Watershed Restoration Act (Section 403.067(4), FS) explicitly allows FDEP to not list impaired waters under Category 5 if they already have control programs in place that will ensure water quality standards will be restored. These types of waterbodies – impaired but with control programs already being implemented to reduce pollutant loadings – are placed in assessment Category 4b for Clean Water Act Section 303(d) reporting purposes.

Once FDEP approves an individual waterway RAP for Charlotte Harbor, the County will be eligible to apply for FDEP grant funding for S2S projects in that particular waterway basin.

8.3.3 Low-Interest Loans

FDEP administers the Clean Water SRF loan program for financing public sewer utility infrastructure projects. The SRF financing rate for clean water projects is determined using a formula that includes the Bond Buyer 20-Bond GO Index average market rate[1]. In early 2024, this rate for many communities was less than 0.67 percent, depending on census tract and other SRF affordability indices. This current level of interest is almost cost free. To the extent that the County is able to take advantage of this program, the interest costs will be significantly minimized. One drawback is that SRF loan repayment terms are typically limited to 20 years or less; however, the loan repayment does not start until 1 year after project construction completion, and there are no penalties for early payment of the load. The principal and interest payments cannot be tailored around the issuer's existing debt

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[1] FDEP. 2025. State Revolving Fund, Interest Rate Fact Sheet Accessed at: https://floridadep.gov/wra/srf/content/state-revolving-fund-resources-and-documents

The clean water SRF Financing Rate Formula is:

$$FR = MR - 4 + (4/(1+(100/AI)3)) - 1/Log(P)$$

Where: FR = Financing Rate.
MR = Market Rate.
AI = Affordability Index.
P = Population served or to be served by the sponsor.

service structure in an effort to levelized overall debt payments. SRF loan agreements also require that rates are sufficient to provide for at least 1.15-percent annual debt service coverage. Another drawback is that SRF loans require a loan service fee to be paid by the local government or entity eligible to receive the loan. The loan service fee is 2 percent of the total loan amount minus the portion of the loan for capitalized interest.

The Water Infrastructure Finance and Innovation Act of 2014 (WIFIA) established the WIFIA Program, a federal credit program administered by EPA for eligible water and wastewater infrastructure projects. WIFIA provides a subsidized loan program for water- and sewer-related infrastructure projects. By law, the WIFIA interest rate must be equal to or greater than the yield on US Treasury securities of comparable maturity on the date of execution of the credit agreement. The WIFIA Program will estimate the yield on comparable Treasury securities by adding one basis point to the Treasury Direct State and Local Government (SLGS) Daily Rate, which in early 2024 was 4.01 percent. The subsidized interest rates are based on a similar maturing treasury bond. Based on recent treasury rates, a 30-year WIFIA interest rate could be near 3.0 percent. Since the WIFIA legislation limits funding to 49 percent of the project, the remaining 51 percent would need to be derived from other loans or sources.

One benefit of WIFIA is that the repayment structure can be tailored to suit the specific project needs and other obligations, unlike SRF loans that typically have fixed 20-year debt service terms. The County should consider the WIFIA program as a potential funding source, especially once it is eligible for FDEP grant funding under the water quality improvement Grant Program. An FDEP grant could be used as part or all of the 51-percent march required for a WIFIA loan. However, the SRF loan program appears to currently better suit the County's SMP funding needs since the interest rate is much lower than other loan options and the program is firmly established for Florida utilities. Unfortunately, a $20M annual segment cap was established for SRF loans, which is expected to exceed the County's annual borrowing requirements for this SMP.

8.3.4 Bonds

A traditional method for utilities to finance infrastructure programs is to issue revenue bonds. Public utilities typically issue tax-exempt revenue bonds that provide tax savings for investors and thus attract lower interest rates than conventional bonds that are subject to income taxes from the investor. The term revenue bond is used since the primary pledge of repayment is a revenue stream associated with the infrastructure improvements. The interest rate on revenue bonds is currently in the 3.0- to 4.5-percent range, depending on the issuer's credit rating, bond maturity structure, economic conditions, and other factors. Since this interest rate is substantially higher than SRF loans, the advantage to revenue bonds is that the repayment structure can be tailored to meet the utilities' short- and long-term needs and existing debt repayment structure. A drawback of revenues bonds is the issuance costs associated with the bonds. Management, legal, financial, consulting, and engineering fees, along with other issuance costs inherent in this type of debt, generally increase the issuer's costs. Unlike SRF loans, which are 2 percent of the total loan amount, issuance costs on revenue bonds can vary depending on the costs mentioned above.

8.3.5 Sales Tax

Pursuant to Section 212.055, FS, the governing authority in each Florida county may levy a discretionary sales surtax of 0.5 or 1 percent to fund infrastructure projects, contingent on a successful referendum. Proceeds from the discretionary sales tax may be used toward capital outlays associated with construction, reconstruction, or improvement of public facilities that have a life expectancy of 5 years or more; any related land acquisition, land improvement, and design and engineering costs; and all other professional and related costs required to bring the public facilities into service (Florida Legislature, 2016).

Charlotte County has imposed a 1-percent discretionary sales tax since 1995 with the current tax effective starting January 1, 2021, and expiring December 31, 2026. A voter referendum would be required to extend the discretionary sales tax to account for projects identified past 2026. Through discussions with County staff, an allocation of 0.50 percent of the potential future discretionary sales tax could be used toward the septic tank and central sewer program. The level of revenue associated with this allocation is approximately $10M per year and would defray the costs of central sewers to property owners.

8.3.6 Environmental Assessment

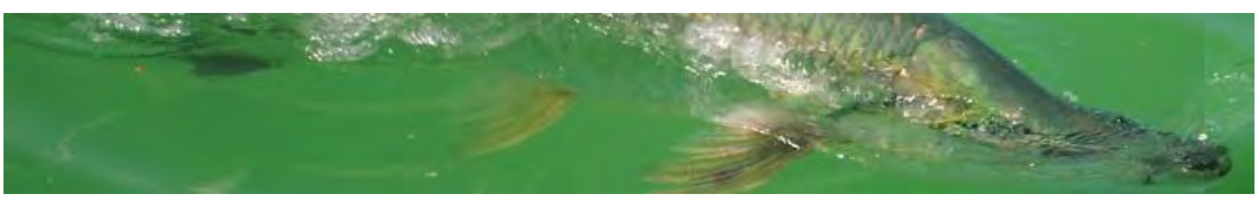
As Chapter 4 discusses, the sewer improvement program provides an environmental benefit as well as a general benefit to property owners. Revenue from an environmental assessment could be used for central sewer implementation.

Although constructing central sewer and eliminating every septic tank in the County is not practical, each property with a septic tank – or even vacant lots with no sewer availability – should help fund the central sewer improvement program. Two apparent setbacks from this approach are:

- The legality and enforcement of such a fee or assessment.
- The practical amount of revenue such a program (similar to stormwater fee) would generate for the central sewer program.

A stormwater fee or assessment is similar in that it benefits properties in ways that are not directly measured compared to a service such as metered water service. Stormwater funding has an explicit state statutory authorization pursuant to Section 403.0893, FS, but no such provision is provided for an environmental assessment or fee.

Although some overlap of water quality improvements initiated from a central sewer program and stormwater program can be debated, no known literature of a fee system combines both. If a County-wide stormwater program is pursued, opportunities may arise to link septic tank management and central sewer planning with the stormwater program. Such a program requires an inter-disciplinary study of the specific merits, which is beyond the scope of this study.



8.4 MUNICIPAL SERVICE BENEFIT UNIT (MSBU)

Through the MSBU assessment approach, Charlotte County is able to recover the cost of S2S projects. Because of the localized nature of the costs and benefits of centralized sewer installation, local governing bodies often impose special assessments (or MSBUs) on the property for the benefits provided by the project and typically collect such assessments through the annual tax bill administered through the Tax Collector's office. The procedure for imposing an MSBU in Florida is set forth in Chapter 197, FS. MSBUs imposed on a property must meet the following criteria, in addition to public hearing, notification, and other procedural matters:

- The property must receive a special benefit from the improvement(s).
- The costs of such improvements must be fairly and reasonably apportioned among all benefiting developed and undeveloped properties.

Counties typically will establish MSBUs if special assessments apply to only portions of the county area. Charlotte County has developed MSBUs for a variety of infrastructure services such as S2S projects and water and sewer improvements, streets/drainage, stormwater, and waterways.

For a typical residential property, these MSBU costs were originally determined to be $10,000 in 2011 for a 20-year term for the East/West Spring Lake S2S project. In 2017, the assessment increased to $11,500 for a 20-year term under the El Jobean and Ackerman S2S projects, equivalent to an annual assessment of $575 per year for a 20-year term. Based on recent project costs for the Ackerman S2S project, the Ackerman MSBU assessment may need to be amended. The County is currently evaluating options to address project cost gaps including consideration of a time extension for the typical 20-year MSBU term. The County's methodology for MSBU assessments has varied over the course of these S2S projects. Standardized methodology would provide a more consistent and uniform approach to establishing assessment fees. As mentioned previously, the costs of these improvements must be fairly and reasonably apportioned among all the benefiting developed and undeveloped properties.

The BCC has expressed its commitment to keeping the annual assessment for S2S projects in line with the affordability metrics discussed in Section 8.1. The BCC has consulted with experts in the design of S2S projects who have confirmed that the useful life of S2S project components is longer than 40 years; therefore, applying the assessment for up to 40 years may be a feasible solution for limiting the annual impact to property owners and keeping sewer utility costs within the affordability metrics.

The advantages to this approach are that it meets the Florida Statutes requirements and involves an established collection procedure through the local tax collector. Since taxes have the highest priority of payment relative to liens and other claims, collection of the assessment is guaranteed. The disadvantages to an MSBU assessment are the administrative costs of the program, the need to develop assessment resolutions and conduct public hearings, and managing related procedural matters. Statutory early-pay discounts of up to 4 percent to property owners are available and need to be built into the assessment calculation so that revenues adequately fund the S2S project.

8.5 Private Development Utility Extensions

Charlotte County has an established policy for private development utility extensions known as the Utility Extension Standards under Ordinance 2020-014. HB 1379 is also applicable for certain private development sewer extensions which may require them to connect to centralized sewer. Private development is required to construct their own sewer facilities at their cost. Property owner(s), per Ordinance 2020-014, will be required to execute a utility agreement that provides more specific obligations of the County and the property owner.

8.6 Funding Options for 5-Year S2S Projects

For the County to continue progressing the water quality improvement initiative through S2S conversion projects, multiple funding sources will need to be considered to achieve better economic feasibility and affordability to residents. Currently, state appropriations and grants for S2S projects are difficult for the County to receive based on the limited funding that is primarily available to areas that have established BMAPs, RAPs, or other restoration plan areas accepted by FDEP. State funding is typically the best option for funding projects because it becomes an offset to the overall project cost that does not have to be repaid. Also, funds are available at the start of projects.

Low-interest loans (such as SRF and WIFIA) and bonds are feasible options to fund S2S projects but not ideal compared to state appropriations and grants. SRF loans are an economically feasible option with minimal interest rates (1 to 2 percent) but typically require repayment in 20 years or less and are limited to an annual maximum of $20M. Also, SRF loans must be applied for on an annual basis and securing that funding is not guaranteed. Bonds are a means to secure large loans under 10-, 20-, or 30-year terms but have less-than-ideal interest rates compared to other options (3.0 to 4.5 percent).

MSBU funding is a feasible means to secure recuperation for project expenses that must be paid up-front. Therefore, other funding sources that provide capital up front are required to initiate a project.

Completing each individual waterway RAP for the nutrient-impaired waterbodies in Charlotte County will allow the County to progress S2S projects in the most economically feasible manner.

Appendix A

References

APPENDIX A
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Appendix B

Charlotte County Project Plan for Ambient Surface Water Monitoring Program

Charlotte County Project Plan

For

Ambient Surface Water Monitoring Program

Field-CCPP-001-01

06/20/2022

Table of Contents

1. Acronyms and Definitions

CCBOCC- Charlotte County Board of County Commissioners

FDEP- Florida Department of Environmental Protection

FDEP SOP 001/01- FDEP Standard Operating Procedures for Field Activities, revised January 2017

FY- Fiscal Year for Charlotte County, which spans October 1st – September 30th

MSBU- Municipal Service Business Unit

TMDL- Total Maximum Daily Load

WBID- Water Body Identification Number, as defined by FDEP

WIN- Watershed Information Network database managed by FDEP

2. Project Introduction and Organization

This document serves as a reference for Charlotte County's ambient surface water monitoring program, detailing the history, site locations, sample collection requirements, and personnel responsibilities for management and execution of this project. This project was initiated in 2022 at the direction of the Board of County Commissioners, as described in the county's 2022-2023 Strategic Plan. Funding is provided by county stormwater MSBUs. This project is currently executed by Environmental Science Associates and Janicki Environmental, and is managed by Charlotte County staff. Project organization and management is described in Tables 1 and 2 below:

Table 1: CCPP-001 Organizational Responsibility

Task	Organization
Project Management	Charlotte County Administration
Project Management	Environmental Science Associates
Project Funding	Charlotte County Stormwater MSBUs
Field Sample Collection and Documentation	Environmental Science Associates
Field Sample QA	Environmental Science Associates & Janicki Environmental
Laboratory Analysis and QAPP	Benchmark Enviroanalytical
Data Management and Reporting	Environmental Science Associates & Janicki Environmental

Table 2: CCPP-001 Funding Allocation

Funding Source[1]	Funding Amount	Confirmed Funding Duration[3]
West County MSBU	$82,000 /Fiscal Year[2]	Two years (FY2021-2022, FY2022-2023)
Middle County MSBU	FY22: $163,000 FY23: $242,000	Two years (FY2021-2022, FY2022-2023)
South County MSBU	$75,000 /Fiscal Year	Two years (FY2021-2022, FY2022-2023)

1. Note that funding provided by an MSBU must be spent on activities within the boundaries of that MSBU.
2. Charlotte County Fiscal Years are October 1st-September 30th. Surplus funds not spent during the FY are absorbed into the respective MSBU's general budget.
3. The amount of funding to be provided beyond FY2022-2023 has yet to be determined.

2.1 Project Objectives

The goal of this project is to obtain information on the condition of surface waters flowing within Charlotte County. The data collected is intended to be utilized as follows:

- Identification of long-term trends and ambient water quality conditions within:
    - waters discharging to Charlotte Harbor, Lemon Bay, and the Caloosahatchee River,
    - waters within WBIDs located in Charlotte County's boundaries, and
    - waters entering Charlotte County (where warranted/possible);
- Inform potential needs for source tracking and opportunities for water quality improvement;
- Conduct investigatory work as warranted in order to identify or clarify the origin and/or impact of in-stream conditions identified through the ambient monitoring activities of this project;
- Submission of data to FDEP WIN for the purpose of assessing Charlotte County WBIDs per 62-302, 62-303, and 62-304, F.A.C;
- Development of models that will allow for the identification and prediction of loading characteristics and trends and in Charlotte County;
- Presentation of sample results to the public in a manner that clearly describes water quality trends in relation to applicable water quality criteria.

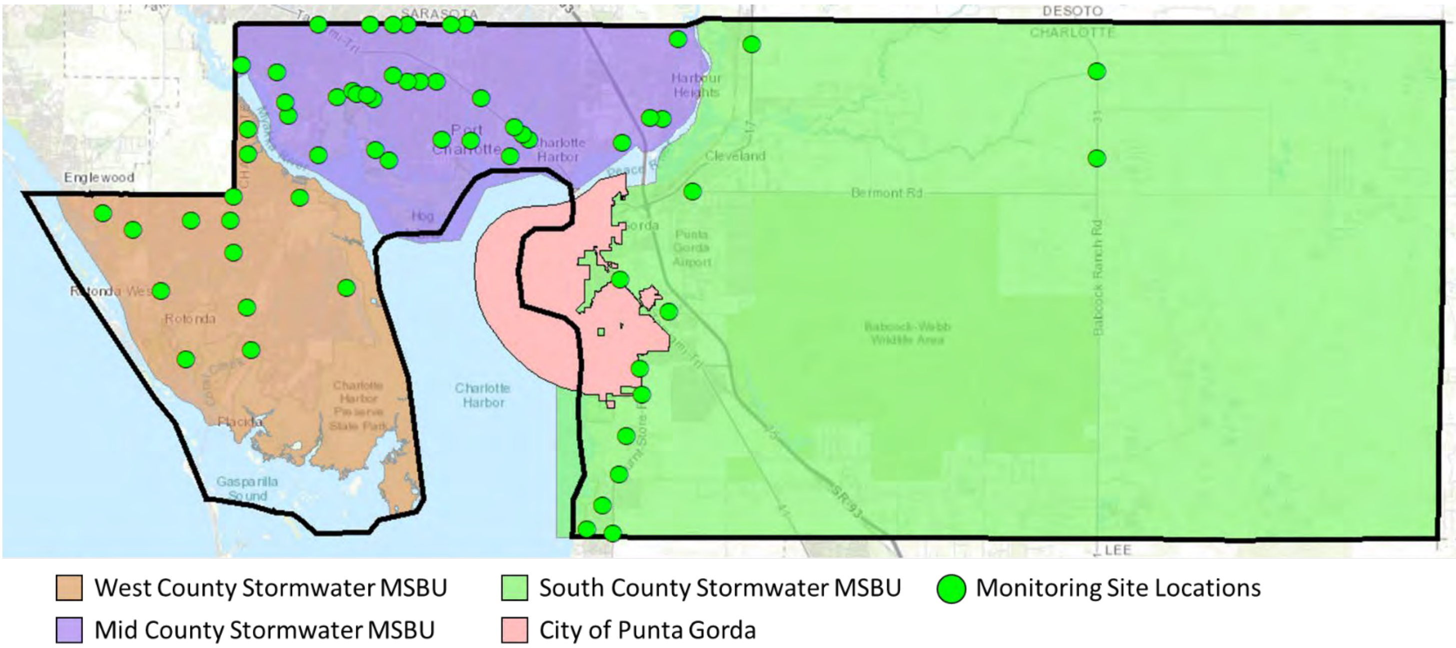
2.2 Project Duration

Monitoring for this project was initiated in June 2022, and will continue as described herein until otherwise terminated by the Charlotte County BOCC. The scope of the project may fluctuate depending on available annual funding and changes in cost for sample collection.

3.0 Geographic Location

The monitoring locations for this project are within the boundaries of the three county stormwater MSBUs; see Figure 1. Location information is described in Table 3 below. Funds provided by an MSBU must be spent on activities within the boundary of that MSBU. General Funds may be spent in any location throughout the county.

Figure 1: CCPP-001 Funding Regions and Monitoring Locations[1]



1. Punta Gorda does not currently fund monitoring under this project, nor are monitoring activities conducted within the city limits.

Table 3: Monitoring Stations and GPS Coordinates

Station ID	Station Name	Latitude[1]	Longitude	MSBU	WBID (Class)	Salinity[2]
MC1991B01	Cheshire Waterway at Eisenhower Drive	27.01204	-82.2509	Middle	1991B (2)	Marine
MC204301	Apollo and Jupiter Waterways near Windcrest Drive	27.00834	-82.2307	Middle	2043 (3M)	Marine
MC2048A01	Trib to Sam Knight Creek at El Jobean Rd	26.99575	-82.196	Middle	2048A (3M)	Marine
MC2048A02	Trib to Myakka River at El Jobean Road	26.99872	-82.1874	Middle	2048A (3M)	Marine
MC204701	Como Waterway at Ohara Dr	26.9632	-82.1667	Middle	2047 (3M)	Marine
MC204702	Trib to Myakka River near Ohara Drive	26.96873	-82.1744	Middle	2047 (3M)	Marine
MC204601	Pellam Waterway at Edgewater Drive	26.97376	-82.1362	Middle	2046 (3M)	Marine
MC2056E01	Little Alligator Creek at Edgewater Drive	26.97337	-82.1197	Middle	2056E (3M)	Marine
MC2056E02	Trib to Alligator Bay At Edgewater Drive	26.96552	-82.0968	Middle	2056E (3M)	Marine
MC2056E03	Trib to Middle Peace River Estuary at Harbor View Rd	26.97207	-82.0327	Middle	2056E (3M)	Marine

Station ID	Station Name	Latitude[1]	Longitude	MSBU	WBID (Class)	Salinity[2]
MC2056E04	Desoto Canal at Harbor View Rd	26.98457	-82.0097	Middle	2056E (3M)	Marine
MC2056E05	Deep Creek near Santos Drive	27.02523	-82.0006	Middle	2056E (3M)	Fresh[3]
MC205301	Hayward Canal near Pambar Avenue	26.9661	-82.2069	Middle	2053 (2)	Marine
MC1991A01	Tributary to Myakka at Riverwood Drive	26.98636	-82.224	Middle	1991A (2)	Marine
MC1991B02	Dickens Waterway at Riverwood Drive	26.99311	-82.2261	Middle	1991B (2)	Marine
MC2056E06	Trib to Peace River at Harbor View Rd and Rio De Janeiro Ave	26.9848	-82.0166	Middle	2056E (3M)	Marine
MC2048B01	Flamingo Waterway Near Tippecanoe Park	26.99464	-82.1754	Middle	2048B (3M)	Marine
MC2056EA01	Pompano Waterway at North Tamiami Trail	26.97368	-82.0862	Middle	2056EA (1)	Fresh[3]
MC2056EA02	Fordham Waterway at North Tamiami Trail	26.97642	-82.0896	Middle	2056EA (1)	Fresh[3]
MC2056EA03	Elkcam Waterway At North Tamiami Trail	26.98038	-82.0948	Middle	2056EA (1)	Fresh[3]
MC2056E07	Morningstar Waterway Near Lakeshore Drive	26.99498	-82.1134	Middle	2056E (3M)	Fresh[3]
MC204602	Pellam Waterway at Cochran Blvd	27.0036	-82.1394	Middle	2046 (3M)	Fresh[3]
MC204603	Courtland Waterway at Cochran Blvd	27.00362	-82.1486	Middle	2046 (3M)	Fresh[3]
MC204604	Auburn Waterway at Cochran Blvd	27.00343	-82.156	Middle	2046 (3M)	Fresh[3]
MC204703	Como Waterway at El Jobean Road	27.00695	-82.1641	Middle	2047 (3M)	Marine[4]
MC2048A03	West Pond Outfall at Charlotte Sports Park	26.99703	-82.1847	Middle	2048A (3M)	Marine[4]
MC2048B02	East Pond Outfall at Charlotte Sports Park	26.99683	-82.1792	Middle	2048B (3M)	Marine[4]
MC2056E07D	Lionheart Waterway at Hillsborough Blvd	27.03251	-82.1226	Middle	2056E	Fresh
MC2056E08D	Crestview Waterway at Hillsborough Blvd	27.03259	-82.1306	Middle	2056E	Fresh
MC204605D	Auburn Waterway at Hillsborough Blvd	27.03274	-82.1558	Middle	2046	Fresh
MC204704D	Como Waterway at Hillsborough Blvd	27.03274	-82.164	Middle	2047	Fresh
MC2048A04D	Crestwood Waterway at Hillsborough Blvd	27.03282	-82.1772	Middle	2048A	Fresh

Station ID	Station Name	Latitude[1]	Longitude	MSBU	WBID (Class)	Salinity[2]
MC204303D	Jupiter Waterway at Chancellor Blvd	27.03286	-82.2071	Middle	2043	Marine[4]
MC2056E07U	Cocoplum Canal at Lionheart Waterway	27.03293	-82.1224	Middle	2010B	Fresh
MC204605U	Cocoplum Canal at Auburn Waterway	27.03293	-82.1558	Middle	2010B	Fresh
MC2048A04U	Cocoplum Canal at Crestwood Waterway	27.03304	-82.1772	Middle	2010B	Fresh
MC204303U	Jupiter Waterway at Cocoplum Canal	27.03301	-82.2071	Middle	2010B	Fresh
SC2093A01	Hog Branch Near Comingo Lane	26.77453	-82.0532	South	2093A (3F)	Fresh
SC209401	Bear Branch at Cape Horn Road	26.78675	-82.0442	South	2094 (3F)	Fresh
SC2082A01	Pirate Canal at Burnt Store Road	26.80268	-82.0345	South	2082A (3F)	Fresh
SC208601	Trib to Charlotte Harbor at Heritage Landing Blvd	26.82261	-82.0304	South	2086 (3F)	Fresh
SC208101	Trib to Whidden Branch at Burnt Store Road	26.85667	-82.0229	South	2081 (3F)	Fresh
SC207401	Alligator Creek at Taylor Rd	26.88591	-82.0059	South	2074 (1)	Fresh
SC208102	Unnamed Canal to Charlotte Harbor at Burnt Store Road	26.84378	-82.0215	South	2081 (3F)	Fresh
SC205901	Trib to Peace River at Bermont Road	26.94718	-81.9927	South	2059 (3M)	Marine[4]
SC2093A02	Hog Branch at Burnt Store Road	26.77262	-82.0381	South	2093A (3F)	Fresh
SC206301	North Fork Alligator Creek at Tamiami Trail	26.9022	-82.0339	South	2063 (3M)	Marine
SC204001	Myrtle Slough at Babcock Ranch Road	27.0088	-81.7604	South	2040 (1)	Fresh
SC204101	Shell Creek at SR 31	26.9646	-81.7607	South	2041 (1)	Fresh
SC203501	Lee Branch at Duncan Road	27.022829	-81.95841	South	2035 (3F)	Fresh
WC1991B01	Blitman Waterway at Gillot Blvd	26.97932	-82.2472	West	1991B (2)	Marine[4]
WC1991A02	Bacchus Waterway at Gillot Blvd	26.96677	-82.2473	West	1991A (2)	Marine[4]
WC1991A03	Trib to Lafitte Waterway near Bennett Drive	26.94433	-82.2177	West	1991A (2)	Marine[4]
WC206801	Trib to Buck Creek at Boundary Blvd	26.89651	-82.2971	West	2068 (3M)	Fresh[3]
WC205201	Ainger Creek on South McCall Road	26.9362	-82.3308	West	2052 (3M)	Marine

Station ID	Station Name	Latitude[1]	Longitude	MSBU	WBID (Class)	Salinity[2]
WC206802	Eastern Inflow to Rotonda at Boundary Blvd	26.88795	-82.2478	West	2068 (3M)	Fresh
WC1991A04	Lafitte Waterway at Jennings Blvd.	26.94463	-82.2556	West	1991A (2)	Marine[3 4]
WC1991A05	Seamist Waterway at South McCall Road	26.93271	-82.2575	West	1991A (2)	Marine[4]
WC2078B01	Trib To East Branch Coral Creek at Brig Circle South	26.86617	-82.2454	West	2078B (2)	Fresh
WC206703	Oyster Creek at San Casa Drive	26.92775	-82.313	West	2067 (3M)	Marine
WC206602	Zephyr Waterway at St Paul Drive	26.89801	-82.1906	West	2066 (3M)	Marine
WC2078A01	West Branch Coral Creek Near Anne Underwood Drive	26.86171	-82.283	West	2078A (2)	Marine
WC206803	Butterford Waterway Near Ritz Street	26.91609	-82.2554	West	2068 (3M)	Marine[3 4]
WC1991A06	March Waterway at North Access Road	26.933111	-82.280530	West	1991A (2)	Marine[4]

1. Coordinates are relative to WGS84 horizontal datum.
2. Salinity designation is based on WBID Class and/or known conditions at the upstream portion of the site.
3. An elevation control structure is present at this site and/or downstream of this site, which acts as a delineator between fresh and tidal waters in this drainage area. Samples are to be collected upstream of the control structure.
4. Conditions at this location should be evaluated to verify appropriate salinity status based on average SpC values within the bottom half of the water column.

3.1 Access and Authority

Most sample locations are accessible via public right-of-way. Those that require access through private property are described in Table 4 below.

Table 4: Private Property or Restricted Access Information

Station	Ownership	Access Details
MC204301	Riverbend HOA	Access approval is valid only through June 2023; After that time, access will need to be requested for another year. 1-2 days advance notice requested.
MC1991A01	Riverwood Community Development District	No advance notice needed.

MC1991B02	Riverwood Community Association	No advance notice needed.
SC2093A01	Burnt Store Lakes POA	Samples are only collected monthly from July-October when discharging. Samples must be collected at SC2093A02 on the same day.
WC2078A01	Rotonda Owners Assn	No advance notice needed.
MC2056E05	Deep Creek POA	5 day advance notice required.
WC1991A03	Gardens of Gulf Cove	No advance notice needed.
SC208601	Heritage Landing	No advance notice needed.
MC2048B02	Charlotte County	24-48 hour notice required; access can be granted after 11:00 AM
MC2056E07U MC204605U MC2048A04U MC204303U	City of North Port	No advance notice needed, but city has requested to be kept informed on sampling schedule, parameters, and results.

4.0 Field Activities

4.1 Station Monitoring Frequencies and Sample Collection Requirements

The frequency and parameters associated with routine sample collection events under this project are provided in Table 5. Unless otherwise noted in Section 4.2, all surface water samples are collected at a depth of 0.5 meters on the upstream side of any access or control structure at the coordinates provided in Table 3. If the site depth at the time of sample collection is less than 1 meter, samples are collected at half depth. Samples are not collected if the site depth is less than 10 cm.

Samples may be collected at an alternate location if safety concerns, aquatic vegetation or other obstructions prevent collection of a representative sample within the water column. Alternate sample locations must be positioned upstream as close as possible to the established site such that the collected sample is still representative of the target water body. Alternate locations must be represent contributing tributaries that is ordinarily captured at the established site. The coordinates of the alternative location must be documented at the time of sample collection, and the project manager must be notified of that sample event as soon as is practicable.

Table 5: Sample Frequency and Parameters

<table>
<tr><th>Site(s)</th><th>Frequency</th><th>Parameters</th></tr>
<tr><td>All sites not otherwise described below</td><td>Monthly</td><td rowspan="3">Total Phosphorus
Dissolved Orthophosphate
Total Ammonia Nitrogen
Nitrate-Nitrite Nitrogen
Total Kjeldahl Nitrogen
Chlorophyll-a (corrected for pheophytin)
Total Organic Carbon
True Color
Turbidity
Total Suspended Solids
pH
DO (mg/L and % Sat)
Specific Conductance
Salinity
Temperature
Bacteria (Fecal Coliform, E. coli or Enterococci)</td></tr>
<tr><td>SC2093A01</td><td>Monthly from July-October when discharging. Samples must be collected at SC2093A02 on the same day.</td></tr>
<tr><td>MC2056E07U
MC204605U
MC2048A04U
MC204303U</td><td>Monthly when discharging</td></tr>
</table>

Table 6: Sample Analysis Information

Parameter	Laboratory	Method	MDL
AMMONIA NITROGEN	Benchmark EnviroAnalytical	USEPA 350.1	0.008 mg/L
NITRATE+NITRITE AS N	Benchmark EnviroAnalytical	STANDARD METHODS SYSTEA EASY	0.006 mg/L
NITRATE+NITRITE AS N	Benchmark EnviroAnalytical	USEPA 353.2	0.004 mg/L
TOTAL KJELDAHL NITROGEN	Benchmark EnviroAnalytical	USEPA 351.2	0.05 mg/L
TOTAL NITROGEN	Benchmark EnviroAnalytical	STANDARD METHODS SYSTEA+351	0.05 mg/L
TOTAL NITROGEN	Benchmark EnviroAnalytical	USEPA 353+351	0.05 mg/L
TOTAL PHOSPHORUS AS P	Benchmark EnviroAnalytical	USEPA 365.3	0.008 mg/L
ORTHO PHOSPHORUS AS P	Benchmark EnviroAnalytical	USEPA 365.3	0.002 mg/L

Parameter	Laboratory	Method	MDL
CHLOROPHYLL A, CORRECTED	Benchmark EnviroAnalytical	USEPA 445.0	0.25 mg/M3
TOTAL ORGANIC CARBON	Benchmark EnviroAnalytical	STANDARD METHODS SM5310B	0.271 mg/L
TOTAL SUSPENDED SOLIDS	Benchmark EnviroAnalytical	STANDARD METHODS SM2540D	0.57 mg/L
TURBIDITY	Benchmark EnviroAnalytical	USEPA 180.1	0.11 NTU
COLOR PH	Benchmark EnviroAnalytical	STANDARD METHODS SM4500H+B	
COLOR, APPARENT	Benchmark EnviroAnalytical	STANDARD METHODS SM2120B	2.5 PCU
E- COLI BY IDEXX QUANTITRAY	Benchmark EnviroAnalytical	STANDARD METHODS SM9223B	10 #/100 ML
ENTEROCOCCI	Benchmark EnviroAnalytical	ENTEROLERT	10 #/100 ML

4.2 Project and Site-Specific Sample Collection Considerations and Deviations

4.2.1 Bacteria Sample Collection Considerations

For this project, bacteria samples may adhere to a maximum hold time of 24 hours from the date/time of sample collection. The specific type of bacteria sample to be collected is determined by the salinity status associated with that site in Table 3:

- "Fresh" Sites- E. coli samples are collected.
- "Marine" Sites- Enterococci samples are collected.

The salinity status is based on the WBID Class designation associated with each site, except:

- Sites at which a water control structure serves as a boundary between freshwater flow and tidally-influenced waters. In those instances, samples are collected on the freshwater side of the structure.
- Sufficient volume of chloride and/or specific conductance data has been captured at a site indicating the WBID class designation at that site may not be correct. Data must represent the conditions of waters within the bottom half of the water column. Per 62-302, F.A.C.:
    - Predominantly fresh waters = chloride $<$ 1,500 mg/L OR SpC $<$ 4,580 µmhos/cm
    - Predominantly tidal waters = chloride $\geq$ 1,500 mg/L OR SpC $\geq$ 4,580 µmhos/cm

4.2.2 Mid County Canal Sample Collection- Sarasota County/Cocoplum

Sites located on Hillsborough Blvd (the northern border of Charlotte County) must be collected on the downstream side of the road, as MSBU funds cannot be expended on sample collection efforts in other counties (waters north of Hillsborough lie within Sarasota County). The affected sites are:

- MC2056E07D (Lionheart Waterway at Hillsborough Blvd)
- MC2056E08D (Crestview Waterway at Hillsborough Blvd)
- MC204605D (Auburn Waterway at Hillsborough Blvd)
- MC204704D (Como Waterway at Hillsborough Blvd)
- MC2048A04D (Crestwood Waterway at Hillsborough Blvd)
- MC204303D (Jupiter Waterway at Hillsborough Blvd)

Pending availability of General Funds, additional samples are collected on the upstream side of water control structures regulating discharges from the Cocoplum Waterway (Sarasota County) into the following Charlotte County canal systems:

- MC2056E07U (Lionheart Waterway at Hillsborough Blvd)
- MC204605U (Auburn Waterway at Hillsborough Blvd)
- MC2048A04U (Crestwood Waterway at Hillsborough Blvd)
- MC204303U (Jupiter Waterway at Hillsborough Blvd)

Samples are collected only during periods of discharge through the associated elevation control structures.

4.3 Field Quality Control Requirements

Blank and QC sample collection shall follow the procedures found in FDEP SOP 001/01. Blanks and duplicates are collected at the frequencies described in Table 7 below. Field-cleaned equipment blanks are collected during trips in which sampling equipment decontamination occurs in the field; otherwise, an equipment blank or field blank are collected.

Table 7: Quality Control Checks and Requirements

QC Type	Frequency (All Parameter Groups)	Sample/QC Associations	Review Element Criteria
Field Cleaned Equipment Blank (FCEB)	One per trip or 5% of all samples collected for the duration of this Project; collected during trips in which intermediate sample collection equipment is utilized and decontaminated in the field.	Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.	Acceptance Criteria = <MDL. Qualify the FCEB result if ≥ tested analyte's MDL. Qualify all sample associated results with concentrations ≤ 10 times blank value.
Field Blank (FB)	Required in lieu of FCEB when no intermediate sample collection equipment is used during a trip (samples collected directly into sample bottle). May also be collected if environmental contamination is suspected.	Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.	Acceptance Criteria = <MDL. Qualify FB result if it is ≥ tested analyte's MDL. Qualify associated sample results ≤ 10 times blank value.
Equipment Blank (EB)	When an FCEB or FB is not collected.	Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.	Acceptance Criteria = <MDL. Qualify EB result if ≥ tested analyte's MDL. Qualify associated sample(s) if the result is ≤ 10 times the blank value.

QC Type	Frequency (All Parameter Groups)	Sample/QC Associations	Review Element Criteria
Duplicate Sample (DS)	One per trip or 5% of all samples collected for the duration of this Project. Duplicates are collected by repeating the entire sample collection, processing, and equipment decontamination process.	Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.	Acceptance Criteria = <20% RPD. Qualify DS result if it is ≥ RPD. Provide feedback to the affected group and initiate troubleshooting or other corrective action.

4.4 Sample Submission

Following completion of sample collection for each day, samples are transported to the laboratory for analyses in accordance with the requirements specified in that laboratory's Quality Manual. Samples are submitted to the laboratory on the same day as collection or as soon as possible the following day. Samples are submitted in accordance to hold time requirements provided in the documentation described in Table 2, except for those analytes exempted per Section 4.2 of this document.

5.0 Data Quality Objectives (DQOs)

5.1 Data Usage

Field and laboratory analytical results and associated information must be submitted in a standardized electronic format in accordance with Rule 62-40.540, 62-160.240, and 62-160.340, F.A.C., and as described within the Watershed Information Network Minimum Data Quality Standards (WIN MDQS). All information provided in this manner must be organized and formatted per WIN's data upload requirements. Information on WIN MDQS, including example template upload files, may be obtained at http://publicfiles.dep.state.fl.us/DEAR/WIN/

5.2 Data Quality

All monitoring described herein shall meet the requirements conveyed in the FDEP's Quality Assurance Rule, 62-160 F.A.C.

Field parameter DQOs are described in the Field Quality Assurance Objectives table found in the Field Testing section of the Charlotte County FSM and FQM. The most recent version of these documents details the specific field testing DQOs at the time of sample collection.

Samples are analyzed according to the provisions within the FDEP Rule 62-160 F.A.C. and the contract laboratory quality manual. Data are qualified in accordance with the FQM and applicable laboratory quality manual. Contract laboratories must be certified through the National Environmental Laboratory Accreditation Program (NELAP) for the submitted samples' analyses.

5.3 Completeness Target

At times samples will not be able to be collected due to no flow or low water conditions, unsafe station conditions, equipment malfunction, site maintenance, tropical storms/hurricanes or other unforeseen problems that might affect sample collection and/or quality. If samples cannot be collected on an attempt, collectors shall document the reason.

The completeness target (i.e., the number of samples successfully collected and analyzed) has been set at 92% annually for this project. Sampling attempts shall be included in the completeness target.

6.0 Data and Records Management

Contract laboratory and/or field data and documentation are submitted to the County in the necessary format for transmittal to FDEP's WIN database as described in the associated contract for this project. Copies of all supplemental information, including field notes, laboratory reports, and revisions to procedural/quality manuals are also retained by the county such that a complete record of sample event conditions, results, and supporting information may be maintained for storage and review. It is the responsibility of the County to maintain both records of current and historical methodologies and operating procedures so that at any given time the conditions that were applied to a sampling event can be evaluated.

7.0 References

Florida Department of Environmental Protection Standard Operating Procedures for Field Activities, DEP-SOP-001/01, Revised January 2017

8.0 Revisions and Modifications

Revision Number	Effective Date	Section/Page	Change/Reason
01	06/20/2022	All	Initial version of Field-CCPP-001

Appendix 1: Site Identification and Naming History

The following table serves as a reference describing any changes made to IDs for sites sampled under this project.

Current Site Name	Previous Site Name (Date of Retirement)
MC1991A01	CCCS0079 (June 2022)
MC1991B01	CCCS0001 (June 2022)
MC1991B02	CCCS0082 (June 2022)
MC2010A01	CCUS0005 (June 2022)
MC2010B01	CCUS0006 (June 2022)
MC2010B02	CCUS0009 (June 2022)
MC2010B03	CCUS0010 (June 2022)
MC2010B04	CCUS0012 (June 2022)
MC204301	CCCS0006 (June 2022)
MC204302	CCUS0015 (June 2022)
MC204601	CCCS0023 (June 2022)
MC204602	CCUS0039 (June 2022)
MC204603	CCUS0040 (June 2022)
MC204604	CCUS0041 (June 2022)
MC204701	CCCS0013 (June 2022)
MC204702	CCCS0016 (June 2022)
MC204703	CCUS0042 (June 2022)
MC2048A01	CCCS0009 (June 2022)
MC2048A02	CCCS0010 (June 2022)

Current Site Name	Previous Site Name (Date of Retirement)
MC2048A03	ComServ01 (June 2022)
MC2048B01	CCUS0030 (June 2022)
MC2048B02	ComServ02 (June 2022)
MC205301	CCCS0078 (June 2022)
MC2056E01	CCCS0024 (June 2022)
MC2056E02	CCCS0028 (June 2022)
MC2056E03	CCCS0034 (June 2022)
MC2056E04	CCCS0040 (June 2022)
MC2056E05	CCCS0042 (June 2022)
MC2056E06	CCCS0083 (June 2022)
MC2056E07	CCUS0036 (June 2022)
MC2056EA01	CCUS0032 (June 2022)
MC2056EA02	CCUS0033 (June 2022)
MC2056EA03	CCUS0034 (June 2022)
SC204001	CCUS0024 (June 2022)
SC204101	CCUS0026 (June 2022)
SC205901	CCCS0096 (June 2022)
SC206301	CCUS0019 (June 2022)
SC207401	CCCS0073 (June 2022)
SC2074B01	CCCS0074 (June 2022)
SC208101	CCCS0068 (June 2022)
SC208102	CCCS0087 (June 2022)

Current Site Name	Previous Site Name (Date of Retirement)
SC2082A01	CCCS0063 (June 2022)
SC208601	CCCS0065 (June 2022)
SC2093A01	CCCS0058 (June 2022)
SC2093A02	CCCS0101 (June 2022)
SC209401	CCCS0060 (June 2022)
WC1991A01	CCCS0045 (June 2022)
WC1991A02	CCCS0046 (June 2022)
WC1991A03	CCCS0047 (June 2022)
WC1991A04	CCCS0094 (June 2022)
WC1991A05	CCCS0095 (June 2022)
WC1991A06	CCUS0046 (June 2022)
WC1991B01	CCCS0044 (June 2022)
WC205201	CCCS0052 (June 2022)
WC206602	CCCS0103 (June 2022)
WC206703	CCCS0102 (June 2022)
WC206801	CCCS0050 (June 2022)
WC206802	CCCS0092 (June 2022)
WC206803	CCUS0045 (June 2022)
WC2078A01	CCUS0027 (June 2022)
WC2078B01	CCCS0100 (June 2022)

Appendix C

Septic Systems Background and Impacts on Water Quality

APPENDIX L

SEPTIC SYSTEM BACKGROUND AND IMPACTS ON WATER QUALITY (From 2017 SMP)

PURPOSE

This appendix is excerpted from the 2017 SMP and provided as an appendix in the 2024 SMP as supplemental information.

BACKGROUND

The Charlotte Harbor area was originally explored by Ponce de Leon in 1515 and 1521. In 1565, Spanish explorers named the area Carlos Bay after the Native American Calusa Tribe who inhabited Florida's southwest coast at the time. Early settlements on the outer islands failed due to confrontations with the local inhabitants, but Spanish and English settlements slowly developed along the banks of the Peace River.

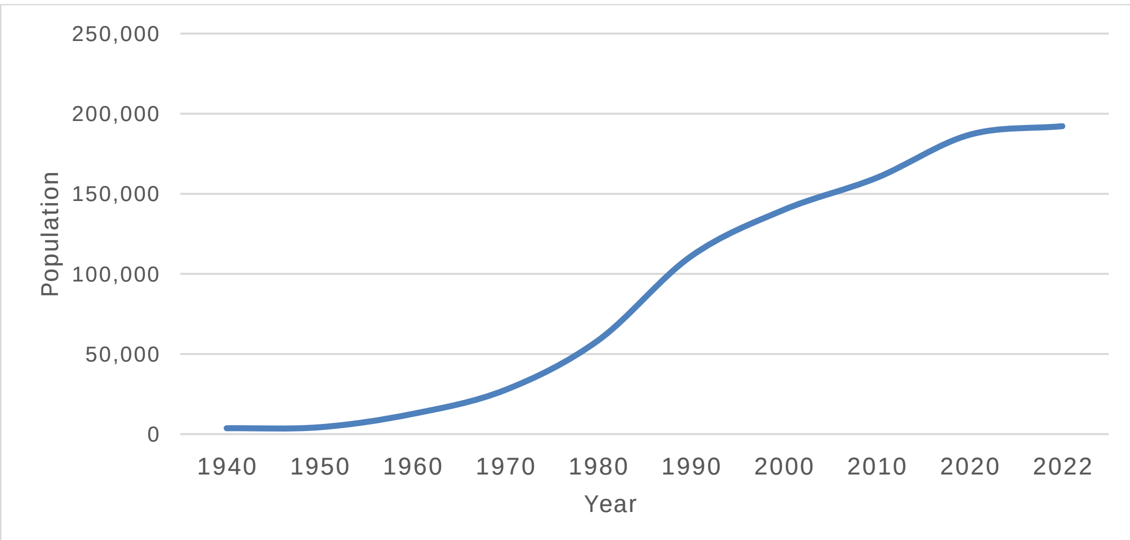
English settlers renamed the bay "Charlotte" in 1775 as a tribute to Queen Charlotte Sophia. In 1819, Florida was ceded to the United States by the Spanish and 26 years later became the 27th state. Col. Isaac Trabue purchased 30 acres on the south shore of Charlotte Harbor and established the Town of Trabue in 1885; today we know it as Punta Gorda.

Real change started to occur in 1886 when the Florida Southern Railroad arrived, connecting the area to the rest of the state. As the century ended, Punta Gorda became an important port for Cuban cattle shipments, and the harbor served as a fishing resource for mullet, Spanish mackerel, and channel bass.

In April 1921, the State approved dividing the original DeSoto County into five counties including Glades, Hardee, Highlands, and Charlotte – which was named after the bay by Punta Gorda citizens. Today, Charlotte County covers 694 square miles with approximately 126 square miles of waterways.

Growth took off after the General Development Corporation established the unincorporated community of Port Charlotte in the 1950s, offering affordable homes in Florida's paradise to the rapidly expanding middle class. Attracted by the beautiful rivers, beaches, estuaries, and resources of Charlotte Harbor, Figure 1 shows the population grew rapidly and increased from fewer than 5,000 in 1950 to over 192,000 residents today.

Figure 1 Charlotte County Population by Year



The population increase has impacted water bodies and rivers in Charlotte County. The harbor's historically pristine waters and thriving ecology are being threatened by excess nutrients, bacteria, viruses, dissolved oxygen, and toxic organic compounds; harmful algae blooms (HABs); and decreasing water clarity. The Peace and Myakka Rivers, which flow through Charlotte County and discharge into the Upper Charlotte Harbor, and Charlotte Harbor are now listed as *impaired* by the US Environmental Protection Agency (EPA) for dissolved oxygen, chlorophyll-a, bacteria in shellfish, and mercury in fish tissue.

Coastal water quality degradation is not limited to Charlotte Harbor. Numerous cities and counties along the Florida coast are experiencing eutrophication and HABs due to nutrient pollution. In 2012, the Florida Department of Environmental Protection (FDEP) adopted specific numeric nutrient criteria (NNC) to protect the State's estuaries and coastal areas from nutrient over-enrichment (Rule 62-302.532, Florida Administrative Code [FAC]). The Rule was amended in 2016.

The deteriorating water quality in Charlotte County has been largely attributed to nutrient and bacteria loads originating from on-site treatment and disposal systems (OSTDSs), more commonly referred to as septic systems (Charlotte Harbor Environmental Center, Inc. [CHEC], 2003; Tetra Tech, 2013; LaPointe, 2016).

Septic systems operate through a multi-step process that includes a septic-holding tank and a drainfield. Figure 2 depicts how wastewater from the home is collected and conveyed to the septic system through drainpipes. In the septic tank, solids settle out and the effluent flows through a series of perforated pipes that are embedded in a drainfield generally located in the yard. The effluent percolates into the drainfield and through a deep layer of soil, allowing additional treatment to occur before entering the groundwater.

All septic systems release the nutrients of nitrogen (N) (primarily in the form of ammonia [NH_{4+}]) and phosphorus (P) to the groundwater from the drainfield. In a properly operating system, nitrifying bacteria in the upper portions of the drainfield/soil convert NH_{4+} to nitrate (NO_{3-}) in the presence of oxygen (O_2) in porous soils.

As the effluent percolates deeper into the ground, another group of bacteria denitrifiers convert the NO_{3-} to nitrogen gas (N_2 gas), which escapes upward to the atmosphere. The denitrification process occurs under conditions without O_2 present.

FACTORS CONTRIBUTING TO SEPTIC FAILURE

The soil type and separation depth relative to the groundwater table play significant roles in the septic systems' treatment effectiveness. High-porosity soils found in many coastal regions of Florida are saturated due to seasonal high groundwater and are typically unsuitable for providing the necessary treatment time since the effluent travels too quickly through the soil to neutralize bacteria and pollutants in the sewage.

Figure 3 shows a Septic System with Non-Ideal Treatment. The high groundwater creates flooded soils, which reduce O_2 transfer and create low O_2 levels, leading to incomplete removal of nitrogen. Consequently, a limited amount of NH_{4+} will be nitrified to NO_{3-}, and the denitrifying bacteria will not convert the NH_{4+} to nitrogen gas, leaving the NH_{4+} to persist in the groundwater and ultimately impact surrounding surface waters.

In Florida, fill soils are often required for the septic systems to function to meet design parameters and used to increase the separation depth to seasonal high groundwater. To help protect the groundwater, the State changed the septic system requirements in 1983, increasing the requirements from a 6-inch-minimum separation distance between the bottom of the septic tank drainfield and seasonal high water table to a 2-foot-minimum. EPA recommends a minimum 5-foot separation to seasonal high groundwater. Additionally, the distance from the septic system to surface waters was increased from a 25- to 50-foot setback to a 50- to 75-foot setback (Section 62E-6.005, Florida Statutes [FS]).

The soil conditions in Charlotte County are classified as A/D, indicating high groundwater and drained conditions . Figure 4 displays the groundwater flow patterns throughout Charlotte County. In general, groundwater in Mid and South County ultimately flows into the Peace River and in east portions of West County flows into the Myakka River – all of which flow to Charlotte Harbor. Therefore, Charlotte Harbor is the final destination for nearly all septic tank effluent in the area via groundwater. In areas of high groundwater, the partially

Figure 2 Typical Septic System and Drainfield With Ideal Treatment

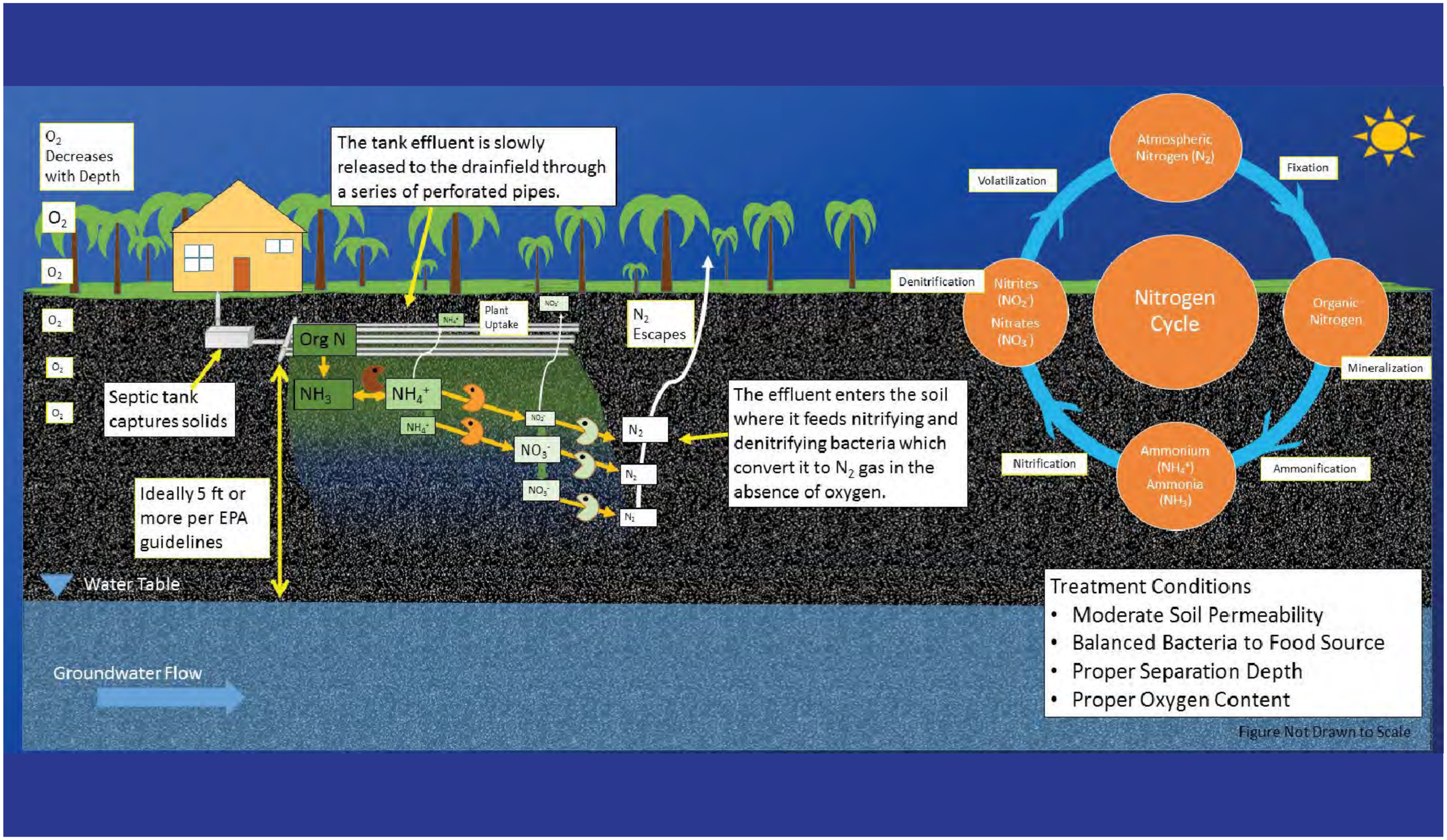


Figure 3 Typical Coastal Septic System and Drainfield with Non-Ideal Treatment

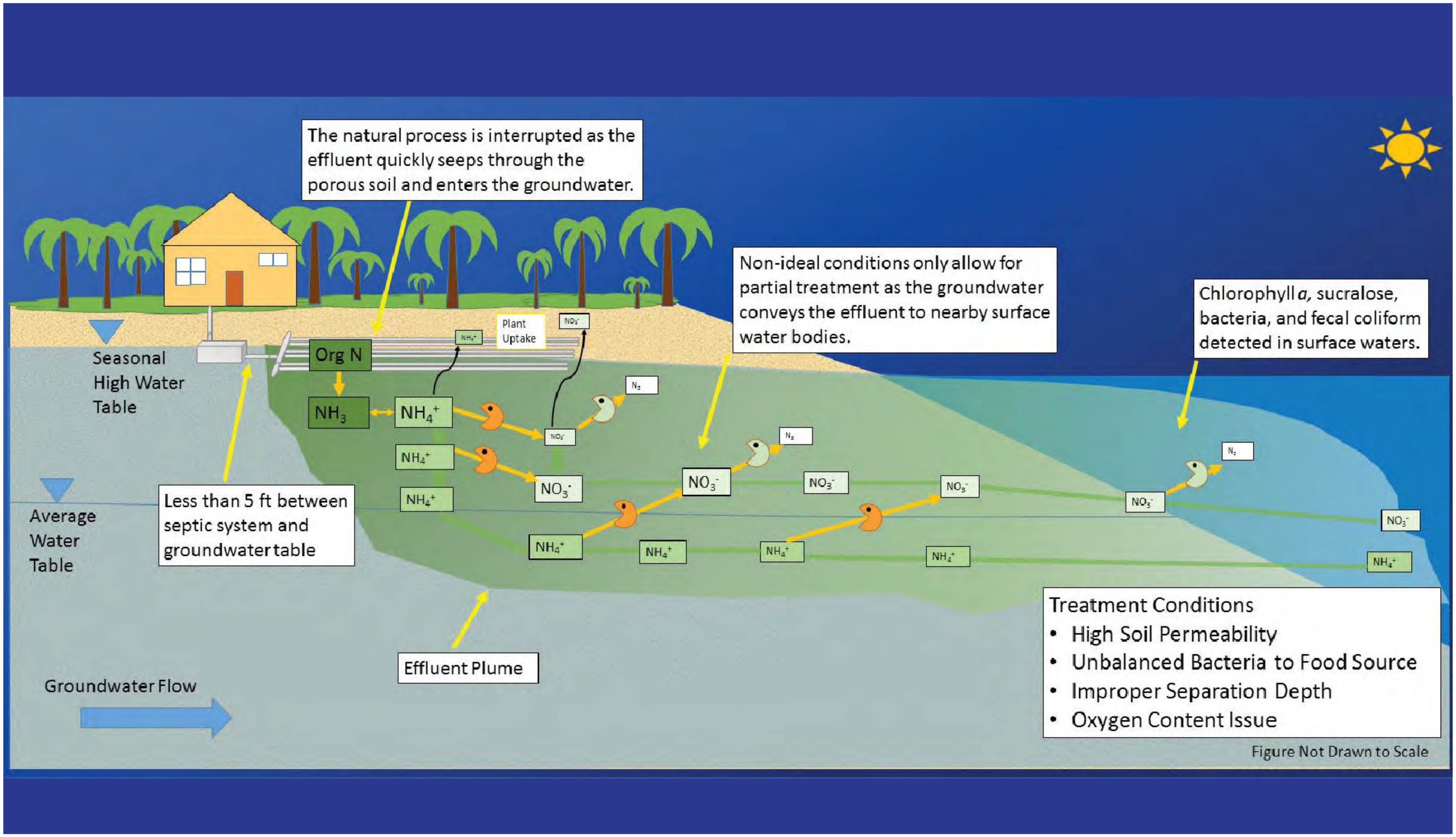
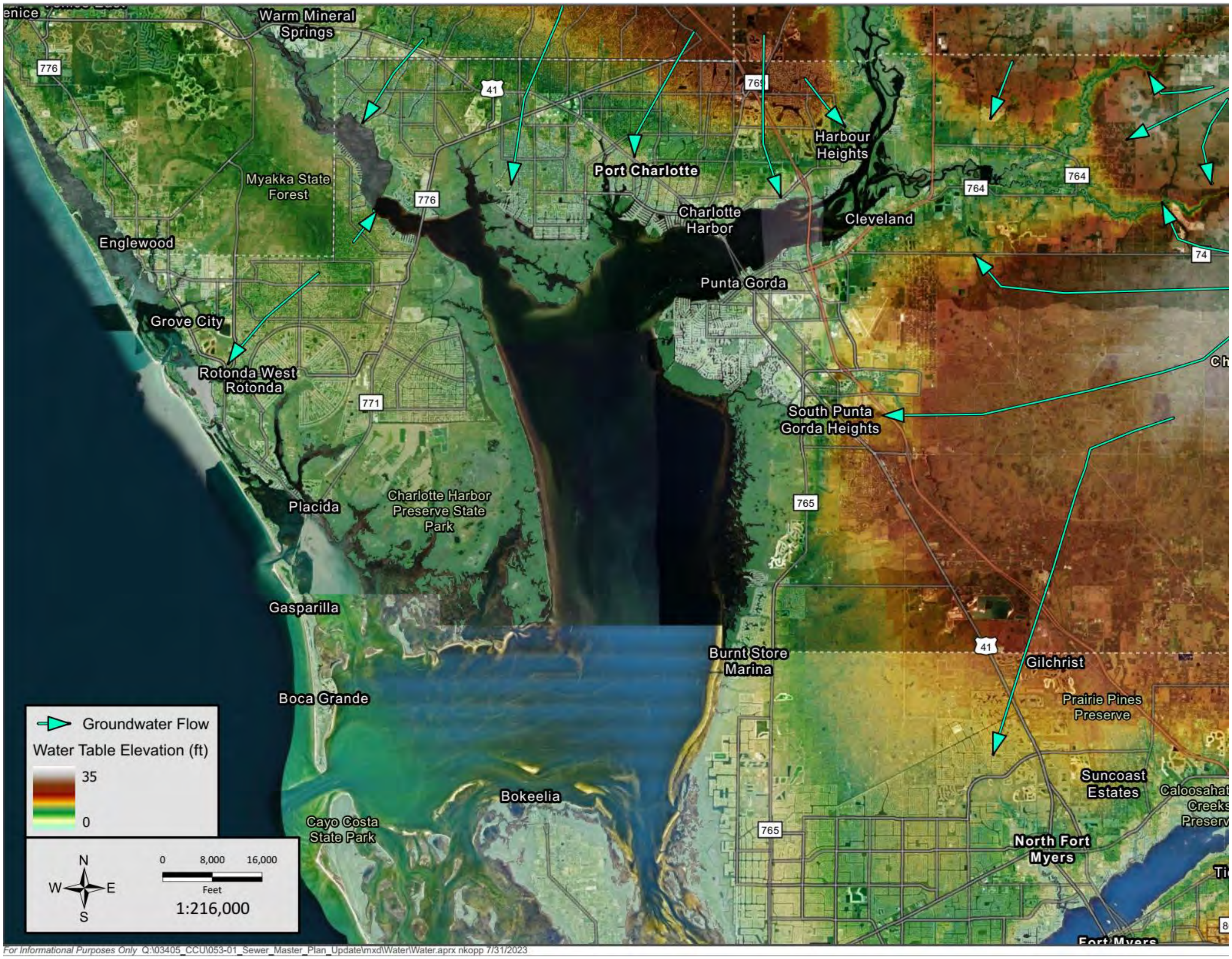


Figure 4 Groundwater Flow in Charlotte County

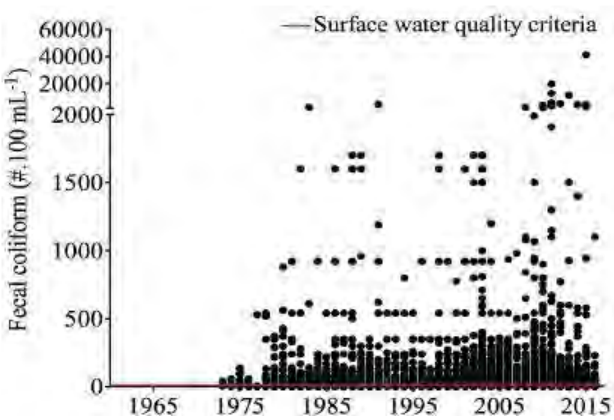


treated sewage exiting septic tanks can comingle with surface water and make its way to the receiving waters even faster.

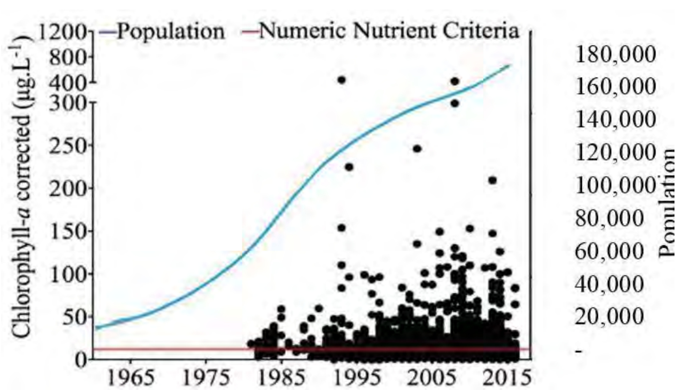
Many researchers have shown correlations between the human population and N loadings through the use of sewage tracers such as fecal bacteria, nitrogen isotopes, and sucralose concentrations (Lapointe, 2016; Green et al., 2015; Risk et al., 2009; Ursin and Roeder, 2008; and Howarth et al., 2000). Recent studies conducted by the Harbor Branch Oceanographic Institute at Florida Atlantic University (FAU) Marine Ecosystem Health Program have shown that the presence of fecal coliform and concentrations of chlorophyll-a in Charlotte Harbor have increased over the years.

The increased levels of sewage tracers are strongly correlated to the increase in population and septic system installations. The researchers found ammonia values were well above the macroalgae bloom threshold of 0.014 micrograms per liter (μg/L), indicating favorable conditions for HABs. Figure 5A shows fecal coliform bacteria concentrations are above the surface water quality criteria established by FDEP in the Florida Statutes to protect the health of swimmers and recreation. Figure 5B shows chlorophyll-a has consistently increased over time and is well above the NNC value of 6.10 μg/L. (Chlorophyll-a is used as an indicator of the level of algae growth and biomass within a water body.)

Figure 5A-C Wastewater Indicator Trends over Time in Charlotte County

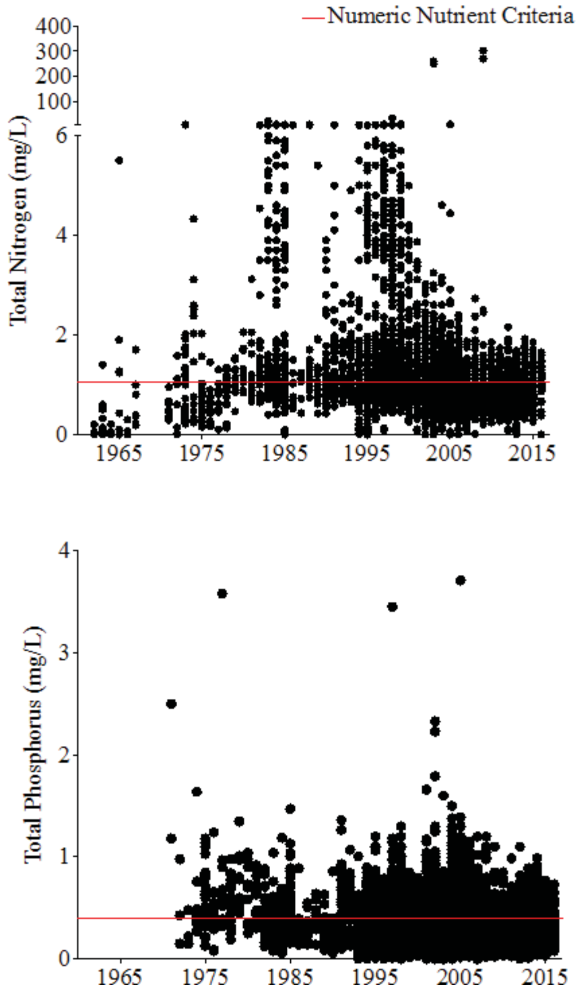


(A)



(B)

Figure 5C summarizes the Total N and Total P levels in the Charlotte Harbor canals and estuary and the increasing trend in these parameters.

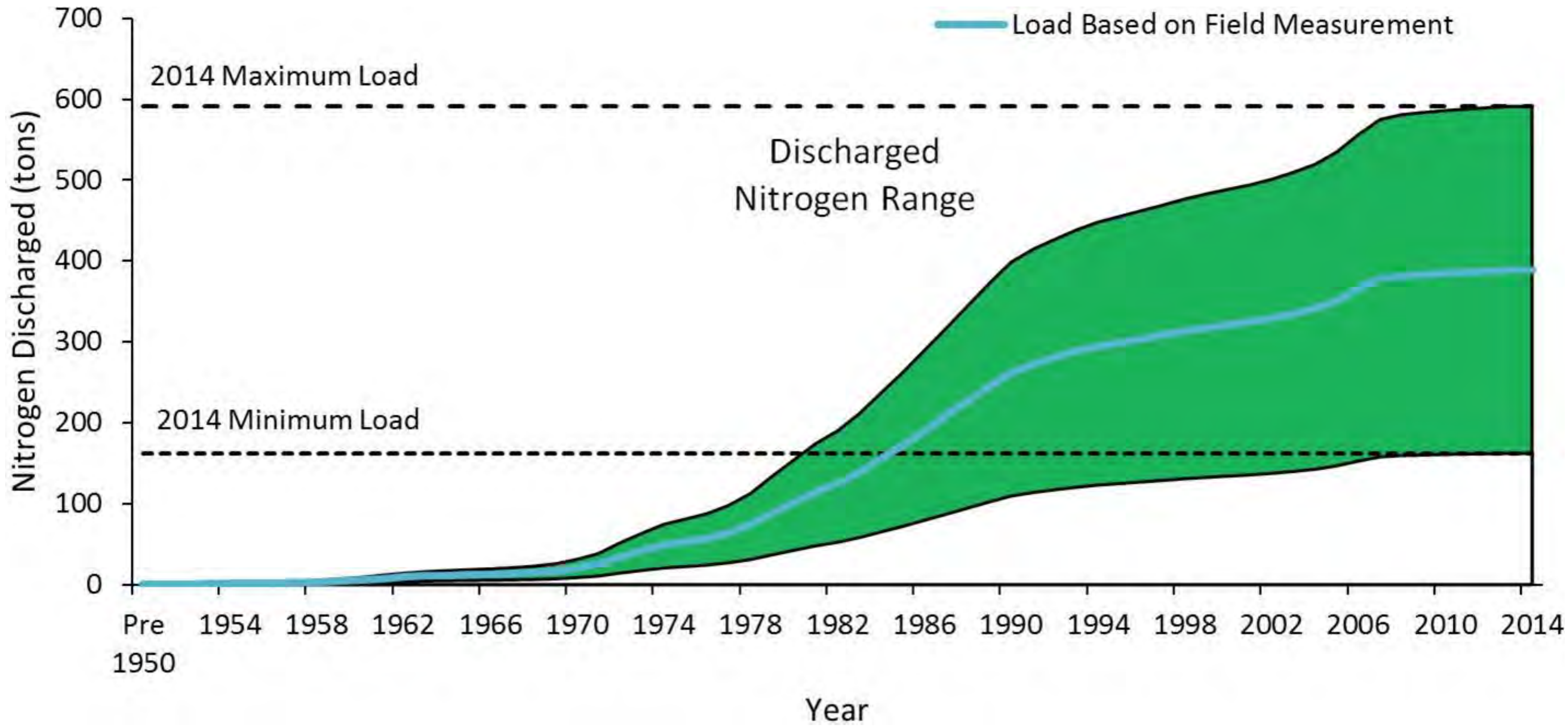


(C)

The increasing levels of N, fecal coliform, and chlorophyll-a reveal that the level of treatment provided by septic systems is not sufficient to protect the water quality of receiving water bodies. The combination of unsuitable soils, seasonally high groundwater tables, and aging septic systems allows minimally treated sewage to percolate through the soil and enter the groundwater where it is conveyed to canals, rivers, creeks, and estuarine shorelines. This results in high levels of N, P, fecal microbes, and organic wastewater contaminants being transported to the harbor.

Researchers estimate N effluent loads originating from septic systems vary between 4.8 to 17.5 pounds per person per year (Ursin and Roeder, 2008; EPA, 2002; and Crites et al., 1998). Based on N loading data and current septic system counts, approximately 161 tons of N (approximately 321,500 pounds N) to 580 tons of N (approximately 1,172,000 pounds N) were discharged from septic systems in 2014. Based on Census data, an average of 2.2 people per household contribute to each of Charlotte County's 45,000 septic systems. Figure 6 displays the range of Total N loading in Charlotte County based on the number of septic systems within the County's service areas.

Figure 6 Range of Discharged Nitrogen from Septic Systems in Charlotte County



Since 2016, the County has conducted field measurements of N levels released from septic systems. The average TN effluent concentration was found to be 70 milligrams per liter (mg/L), corresponding to an N load of 389 tons (approximately 778,000 pounds N) per year discharged to Charlotte Harbor. The excessive amount of N promotes excess algae growth within the water bodies, which sustains and contributes to the formation of HABs. HABs can lead to aquatic hypoxia, causing red tide events and significant ecological destruction (Gilbert P., 2009; Gulf of Mexico Coastal Ocean Observing System [GCOOS], 2013).

Surface water quality in Charlotte Harbor varies between the wet and dry seasons. The rainy season and large tropical storms increase surface water and groundwater flows into the Harbor. Increased groundwater and stormwater flows contaminated with partially treated septic tank effluent have ammonia-N and fecal coliforms that flow into Charlotte Harbor. The increase in N results in algal blooms as measured by increases in chlorophyll-a. Figures 7A, B, C, and D show the variability of water quality in Charlotte Harbor during the dry seasons (April 2015 and April 2016) and wet seasons (August and September 2015) for chlorophyll-a, fecal coliform, and TN.

Maintaining Charlotte Harbor's estuary water quality is critical to the future of the community. Charlotte Harbor is known as a world-class destination for recreational fishing. The Southwest Florida Regional Planning Council (SWFRPC) estimated that the fishing industry has a local economic impact in excess of $1 billion annually (Southwest Florida Water Management District [SWFWMD], 2006). Most visitors are drawn to the area for the harbor and local beaches and generate an estimated economic impact of $817 million at local restaurants, hotels, and attractions (Charlotte County, 2022). Reducing pollutants entering the water bodies means fewer beach closures and improved fishing and recreational opportunities, which improves the quality of life for residents and enhances tourism to the County's shorelines.

The harbor's health not only impacts fishing, retail, and travel industries, but also the real estate market and home values. Modeling studies have been used to estimate the impact of water quality on real estate values. Michael et al. (1996) found a 1-meter improvement in water clarity resulted in average property value increases ranging from $11 to $200 per foot of water frontage along Maine lakes. Considering total water frontage within the study area, this equates to potentially millions of dollars in improved property values. Similar studies have correlated the effect of 1-mg/L changes in suspended solids and dissolved inorganic N concentrations, noting that the average price of non-waterfront and waterfront Maryland properties is affected by 1 and 9 percent, respectively (Poor, 2006).

The average property value in Charlotte County is $367,286 (Zillow, 2023). A 9-percent decrease in home values due to increases in N loadings could lower home values by an average of $33,055. To protect the land and home values, the community must commit to the future – the future of the harbor, rivers, aquifer, beaches, and estuaries, as well as the groundwater under their properties.

Figure 7A Surface Water Quality: April 2015 (2.1 inches Rain)

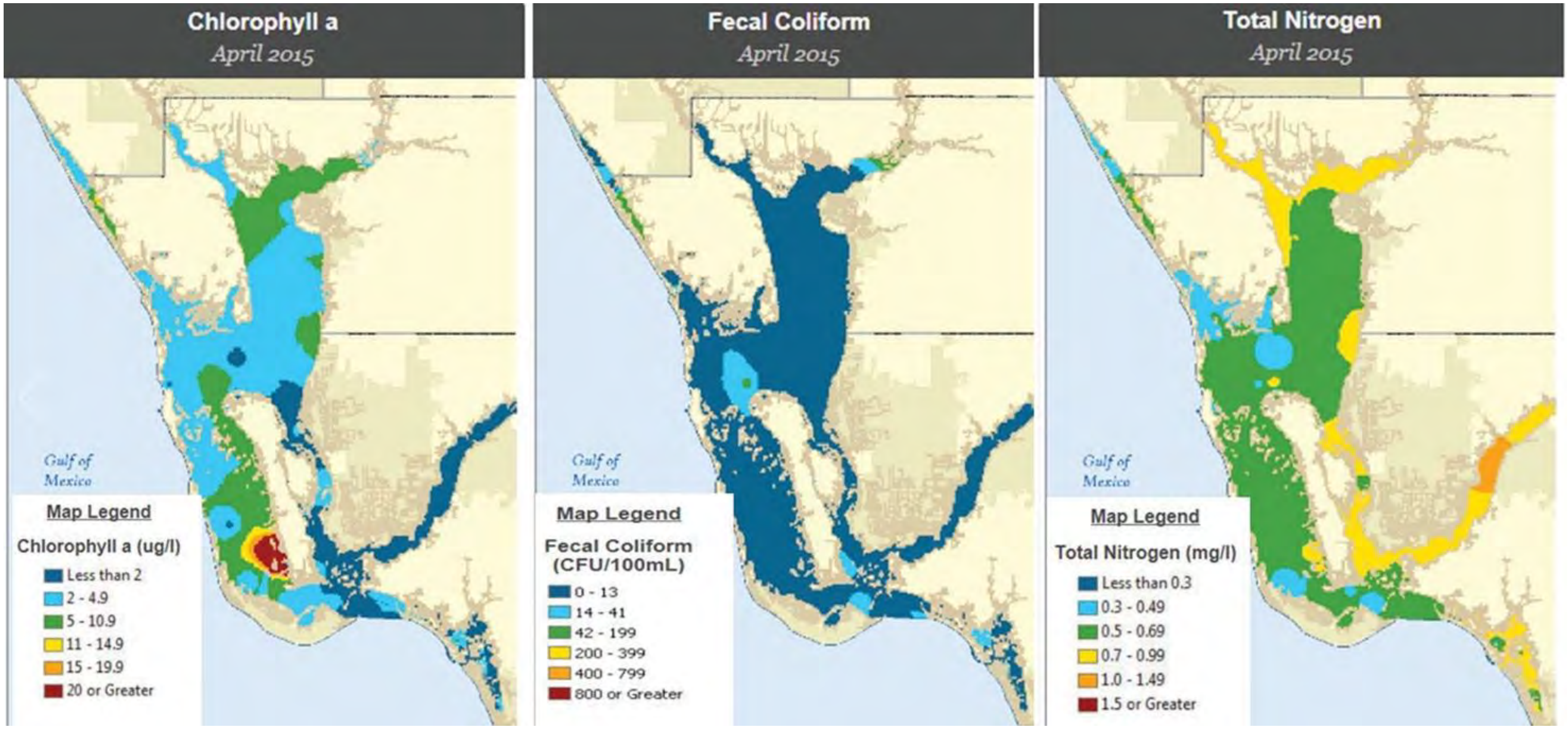


Figure 7B Surface Water Quality: August 2015 (13.6 inches Rain)

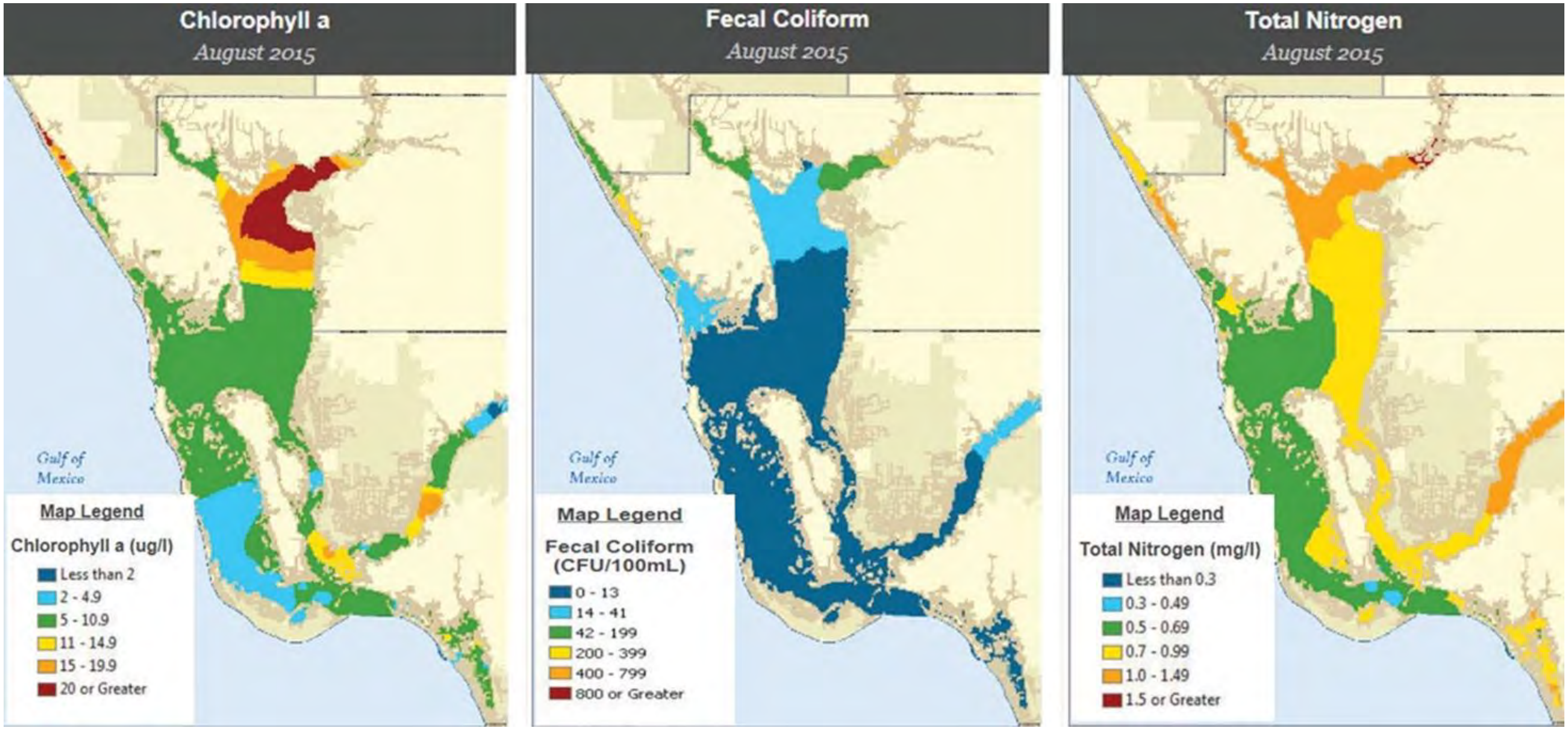


Figure 7C Surface Water Quality: September 2015 (8.2 inches Rain)

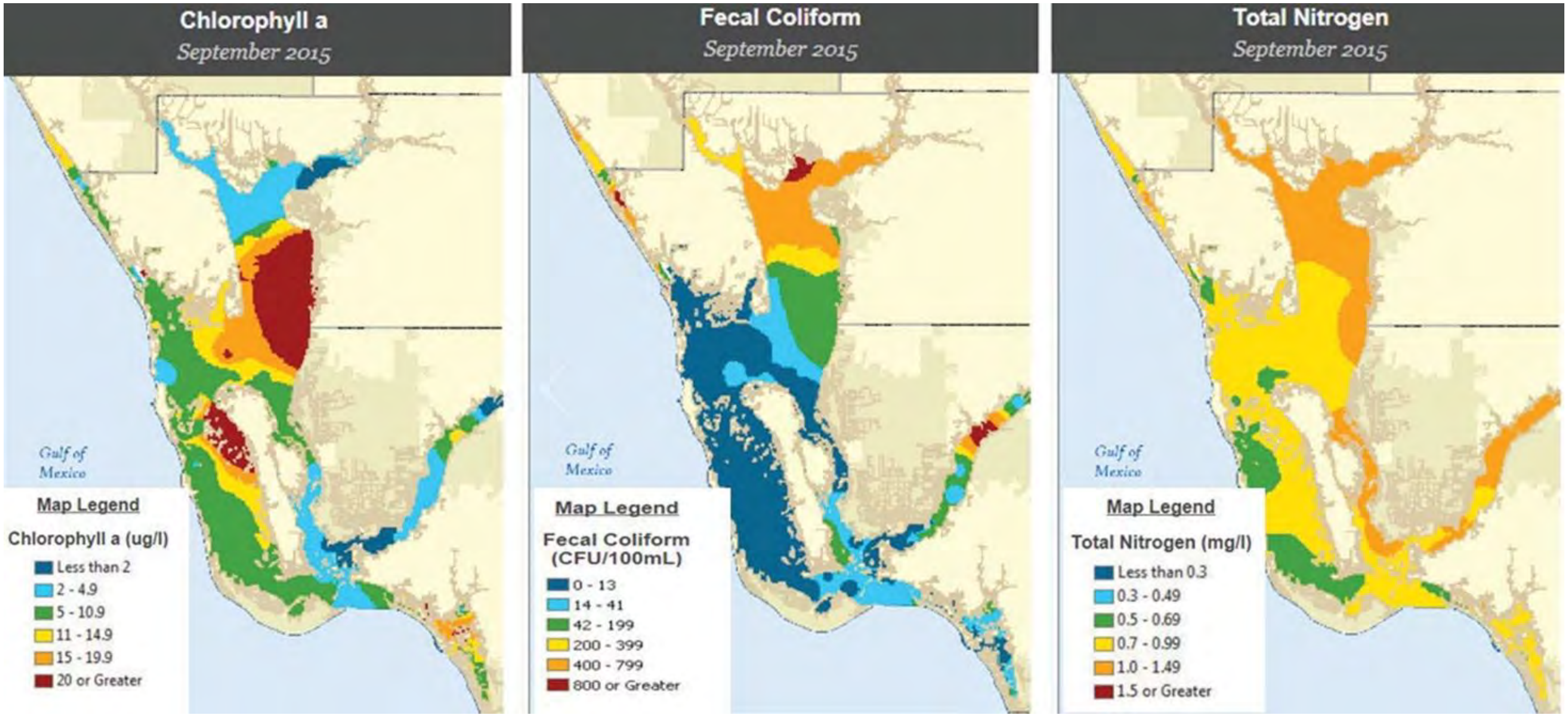
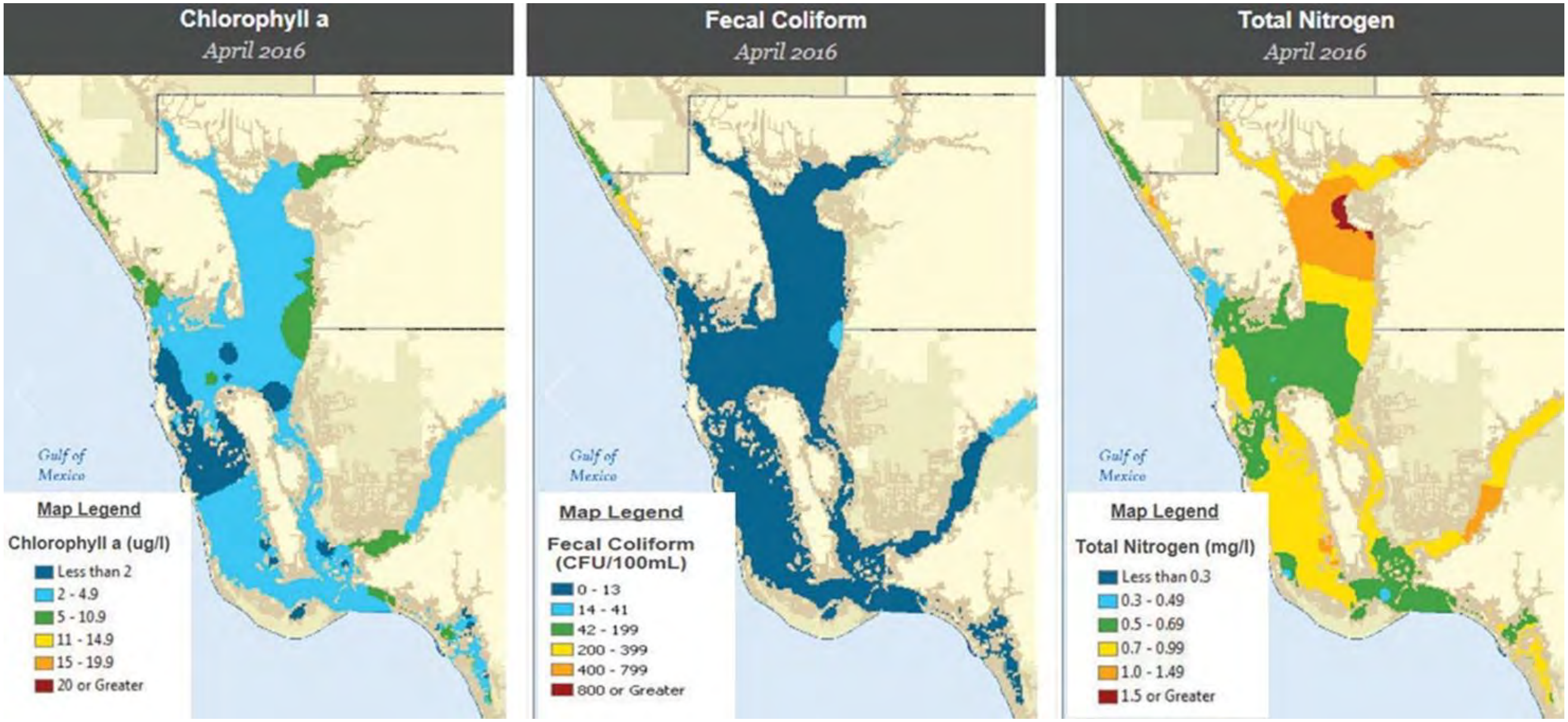


Figure 7D Surface Water Quality: April 2016 (1.4 inches Rain)



Charlotte Harbor is Florida's second-largest open-water estuary and is home to a large population of snook, tarpon, redfish, and spotted seatrout, as well as numerous species of aquatic organisms, plants, birds, and wildlife. It is the focal point of the County, and restoring the harbor is a common goal to the local, state, and national community. Continuing to install centralized sewer systems will benefit the environment by giving the community the ability to transport sewage to water reclamation facilities (WRFs) where it can be engineered to achieve a higher level of nutrient removal. Removing the existing septic systems and connecting residential and commercial units to the central sewer systems, upgrading sewer collection systems, and upgrading the treatment efficacies of the existing WRFs will alleviate problems with the existing septic systems, protect the public health of the community, improve the water quality of surrounding waterbodies, and promote economic growth within the community for current and future generations.

Appendix D

2023 Compliance Monitoring Report

CHARLOTTE COUNTY
FLORIDA

January 25, 2024

RE: Compliance Monitoring Report for Specific Condition No. 18, 08-0210682-001
Annual Summary 2023

Dear Ms. Carpenter:

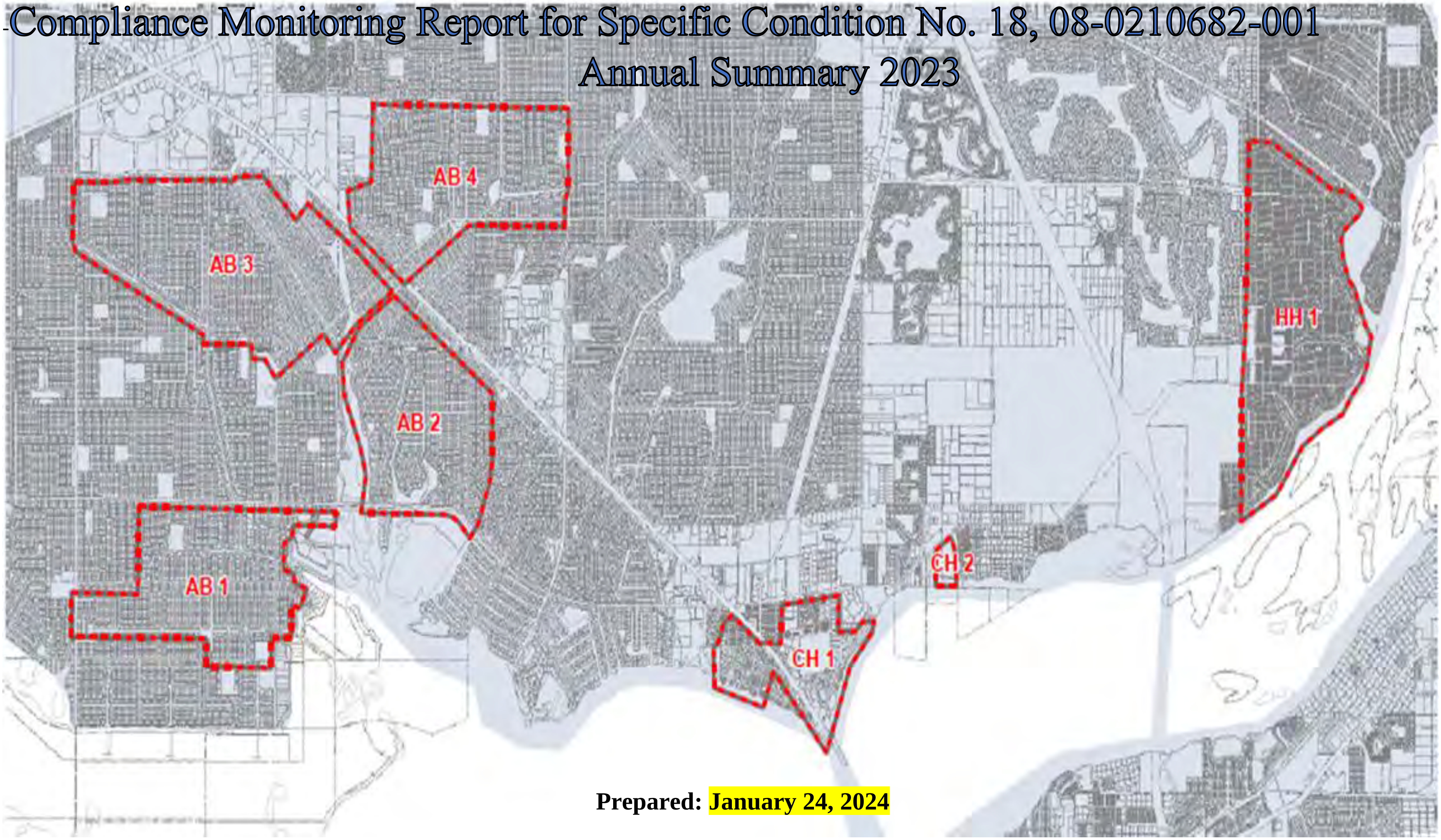
Charlotte County Utilities Department (CCUD) is pleased to provide this updated report following the County's submittal last year.

The approach taken for updating the report was to utilize the same format as previous years and update the project status, number of connections, maps, and project status to show progress for calendar year 2023. In reviewing this report, please note that the number of connections required, vacant properties, and occupied properties shown in the report reflect the status of 2017 when the report was started.

Sincerely,

E. Dave Watson, PE
Utilities Director
Charlotte County Utilities
Phone: 941.764.4502
www.CharlotteCountyFL.gov

Compliance Monitoring Report for Specific Condition No. 18, 08-0210682-001
Annual Summary 2023



Prepared: January 24, 2024

Prepared by: Charlotte County Utilities Department
25500 Harborview Rd., Suite 1
Port Charlotte, FL 33980
www.CharlotteCountyFL.gov

On behalf of the Permittee:
Charlotte County Board of County Commissioners

Table of Contents

Background

Charlotte County Utilities Department has been working on compliance with the following Specific Conditions, outlined in the Florida Department of Environmental Protection permit number 08-0210682-001.

Phased Sewer Expansion

SC 18. The permittee has included the area as referenced in "Figure Phased Sewer Expansion NEB Location Map" in the Charlotte County Sewer Expansion Plan. These areas include portions of the Little Alligator drainage basin that have been identified as having on-site disposal systems that do not treat wastewater to current standards (i.e., those on-site disposal systems built prior to 1983). The permittee shall first focus on the area between West and East Spring Lake. The permittee shall commence and complete the installation of the sanitary sewer system in accordance with the attached "FY2007 Capital Improvements Budget/FY 2007-FY 2011 Project Detail.".

SC 19. The permittee shall submit to the Department an annual status report that shall include the following information:

- *a) The notations "Compliance monitoring report for Specific Condition No. 18, 08-0210682-001" and name of the permittee.*
- *b) The areas where the sanitary sewer system has been completed and is in service.*
- *c) The areas that are projected to be initiated within the next year.*
- *d) A contact person that is responsible for implementing Specific Condition No. 18.*

The annual report shall be due annually on the anniversary date of this permit. Upon verification by the Department that the system is in place and has been transferred to the Operation Phase of the permit, the permittee is hereby released from the above monitoring requirements.

This NEB is to provide an improvement to water quality by decreasing nutrient loading from removing the septic systems.

SC 18 outlined priority areas for sewer expansion that included portions of the Little Alligator drainage basin that have been identified as having on-site disposal systems that do not treat wastewater to current standards (i.e., those on-site disposal systems built prior to 1983). The condition required that Charlotte County focus on the area between West and East Spring Lake and commence and complete the installation of the sanitary sewer system in accordance with the enclosed "FY 2007 Capital Improvements Budget/FY 2007-FY2011 Project Detail", which we will call the FY 2007-11 CIP (see Figure 1A and Figure 1B).

The Charlotte County Utilities Department (CCU) currently provides service to over 36,000* sewer customers within Charlotte County and a small portion of Lee County over its 45-square mile service area. However, many areas of Charlotte County are still served by septic systems dating back to the 1950's. There are approximately 26,000** septic systems in CCU's entire service area. The areas identified in the FY 2007-11 CIP were a preliminary outline of areas with high density, aging or failing septic systems, whose receiving waters are the Charlotte Harbor and the Peace River. Most of the areas identified in the FY 2007-11 CIP, areas AB-2, AB-3, and AB-4, are all within or drain into the Little

Alligator drainage basin outlined in condition SC 18. Area AB-1 lies between the Manchester and Little Alligator drainage basins as shown in Figure 1B. The areas identified in the FY 2007-11 CIP as CH-1, CH-2, and HH-1 are directly adjacent to the Charlotte Harbor and Peace Rivers with aging on-site systems prioritizing them for septic to sewer (S2S) conversion as well.

In November 2017, a consultant completed a Sewer Master Plan (CCSMP) for Charlotte County Utilities. This plan was subsequently approved by the Charlotte County Board of County Commissioners as a planning document. The document outlines prioritized areas and a schedule for converting areas from septic to sewer. The prioritization areas largely are located within the original 2007-2011 CIP priority areas as shown in Appendix A. Appendix B outlines the prioritization sequence within each 2007-11 CIP area within a 15-year planning window outlined in CCSMP. Appendix C outlines the priority criteria used to evaluate each CCSMP priority area. If a prioritization area is located within a 2007-11 CIP area, a status update is provided in Tables 3 and 7; status updates on connections in areas located outside the 2007-11 CIP areas are in Tables 5 and 7.

*As of 2023, CCU now services 42,200+ sewer customers within Charlotte County.

**2017 Sewer Master Plan by Jones Edmunds for Charlotte County

Little Alligator and Manchester Drainage Basin Status

Little Alligator drainage basin is an area containing 16,887 properties, 11,723 of which are primarily occupied as single-family residences (see Figure 2). To date 7,268 central sewer connections have been completed out of the 11,723 required (see Table 1). This drainage basin contains portions, if not all, of the three FY2007-11 CIP areas AB-2, AB-3, and AB-4 (see Figure 1B). AB-2 is in the southern part of Little Alligator drainage basin, closest to Charlotte Harbor.

Manchester Lock basin contains 8,141 properties, 2,200 of which are occupied and 5,941 of which are vacant (see Table 1). To date, 1,225 central sewer connections have been made, out of the 2,200 required (see Table 1). This basin does not intersect with any of the original 2007-11 CIP areas as outlined in condition SC 18. In 2008, CCU proposed a project that would provide central sewer service to approximately 569 properties directly impacting the Manchester drainage basin. However, the area had less than 50% density, which negatively impacted the economic feasibility of the project, and the project did not move forward.

Table 1: Properties Connected Inside Manchester and Little Alligator Drainage Basins

Table 1: Properties Connected Inside Manchester and Little Alligator Drainage Basins		
CONNECTION STATUS	**Little Alligator**	**Manchester**
COMPLETED*	7,268	1,225
REQUIRED	11,723	2,200
% COMPLETED TO DATE	62%	56%

NOTE 1. Connection numbers in table do not match maps below due to inclusion of additional conversions after the maps were already created in the case of the Alligator Drainage Basin map or new construction were not removed in the case of the Manchester Drainage Basin map.

The table below shows a numerical summary of connections completed on an annual basis since 2007. Table 2 shows the yearly connection rate for both the Manchester and Little Alligator drainage basins based on a total of 13,923 required connections.

Table 2: Yearly Connection Rate for the Manchester and Little Alligator C Basins Combined for Existing Homes Since 2007

Table 2: Yearly Connection Rate for Manchester and Alligator Basins (13,923 Total Required)		
YEAR	**# CONNECTED**	**% PER YEAR**
2007	90	0.65
2008	51	0.37
2009	68	0.49
2010	70	0.50
2011	40	0.29
2012	42	0.30
2013	38	0.27
2014	40	0.29
2015	50	0.36
2016	228	1.64
2017	440	3.16
2018	1045	7.51
2019	161	1.16
2020	55	.40
2021	30	.22
2022	18	0.13
2023	30	0.22
Total	**2496**	**17.94**

Figure 1A: Original 2007-11 CIP Areas

NOTE: Areas "AB1", "AB2", & "AB3" have been identified in the new Sewer Expansion Plan as "Area 1"
"CH1" has been completed with the Charlotte Harbor CRA program.

CIP - 2

ACCOUNT # 40??.378???.535.63.0001 PRIORITY# 2

FY2007 Capital Improvements Budget / FY 2007 - FY 2011 Project Detail — Project No. C350202

GENERAL PROJECT DATA:
Project Title: Utility System Redevelopment Plan
Functional Area: Wastewater
Department: Utilities
Location: System Wide

COMPREHENSIVE PLAN INFORMATION:
Project listed in CIE? No
Comp. Plan reference: N/A
LOS/Concurrency Related:

PROJECT NEED CRITERIA	
Safety	
Mandate	
Replace	
Growth	X

PROJECT SCHEDULE	FY07	FY08	FY09	FY10	FY11
	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Design/Arch					
Land/ROW					
Construct					
Equipment					

PROJECT DESCRIPTION:
There are numerous areas in Charlotte County that are currently without central sewer service.
There is a need to replace septic systems with central sewer service in areas that are located within 150 feet of surface water and also in high population density areas. A feasibility study will be conducted and used with the Master Plan (currently being updated) to prioritize areas for expansion of central sewer service. Project will require grant monies to offset homeowners' cost or MSBU system will be used.

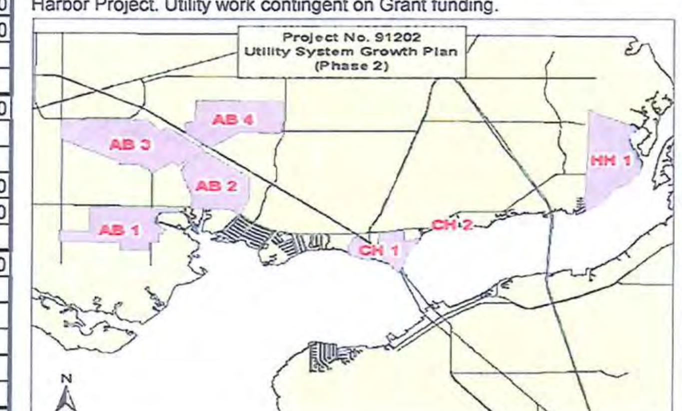
PROJECT RATIONALE (Include Additional LOS Detail, if necessary):
This project would allow examination of growth patterns and identification of areas with a high concentration of septic systems, so that efficient implementation of central sewer service could be achieved.

OPERATING BUDGET IMPACT:
Additional staffing may be required in correlation with customer growth. Additional revenue will support cost.

REPLACEMENT COUNTY PROPERTY NO.:

	Prior Actual	Budget FY06	Est FY06	(1) Calc. for FY07 Orig. FY07	(2) Est c/o to FY07	(3) New FY07	FY07	FY08	FY09	FY10	FY11	FUTURE	Total
EXPENDITURE PLAN (000'S)													
Design/Arch/Eng		550		500	550	-850	200	900	250			1,000	2,350
Land (or ROW)		200		200	200	-400		400	200			600	1,200
Construction				3,325		-3,325		5,825	2,500			6,305	14,630
Other													
Equipment													
Total Project Cost		750		4,025	750	-4,575	200	7,125	2,950			7,905	18,180
FUNDING PLAN (000'S)													
Grant		550		4,025	550	-4,575		7,125	2,950			7,905	17,980
O & M Fund		200			200		200						200
Total Funding		750		4,025	750	-4,575	200	7,125	2,950			7,905	18,180
OPERATING BUDGET IMPACT (000'S)													
Personal Svc.													
Non-personal													
Capital													
Total Operating													

FY 07 includes $2,000,000 for sewer component of CRA Charlotte Harbor Project. Utility work contingent on Grant funding.



(1) This dollar amount is found on the Adopted FY06 CIP project page as the FY07 expenditure amount.
(2) The carryover number is the difference between the adopted FY06 budget and the amount estimated to be expended in FY06
(3) New dollars are due to an increase in project expenditures or an acceleration of the project.

P:\FINANCE\CIPs - CAPITAL IMPROV PROJS\CIPs FY 2001 to 2009-10\CIP FY 06-07\Drafts of CIPs\Copy of CIP 06 - 07 2-2-06.xls

Charlotte County

Figure 1B: Enlarged FY 2007-11 CIP and Basin Areas Enlarged

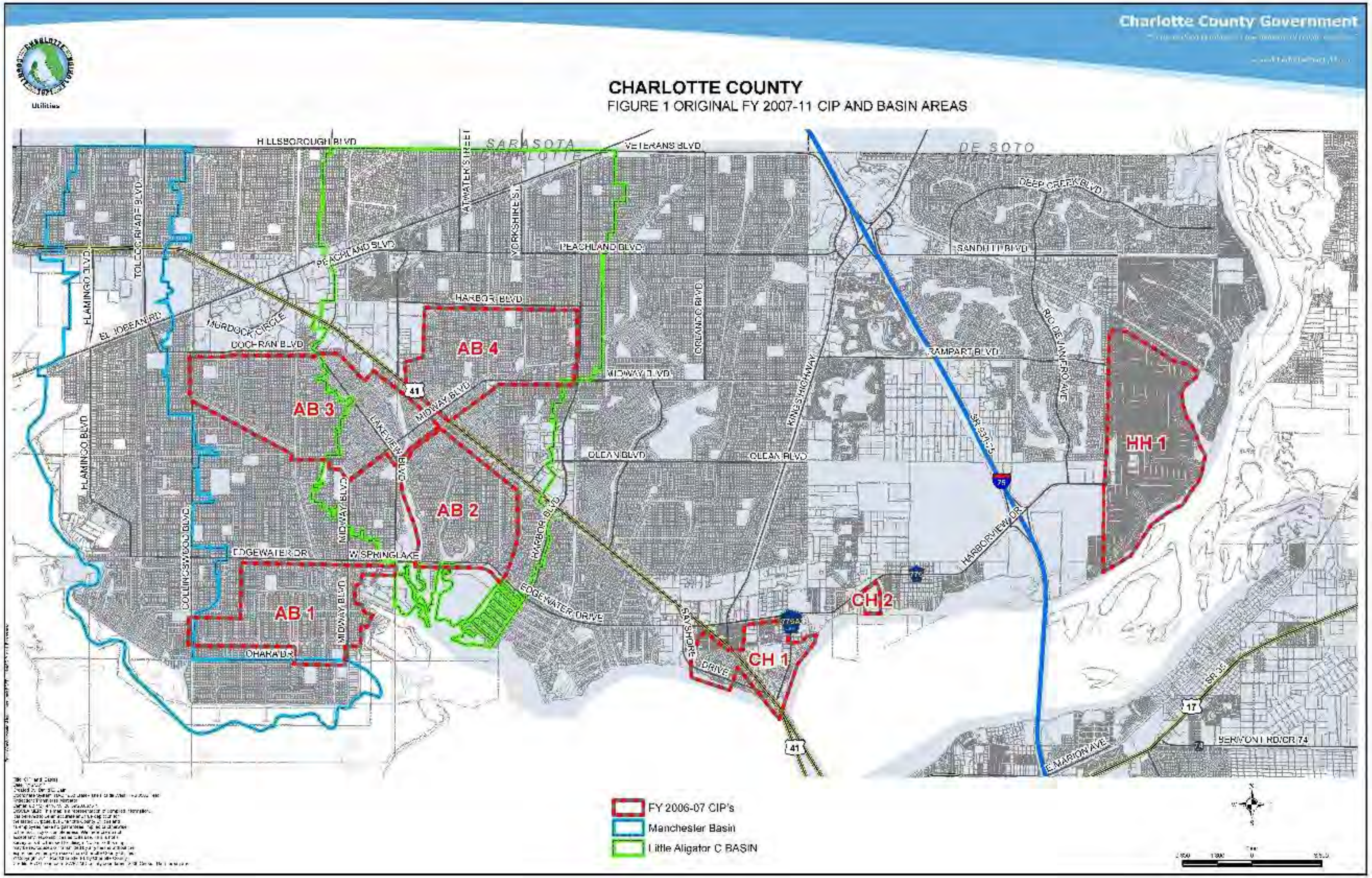


Figure 2: Little Alligator C Drainage Basin, Original FY 2007-11 CIP Boundary

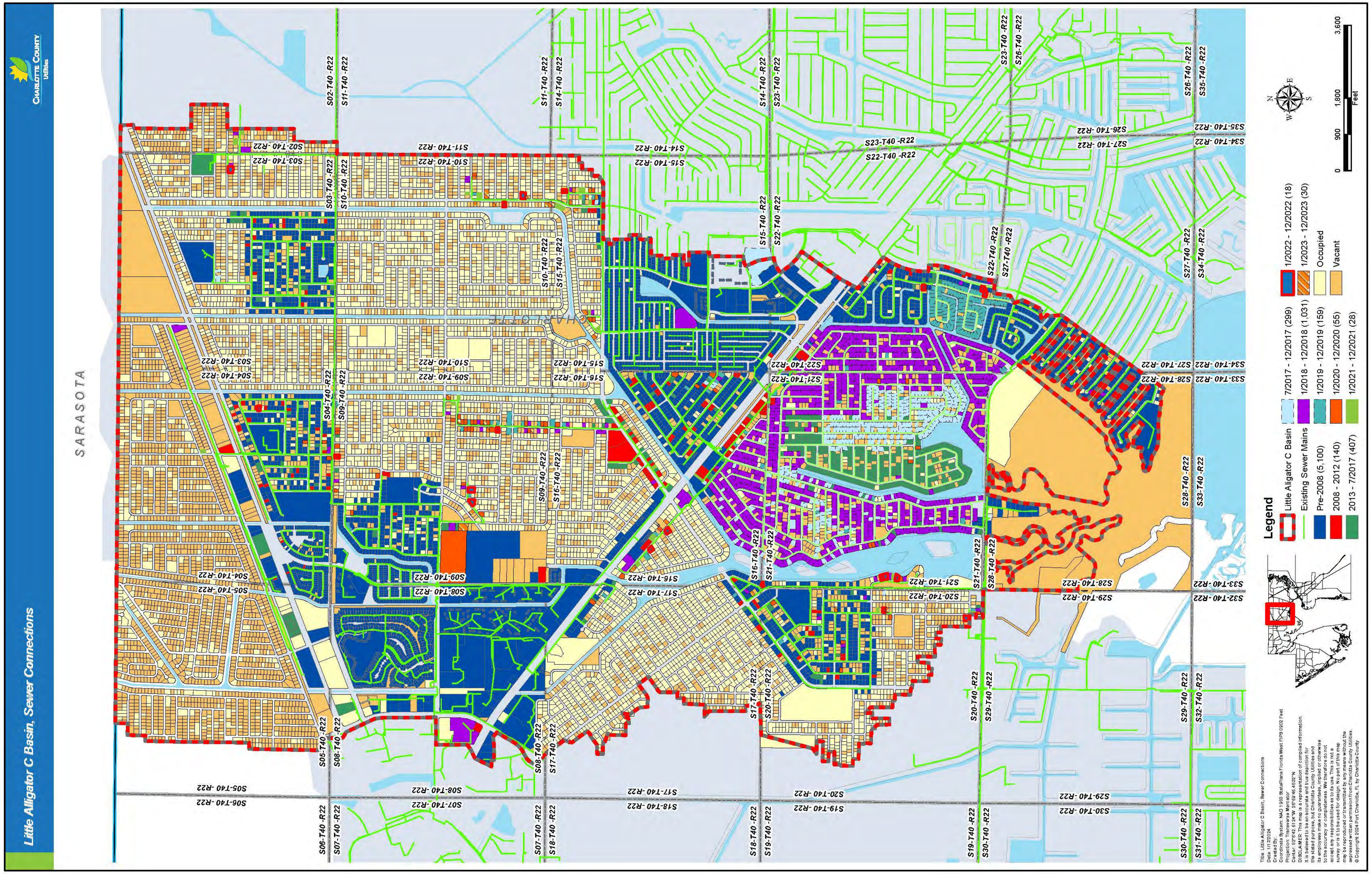
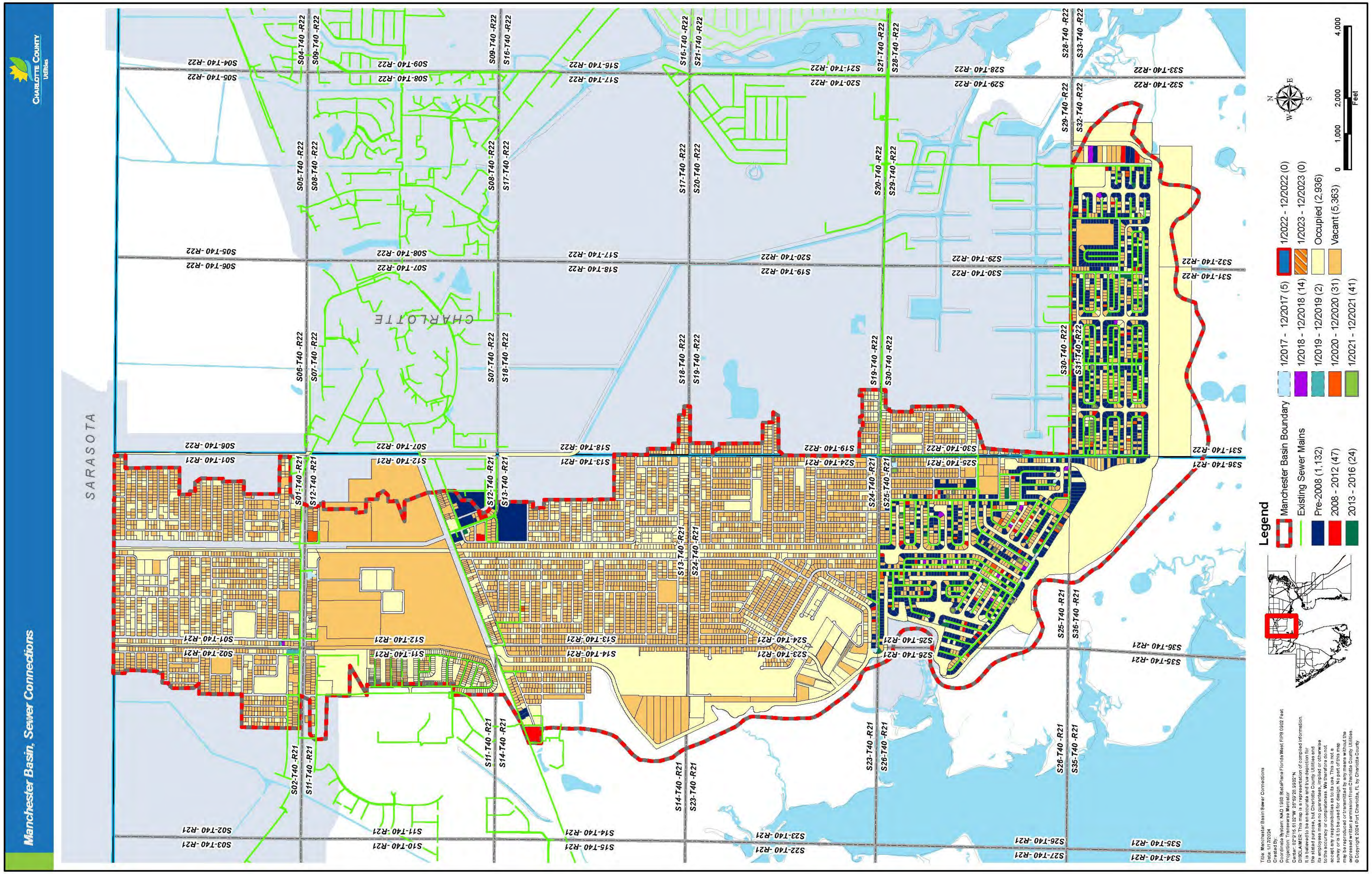


Figure 3: Manchester Drainage Basin, Original FY 2007-11 CIP Boundary



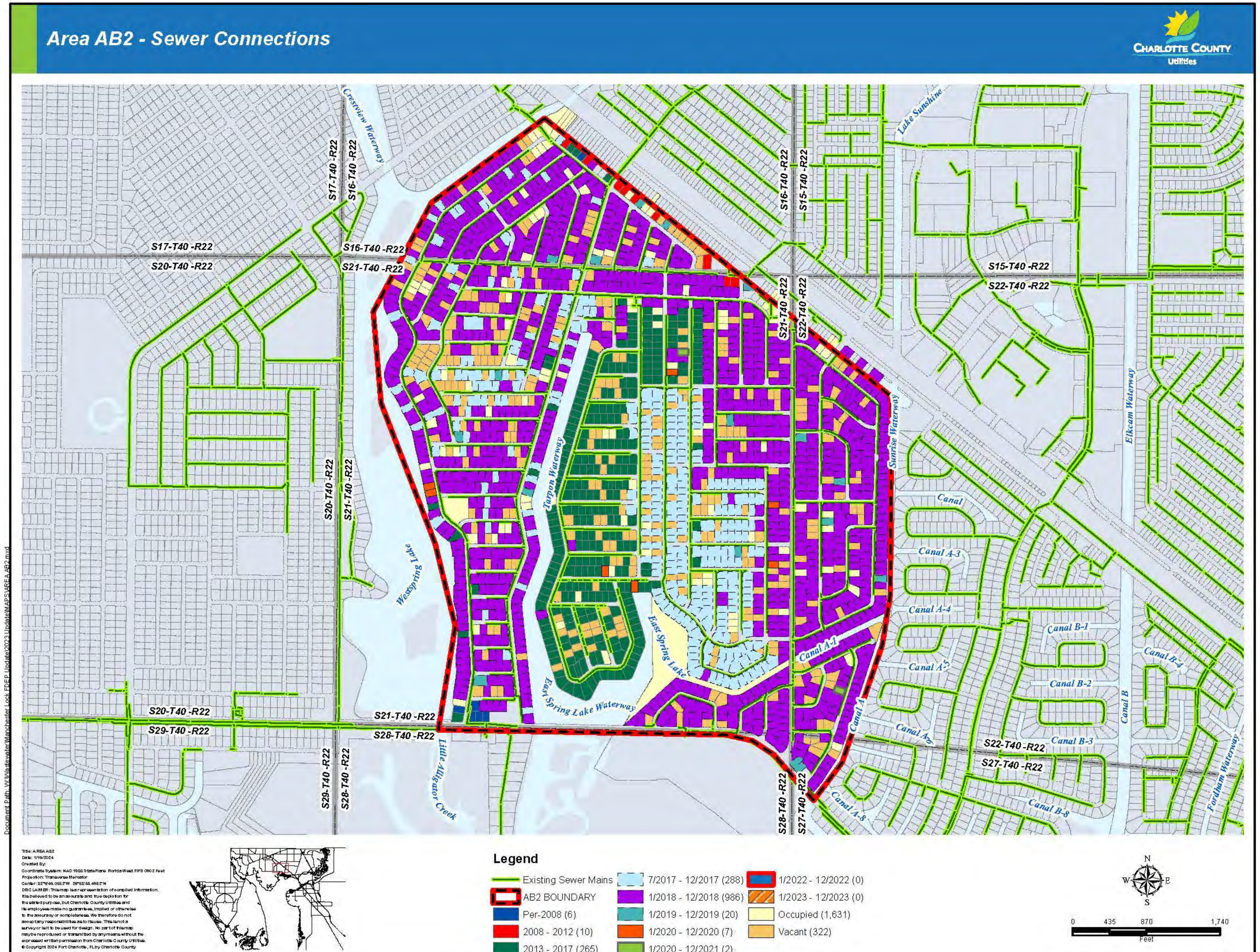
FY2007-11 CIP Area Status

AB-2 (West and East Spring Lake)

The FY 2007-11 CIP includes project AB-2 (West and East Spring Lakes). The project commenced planning in 2008 and is now 100% complete (see Figure 4). All except 2 of the 1,565 connections required have been completed (see Table 3). The remaining connections will be addressed under the steps outlined in County's mandatory connection policy. This is a turn-key project where CCU coordinated the efforts to complete the on-lot sewer connections whether through CCU staff or contract work to plumbers. SRF funding in the amount of $19M allowed CCU the ability to finance this project at low interest rates to increase the affordability of the project to property owners. Once this project is completed, it is estimated that nitrogen loading will be reduced by approximately 16.1 tons annually to Charlotte Harbor *.

> * Charlotte County has conducted its own field testing to obtain an estimate of nitrogen loading due to failed septic systems. The testing was performed at a lift station site that only receives effluent from Low Pressure Sewer Systems that are configured in Septic Tank Effluent Pump format.

Figure 4: Project Area AB-2 (West and East Spring Lakes) Original FY 2007-11 CIP Boundary



AB-1

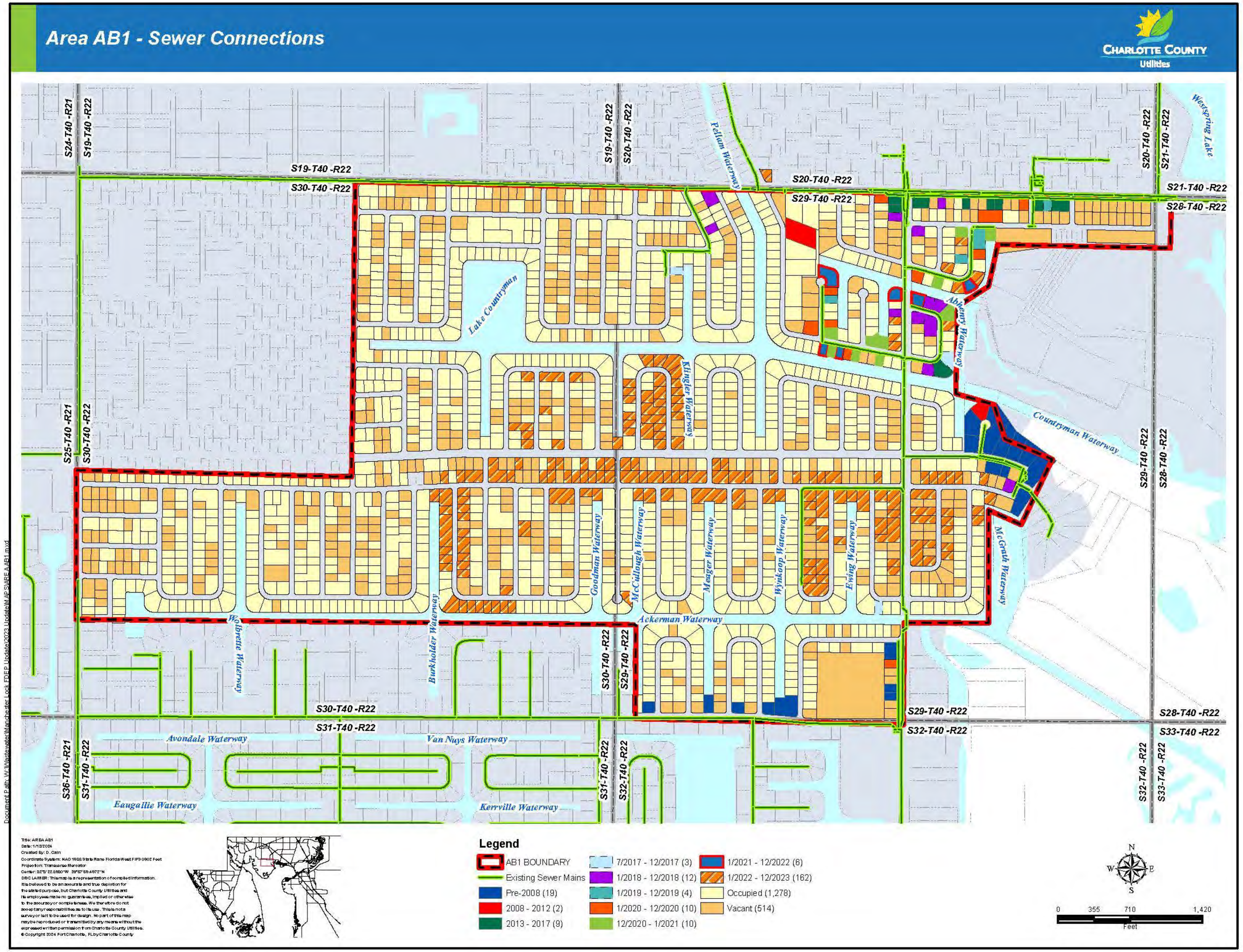

Area AB1 - Sewer Connections
Charlotte County
Utilities
Lake Countryman
Klingler Waterway
Countryman Waterway
McGrath Waterway
Abberly Waterway
Pelham Waterway
Westspring Lake
Goodman Waterway
McCullough Waterway
Meager Waterway
Wynkoop Waterway
Ewing Waterway
Ackerman Waterway
Burkholder Waterway
Walbrette Waterway
Avondale Waterway
Van Nuys Waterway
Eaugallie Waterway
Kerrville Waterway
S19-T40-R22
S30-T40-R22
S20-T40-R22
S29-T40-R22
S21-T40-R22
S28-T40-R22
S31-T40-R22
S32-T40-R22
S33-T40-R22
S24-T40-R21
S25-T40-R21
S36-T40-R21
Legend
AB1 BOUNDARY
Existing Sewer Mains
Pre-2008 (19)
2008 - 2012 (2)
2013 - 2017 (9)
7/2017 - 12/2017 (3)
1/2018 - 12/2018 (12)
1/2019 - 12/2019 (4)
1/2020 - 12/2020 (10)
12/2020 - 1/2021 (10)
1/2021 - 12/2022 (6)
1/2022 - 12/2023 (162)
Occupied (1,278)
Vacant (514)
N
S
E
W
0
355
710
1,420
Feet

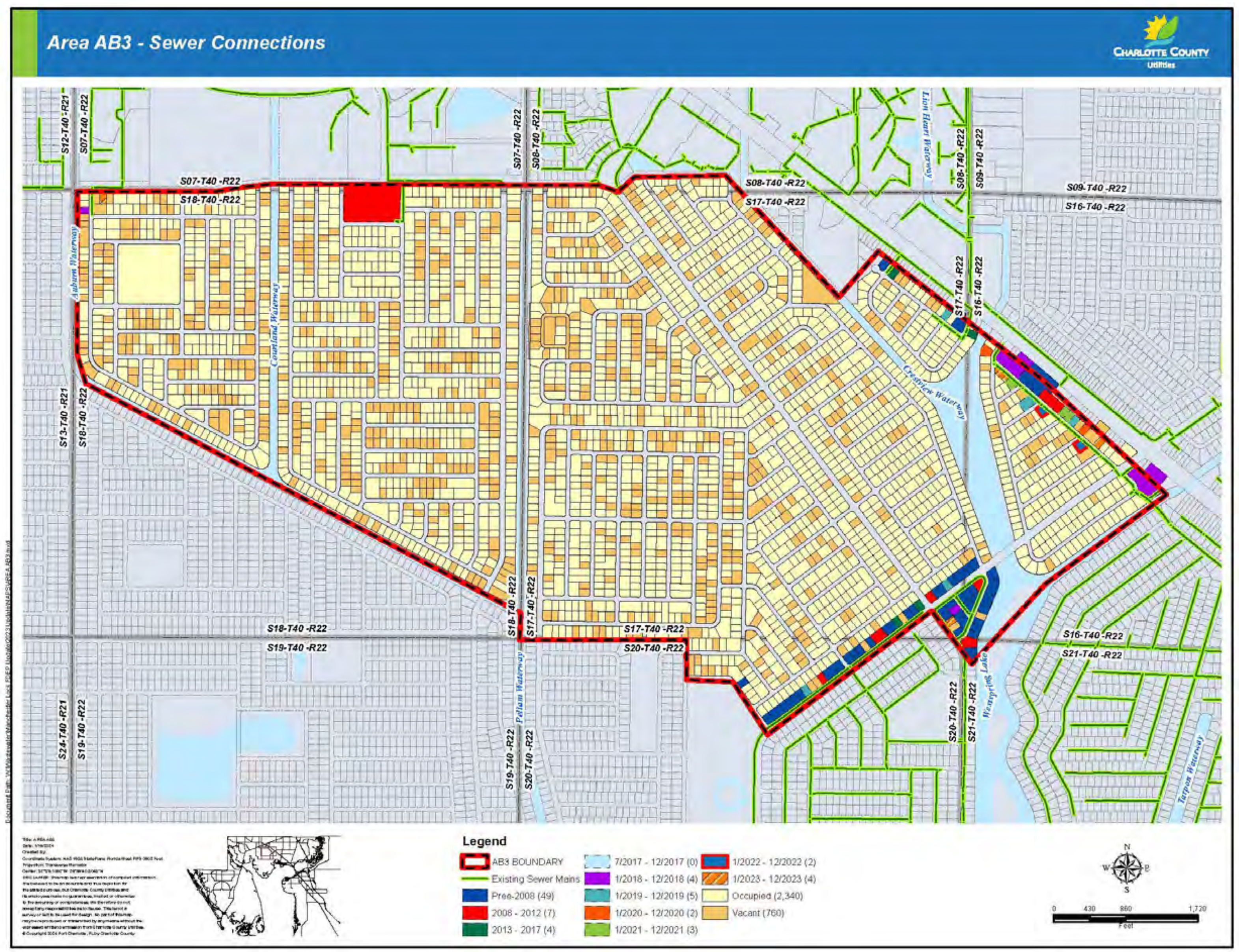
Figure 5 shows the boundary of area AB-1 and connection status. See Table 3 for connection summary and future projected connections for this area. The entire project area is currently under design or under construction. Certain portions within the AB-1 area identified as Zones 1 and 2 along with the vacuum station is under construction with connections starting in mid 2023. Zones 1 and 2 represent approximately 590 connections. Other projects which are partially within AB-1, also known as the LPS area and Zones 3 and 4 are under design and will proceed with construction after Zones 1 and 2. The design is financed with an FDEP SRF $2.1M loan and construction is to be financed with an FDEP SRF loan of $22.5M. The LPS area and Zones 3 & 4 include approximately 665 connections, some of which are shown in Table 5 as Ackerman connections.

Figure 5: Project Area AB-1, Original FY 2007-11 CIP Boundary

AB-3

Figure 6 shows the boundary of area AB-3 and connection status. See Table 3 for connection summary and future projected connections for this area. A sub-area within AB-3 named Ellicott Circle, also known as area M 70 in the 2017 Sewer Master Plan (SMP), is now within a larger planning, area also within AB-3, that includes SMP Areas M61, a portion of M62, M67, M68, as well as M70 representing approximately 1454 connections. The consultant for this project has been selected and preliminary engineering began in 2022. It is anticipated that construction on these areas will begin in a phased approach in 2025. Although SMP areas M63 and M69 and a portion of M62 are not in Area AB-3, they are included in planning due to geographical location and to maximize an efficient collection system layout for the entire area. (See Lake View Midway in Table 5). Any other connections in this area will occur through line extensions funded by private development until a full project is funded and proceeds.

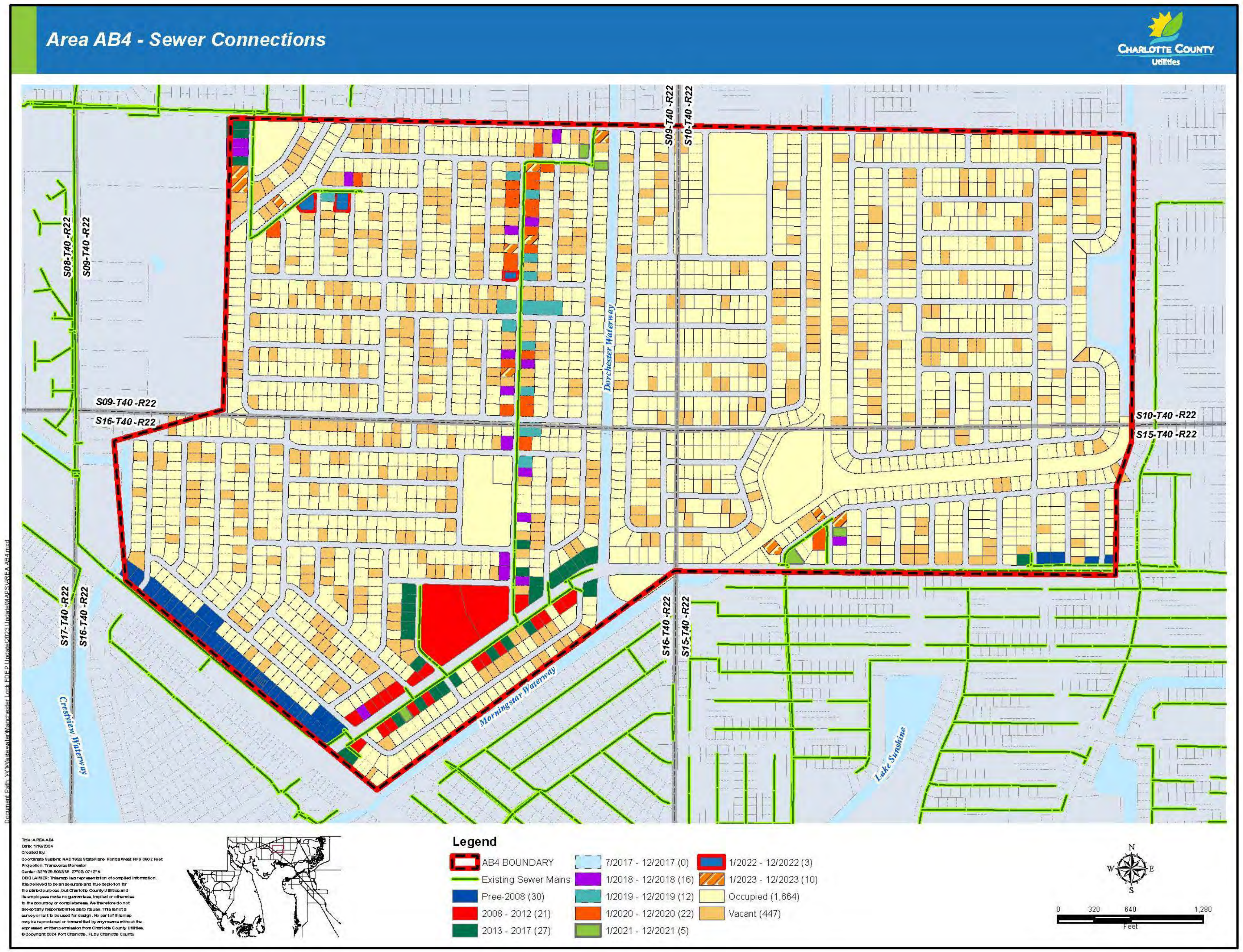
Figure 6: Project Area AB-3, Original FY 2007-11 CIP Boundary



AB-4

Figure 7 shows the boundary of area AB-4 and connection status. See Table 3 for connection summary and future projected connections for this area. Sub-areas within AB-4 have been identified as priority central sewer expansion areas in the Charlotte County Sewer Master Plan (CCSMP) (See Appendices A and B). Any other connections in this area will occur through line extensions funded by private development until a full project proceeds.

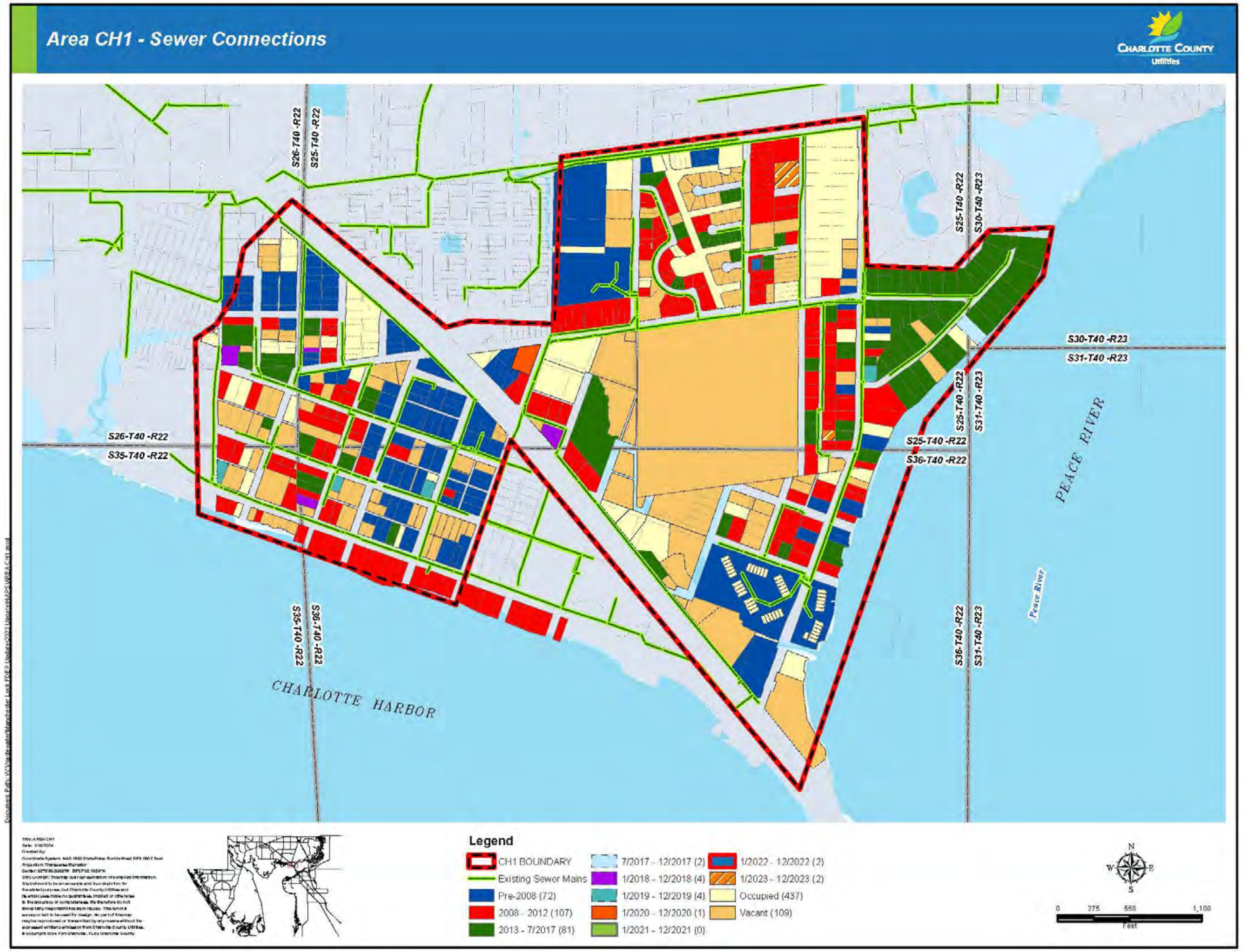
Figure 7: Project Area AB-4, Original FY 2007-11 CIP Boundary



CH-1

The project CH-1 is complete. Any remaining connections are subject to the mandatory connection ordinance.

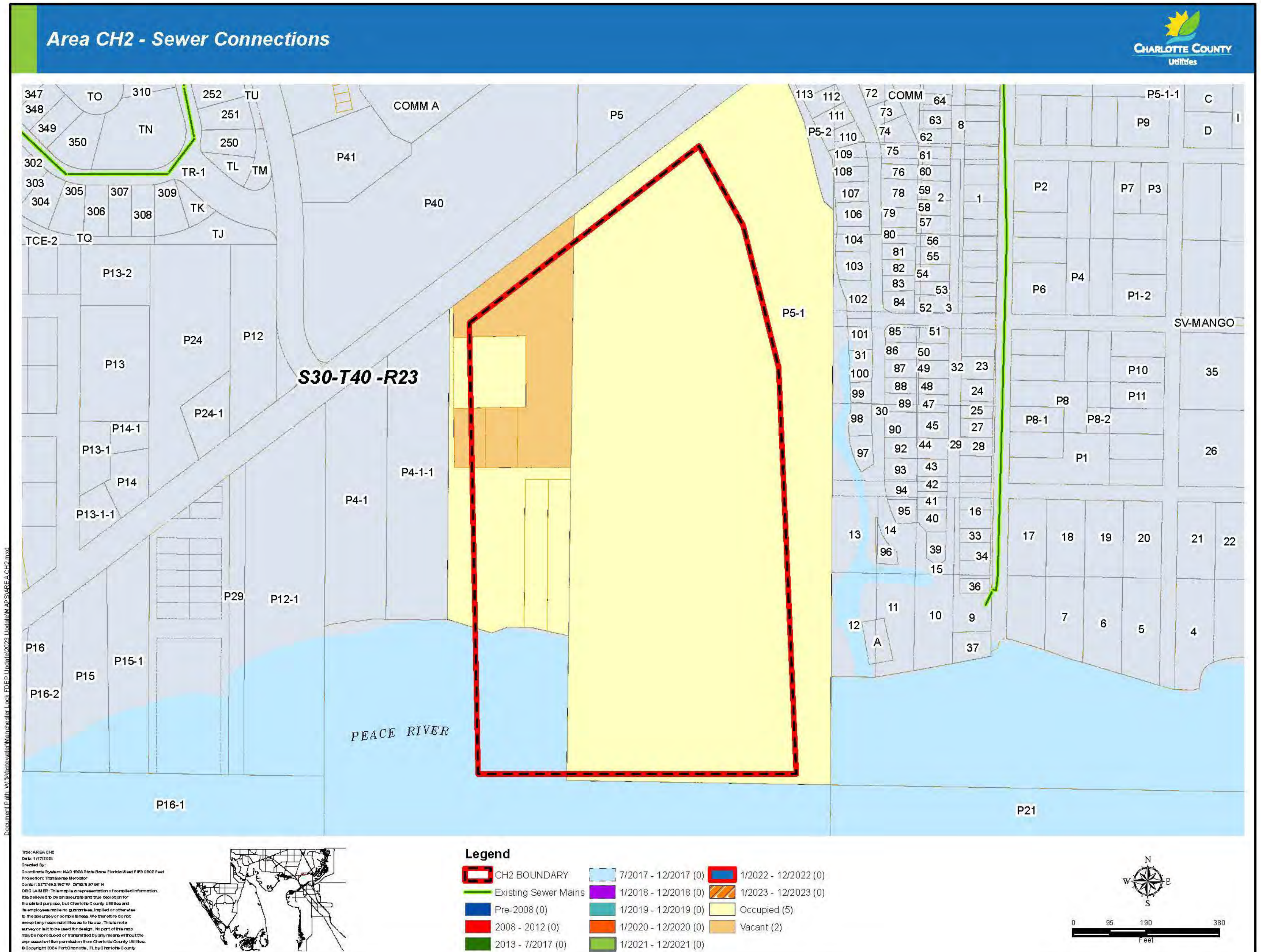
Figure 8: Project Area CH-1, Original FY 2007-11 CIP Boundary



CH-2

Figure 9 shows the boundary of area CH2 and connection status. See Table 3 for connection summary and future projected connections for this area. One of the seven properties in this boundary is a mobile home park named the Harborview Mobile Home Park, with 120 connections. The CCSMP identifies this mobile home community for future connection.

Figure 9: Project Area CH-2, Original FY 2007-11 CIP Boundary



HH-1

Figure 10 shows the boundary of area HH-1 and connection status. See Table 3 for connection summary and future projected connections for this area. HH-1 has also been identified in the draft CCSMP for future central sewer expansion. However, due to the population density compared to other priority areas, and other infrastructure improvements scheduled, this project is not currently within the first 15 years priority list in the CCSMP draft. Any other connections in this area will occur through line extensions funded by private development until a full project proceeds.

Figure 10: Project Area HH-1, Original FY 2007-11 CIP Boundary

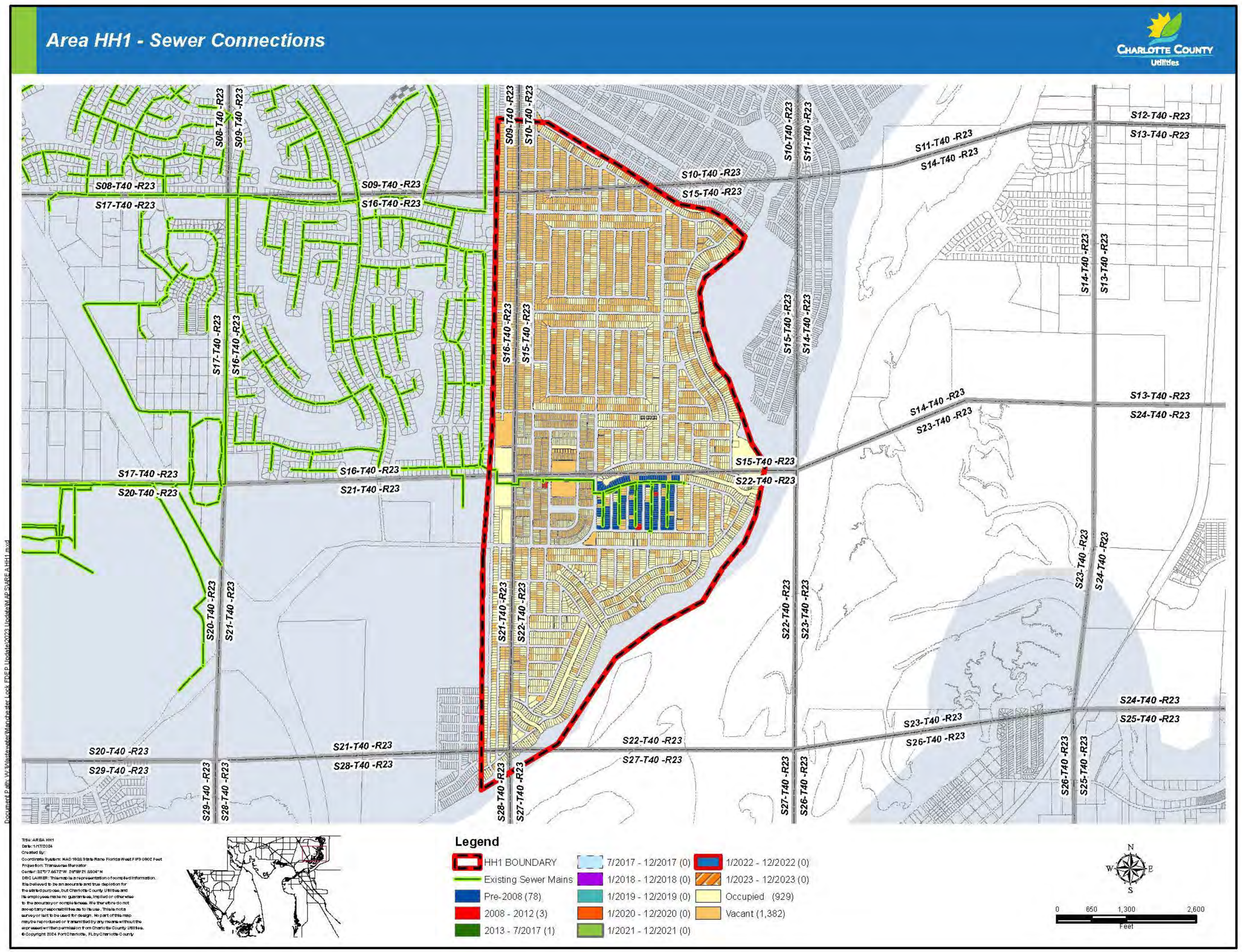


Table 3 summarizes the past and future projections for the areas outlined in the FY 2007-11CIP.

Table 3: Original FY 2007-11 CIP Connections and Expansions

Table 3: Original FY 2007-11 CIP Past and Future Area Connections

PROJECT NAME	FIGURE NUMBER	TOTAL PROPERTIES	VACANT	# CONNECTIONS REQUIRED	# CONNECTIONS COMPLETED	2023	2024	2025	2026	2027	BEYOND 2028	% CONNECTIONS COMPLETED TO DATE
AB-1	5	1839	609	1230	218	162	220	210	220	200	-	17.72
AB-2	4	1973	408	1565	1563	-	2	-	-	-	-	99.87
AB-3	6	3145	919	2226	32	-	5	5	5	500	1679	1.43
AB-4	7	2152	562	1590	117	10	5	5	4	-	1449	8.07
CH-1	8	400	118	282	205	-	24	-	-	-	53	72.70
CH-2	9	7	2	5	0	-	-	-	-	-	5	0
HH-1	10	2322	1515	807	4	-	-	-	-	-	803	0.50
	Total	11838	4133	7705	2139	196	256	345	330	450	3989	27.76

TOTAL COMPLETED CONNECTIONS	2139
TOTAL REQUIRED	7,705
TOTAL % CONNECTED	27.76

*Connection numbers in table do not match maps above due to inclusion of additional conversions after the maps were already created.

Table 4 below shows the number of connections completed on an annual basis since 2007 along with the overall percentage completed for the FY 2007-11 CIP Areas.

Table 4: Yearly Connection Rate for the Original FY 2007-11 CIP Areas of Existing Homes

Table 4: Yearly Connection Rate for FY 2007-11 CIP (7,705 Total Required)		
YEAR	**# CONNECTED**	**% PER YEAR**
2007	13	0.17
2008	16	0.21
2009	34	0.44
2010	56	0.73
2011	23	0.30
2012	22	0.29
2013	30	0.39
2014	19	0.25
2015	33	0.43
2016	151	1.96
2017	437	5.67
2018	1022	13.26
2019	55	0.71
2020	39	0.51
2021	21	0.27
2022	13	0.17
2023	178	2.31
Adjusted Total*	**2139**	**27.76**

*Due to a better process to track connections from year to year, a discrepancy was noted between the total connections completed between Table 3 and Table 4 in the 2020 compliance report. A one-time reduction adjustment was made in Table 4 to match the total in Table 3 to compensate for this discrepancy. However, the annual total for each year has not been adjusted and, therefore, it will appear that the connection for the years 2007-2022 do not total properly.

Septic 2 Sewer (S2S) Additional Projects

Below is a Table showing the additional S2S projects since 2008 not shown in the original FY 2007-11 CIP. These projects provide for an additional 2,094 connections that will contribute towards improving water quality in Charlotte Harbor. An additional project area 'Lake View Midway' has been added in 2019 to Table 5 providing for an additional 626 connections. This area is adjacent to AB-1 and is in the design phase.

Table 5: Additional Septic 2 Sewer (S2S) Projects Outside of Original FY 2007-11 CIP

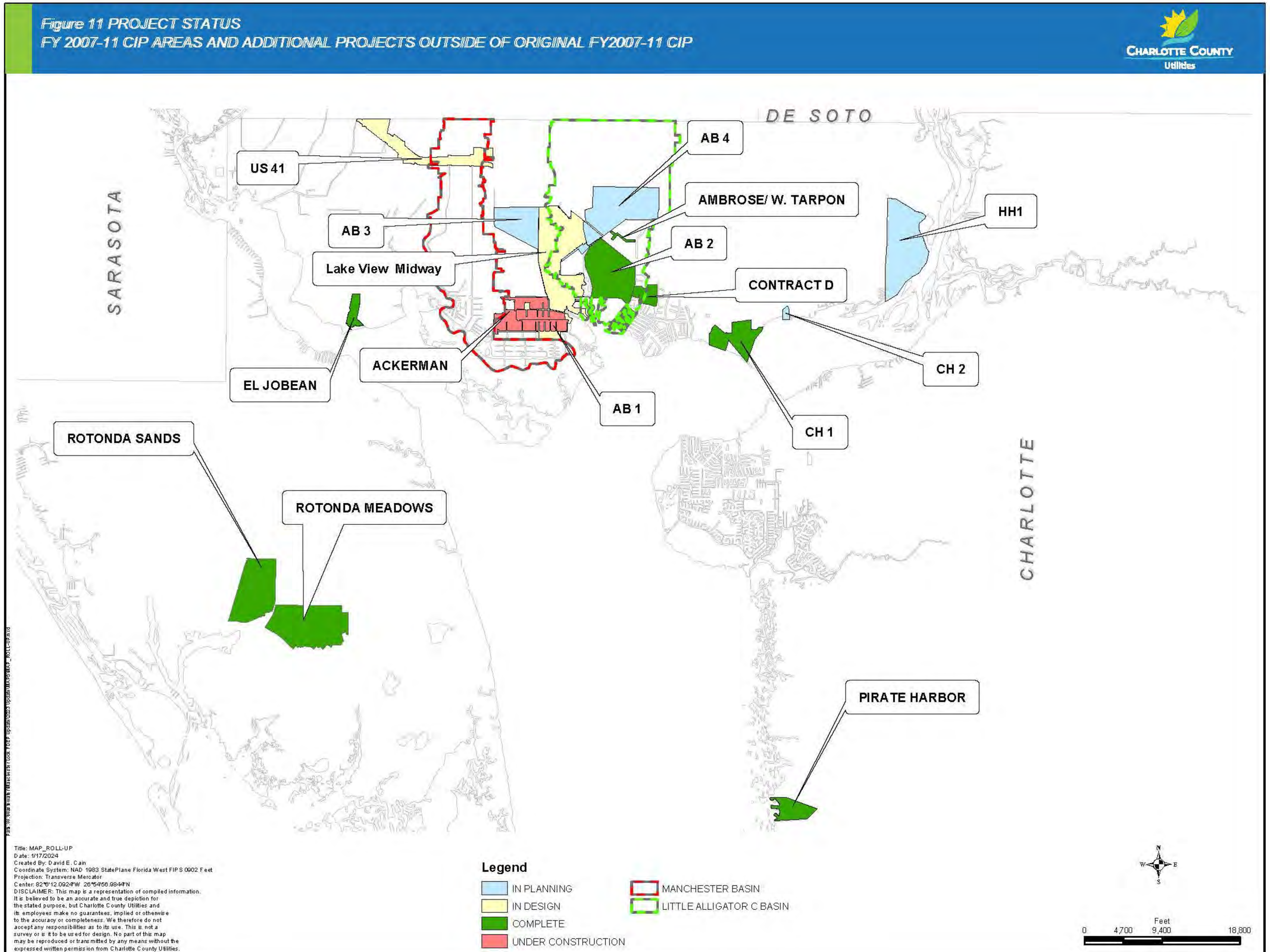
Table 5: Additional Septic 2 Sewer Projects Outside of Original FY 2007-11 CIP						
PROJECT NAME	**FIGURE NUMBER**	**TOTAL PROPERTIES**	**VACANT**	**# CONNECTIONS REQUIRED**	**# CONNECTIONS COMPLETED**	**FUNDING**
PIRATE HARBOR	11	378	173	205	205	This project was funded through property owners and Charlotte County resources.
ROTONDA SANDS and MEADOWS	11	5,229	5,150	79	79	This project was funded through property owners and Charlotte County resources.
Ambrose/West Tarpon	11	18	9	9	9	SRF Funds: $1,800,000
CONTRACT D/EAST WEST SPRING LAKES (EWSL)	11	399	99	300	300	SRF Funds: $3,700,000
US 41	11	1,347	1,017	330	24	This project was funded through property owners and Charlotte County resources.
El Jobean East	11	341	44	282***	278	Vacuum Station- Funded via BP Settlement Fund Collection System being funded via SRF funds- Approximately $4,000,000
ACKERMAN*	11	369	121	248	0	SRF Funds: $2,100,000 design; $22,500,000 construction
Lake View Midway **	11	1134	508	626	195	This project to be funded through property owners, Charlotte County resources, and will apply for grants and other funding.
				2,079***	1090	TOTAL ADDITIONAL SEPTIC 2 SEWER CONNECTIONS

*Numbers based on portion of Ackerman not inside the AB-1 boundary

**Numbers based on portion of Lake View Midway not in AB-3 boundary

***Number has decreased since 2021 Report due to some properties assumed to be occupied that were actually vacant and some properties already had LPS conversions prior to the 2017 report

Figure 11: FY 2007-11 CIP Areas and Additional Septic 2 Sewer Project Status in Charlotte County



Supportive Projects to Benefit Charlotte Harbor Ecosystem

Systems to Support New Connections

New transmission force mains and lift stations must be constructed to provide the capacity to transport the new connections' sewage to the treatment plant, and the treatment plant must be expanded to accommodate additional flows. These efforts are completed or underway through several projects comprised of: the Regional Transmission System, the Loveland Grand Master Lift Station, and the East Port Facility Expansion projects. The Regional Transmission System is composed of transmission force mains and master lift stations constructed throughout the Mid-County area, which will serve the new sewer connections identified in the FY 2007-11 CIP (Table 3) and additional S2S projects (Table 5). The Regional Transmission System has an estimated completion date of 2022. These projects are beneficial to the Charlotte Harbor ecosystem because they are integral in transporting and treating wastes that may have otherwise ended up in the Harbor through septic tank use.

Table 6: Supportive Projects Status and Funding

REGIONAL TRANSMISSION SYSTEM: FORCE MAINS AND MASTER LIFT STATIONS			
PROJECT AREA	**PROJECTED SEWER COSTS & STATUS**	**CWSRF Loan Amount**	**Local Funding Amount**
Parkside CRA Olean/Gertrude/Aaron	$5.0M completed	$0.0M	$5.0M
Parkside CRA Harbor Blvd.	$1.8M completed	$0.0M	$1.8M
Parkside CRA Ambrose/West Tarpon	$2.5M completed	$2.5M	$0.0M
Deep Creek Force Main	$3.6M completed	$3.6M	$0.0M
Morningstar/Spring Lake Blvd.	$1.2M completed	$1.2M	$0.0M
US 41	$2.1M completed	$0.0M	$2.1M
Midway Blvd. Phase 2	$4.0M completed	$0.0M	$4.0M
Edgewater Drive Phase 2	$2.5M completed	$0.0M	$2.5M
Midway Lakeview to Ellicott Force Main	$0.25M design phase	$0.0M	$0.25M
LOVELAND GRAND MASTER LIFT STATION Construction of a gravity interceptor and master lift station to convey existing and future wastewater flows to support S2S projects from Mid-County to the East Port Water	$1.2M design completed	$0.48M	$0.79M

Reclamation Facility (WRF).			
Construction of a gravity interceptor and master lift station to convey existing and future wastewater flows to support S2S projects from Mid-County to the East Port Water Reclamation Facility.	$23.6M completed	$23.6M	$0.0M
PROJECT AREA	**PROJECTED SEWER COSTS & STATUS**	**CWSRF Loan Amount**	**Local Funding Amount**
EAST PORT FACILITY EXPANSION, EQUALIZATION BASIN, RECLAIMED WATER RESERVOIR Associated projects incorporate phases that have been completed, are in progress or in design. SRF funding is being utilized for a portion of the reservoir expansion in Stage 5.			
Stage 1 & 2: Rehabilitation and Expansion	$12.2M completed in 2016	$0.0M	$12.2M
Stage 5: Reservoir Improvements and High Service Pump Station	$5.1M construction completion early 2020	$3.0M	$2.1M
Stage 3: Additional Treatment Train Capacity Improvements with AWT*	$3.6M design, $106M construction; targeted completion in late 2026	$56M	$50M
Stage 4: Additional Treatment Train Capacity Improvements	$106M targeted completion in 2030	$0.0M	$0.0M

*Advanced Wastewater Treatment (AWT)

State Revolving Fund (SRF) Loan Contribution towards Improving Water Quality in Charlotte Harbor

SRF loans have been instrumental in a number of the projects currently underway in the original FY 2007-11 CIP, additional S2S projects, the Regional Transmission System, the Loveland Grand Master Lift Station and the East Port Facility Expansion projects as outlined in Tables 3, 5, and 6. All of these projects have been identified as key components towards either converting septic to central sewer or supporting the transportation of sewage from new connections to the treatment plant as well as treatment plant upgrades resulting in overall water quality improvement to the Charlotte Harbor ecosystem.

Other Septic to Sewer Projects

Please see Table 5 and *Figure 11*.

Additional Efforts by Charlotte County to Measure Water Quality

To measure the impacts of the S2S projects on the water quality of Charlotte Harbor, CCU has secured partnerships with Western Michigan University, Florida Atlantic University, Johnson Engineering, Benchmark Labs, Sanders Labs, and Tetra-Tech to monitor the pre-and post-conditions on water quality surrounding and within the sewer expansion areas. These monitoring efforts have been underway since 2009. This monitoring consisted of over 70 groundwater monitoring wells, over 20 canal surface water monitoring sites, and storm water sampling. CCU contracted with Florida Atlantic University in 2016 to complete a baseline study of water quality in Charlotte Harbor. The results of this study identified septic systems as a key contributor to declining water quality in Charlotte Harbor. CCU is also partnering with Western Michigan University (WMU) to evaluate groundwater velocity to measure the transport of nutrient pollution from septic systems into Charlotte Harbor by measuring a tracer dye and Bromide that were added at measured amounts into the groundwater over a one-year period. The results of this study provided the information for WMU to develop a predictive model for nutrient pollution transport into Charlotte Harbor from septic loading in the AB-1 (Ackerman). The preliminary results of this model were completed and presented in November of this year, the link to this presentation can be found below. The results showed that it will take many years for nutrients from septic loading to be removed from the area. Additionally, 5 ground water monitoring wells were installed, and 2 canal locations in the Ackerman project area have been monitored quarterly to measure pre and post conditions for this septic to sewer project. Continued ground and storm water monitoring for the East and West Spring Lakes area (EWSL) was completed by Tetra-Tech and Johnson Engineering, and the results of the monitoring can be found in the EWSL Presentation linked below. Although the EWSL project has been completed, CCU continues water quality monitoring in EWSL by collecting samples from 6 groundwater monitoring wells and 2 canal sampling sites within the area with a plan to include stormwater in order to measure water quality improvement over the coming years. Charlotte County has also organized a Water Quality Task Force made up of various county departments, a link containing more information about the task force and its future goals can be found below. A new water quality manager has been hired to track water quality for Charlotte County. These efforts will result in a baseline of nutrients present in Charlotte Harbor and can be used with additional computer modeling to track sources of contamination - as well as provide information to the public on overall water quality and status of impairments.

FAU Water Quality Study:

https://www.charlottecountyfl.gov/core/fileparse.php/523/urlt/charlotte-county-hboi-fau-phaseI-final-report-12-12-16.pdf

EWSL Presentation:

https://www.charlottecountyfl.gov/core/fileparse.php/536/urlt/water-quality-presentation.pdf

WMU Model Presentation:

https://charlottecountyfl.gov/core/fileparse.php/523/urlt/septic-effluent-transport.pdf

Water Quality Task Force:

https://www.charlottecountyfl.gov/core/fileparse.php/523/urlt/column-5-19.pdf

Charlotte County Water Quality Tracking:

https://www.charlottecountyfl.gov/one-charlotte-one-water/

Overall Project Progression

Timeline

Based on FY 2007 Capital Improvements Budget/FY 2007-11 Project Detail (FY 2007-11 CIP), CCU initiated a number of efforts over the years to address the permit conditions. Table 7 below shows the timeline for these projects, as well as additional sewer projects that have been initiated or completed in conjunction with completing the proposed FY 2007-11 CIP Areas.

Table 7: Timeline and Activities Completed

Table 7: Timeline and Activities Completed	
Year	Action Items Completed Towards Meeting Specific Condition No. 18
2008	• Initial *planning* for S2S in AB-2 and Manchester Basin areas. • Pirate Harbor project *completed* providing central sewer service to 205 connections located on Charlotte Harbor. • CH-1 Charlotte Harbor low pressure sewer project *completed*. Completes approximately 95% of CH-1 CIP area centralized sewer infrastructure. • Line Extension program initiated providing opportunity for individual property owners to extend service. Allows option for service if septic failure occurs prior to a larger sewer expansion effort. • Rotonda Sands and Meadows project in design, providing for approximately 79 S2S connections. • East Port WRF sewer expansion design from 6 to 9 MGD initiated.
2009	• Feasibility study initiated by CCU to investigate most economical and feasible sewer treatment alternatives and identifying issues causing on-site system failures inclusive of areas between Manchester Basin and Little Alligator drainage basins south of US 41 and 776 encompassing approximately 17,000 properties, also known as 'Area 1.' Initiates groundwater and surface water monitoring program to evaluate impacts of failing on-site systems on water quality. • Line Extension program on-going; provides opportunity for individual property owners to extend service. • Rotonda Sands and Meadows project under construction, providing for approximately 79 S2S connections. • East Port WRF sewer expansion design from 6 to 9 MGD on-going.

2010	• Area 1 feasibility study completed. Initiated public outreach. It was determined to focus on one priority area, the area between West and East Spring Lakes, AB-2, as a Pilot Program with over 50% density. Project name is 'East and West Spring Lakes'. • Additional S2S project area Contract D/EWSL added to Pilot Program. • Line Extension program on-going; provides opportunity for individual property owners to extend service. • Rotonda Sands and Meadows project completed, providing for approximately 79 S2S connections. • East Port WRF sewer expansion design from 6 to 9 MGD on-going.
2011	• Planning for AB-2 and Contract D/EWSL is in progress. • Planning completed to provide Regional Transmission System force main to commercial area located on US 41 between Enterprise Drive and Sarasota County line. • Line Extension program on-going; provides opportunity for individual property owners to extend service. • Planning completed for area within CH-1 called 'North Shore' impacting 37 connections. • East Port WRF sewer rehabilitation/expansion design and permitting from 6 to 9MGD completed, Stages 1-2 portion of expansion including new aerobic digester, mechanical and electrical upgrades, and filter rehabilitation was bid.
2012	• Proposed AB-2 project with Contract D/EWSL to BCC; directed to re-evaluate project costs and central sewer alternatives. • Line Extension program on-going; provides opportunity for individual property owners to extend service. • Design in progress to provide Regional Transmission System force main to commercial area located on US 41 between Enterprise Drive and Sarasota County line. • East Port Water Reclamation Facility Stage 1-2 rehabilitation/expansion construction commences. • County approves moving forward with project within CH-1 called 'North Shore' impacting 37 connections. Design commences. Partial funding by Section 319 grant.
2013	• BCC approves AB-2 project and Contract D/EWSL. Full design commences. • Developed cost estimates and feasibility to provide sewer service to Cape Haze and El Jobean areas, both approximately 300 properties. Conducted public outreach. Property owner survey completed. • Line Extension program on-going; provides opportunity for individual property owners to extend service. • East Port Water Reclamation Facility Stages 1-2 rehabilitation/expansion construction on-going. • Design completed for CH-1 project called 'North Shore' impacting 37 connections.
2014	• AB-2 and Contract D/EWSL design completed, and project was bid, redesigned, repackaged, and bid again. • Line Extension program on-going; provides opportunity for individual property owners to extend service.

	• CCU presents central sewer expansion to BCC in a workshop, recommending areas of more than 50% population density as priority, and reviewing the associated transmission and treatment improvements required. • Construction commences on Regional Transmission System force main to commercial area located on US 41 between Enterprise Dr. and Sarasota County line. • East Port Water Reclamation Facility Stage 1-2 rehabilitation/expansion is under construction. • Construction completed for CH-1 project called 'North Shore' impacting 37 connections.
2015	• Line Extension program on-going; provides opportunity for individual property owners to extend service. • Construction on-going on Regional Transmission System force main to commercial area located on US 41 between Enterprise Drive and Sarasota County line. • Construction commences on Regional Transmission System force main to serve AB-2, Contract D/EWSL and other Little Alligator drainage basin areas in Ambrose St./W. Tarpon Drive areas and Midway Blvd. areas. • Design on-going for additional Regional Transmission System areas. • East Port Water Reclamation Facility Stage 1-2 rehabilitation/expansion is under construction. • Connections completed for CH-1 project called 'North Shore' impacting 37 connections. • AB-2 and Contract D/EWSL design completed, and project was bid, redesigned, repackaged, and bid again. Construction begins on portion of AB-2.
2016	• AB-2 construction underway and connections begin. Contract D/EWSL in redesigned and rebid. • Modification to Line Extension program provides for more affordable payment option for property owners requesting or requiring service. • Mandatory connection ordinance modified to require connection within 180 days of notice of availability. • Design on-going for additional Regional Transmission System areas. East Port WRF Stage 5 Reclaimed Water expansion design completed and bid. • CCU proposes Mid-County sewer expansion program to BCC showing design, construction, and connection phases for all areas greater than 50% density. BCC directs utility to secure consulting services to complete CCSMP for entire service area. Consultant Jones Edmunds commences on the CCSMP where goal is to create 20-year implementation plan for affordable, reliable, and efficient collection and treatment system for a sustainable environment. • CCU proposes three major sewer expansion projects, the areas known as El Jobean (approximately 600 properties); Countryman Ackerman (includes AB-1 and expanded area north and west) and US 41 (approximately 1,000 commercially zoned properties; intersects Manchester drainage basin). Projects not approved due to costs to property owners. • Construction continues on the Regional Transmission System force main to serve AB-2, Contract D/EWSL, and other Little Alligator drainage basin areas in Ambrose St./W. Tarpon Drive areas and Midway Blvd. areas. • CCU contracts with Florida Atlantic University which completes baseline water quality study of Charlotte Harbor prior to commencing overall sewer expansion

	plan. Surface water sampling and analysis for the N isotope and sucralose indicating pollution from septic tanks. • Design commences for AB-1 as well as expanded area to the east and northwest.
2017	• 31 line extensions completed. Property owners continuing to request service. • Construction completed on Regional Transmission System force main to serve AB-2 and other Little Alligator drainage basin areas in Ambrose St./W. Tarpon Drive areas and Midway Blvd. areas. • The portion of El Jobean east of SR 776, the most densely populated area in El Jobean, will be the initial stage to be constructed. The west side will be constructed as requests are received for service via Charlotte County's Line Extension program. Design of pump station and collection system in progress. • Design on-going for additional Regional Transmission System areas. Construction in progress on portion located at Morningstar Waterway adjacent to and within AB-2. • Construction in-progress for East Port WRF Stage 5 Reclaimed Water expansion project. Completion by early 2020. • Design continues for AB-1. Construction completed for a portion of AB-1 on Edgewater Drive. • AB-2 connections in progress. Contract D/EWSL under construction. • Consultant Jones Edmunds completed CCSMP and BCC approved as a planning document. CCSMP outlines priority sewer expansion areas over 15-year period along with project costs.
2018	• 67 line extensions completed. Property owners continuing to request service. • Design on-going for additional Regional Transmission System areas. Construction completed on portion located at Morningstar Waterway adjacent to and within AB-2. • AB-2 connections completed. Contract D/EWSL connections partially completed, final connections to be completed by early to mid-2019. • Design continues for AB-1. Project to proceed pending funding availability. AB-3, AB-4, HH-1, CH-2 evaluated and ranked as part of the CCSMP. Progress on these areas is pending funding availability. Line extensions in these areas will continue to accommodate septic failures and new construction. • Design of pump station for El Jobean completed and request for bids posted. Design of collection system in progress. • Construction in-progress for East Port WRF Stage 5 Reclaimed Water expansion project. Completion by early 2020. • Request for proposals for East Port WRF Facility Expansion in bid phase.
2019	• 31 line extensions completed. • Line extension program continues as funded by private development. • Design for El Jobean collection system completed. • Construction for El Jobean pump station in progress. Completion 2020. • Construction in-progress for East Port WRF Stage 5 Reclaimed Water expansion project. Completion by early 2020. • East Port WRF engineering consultant selected and under contract for East Port WRF Facility Expansion.

	• Design continues for AB-1 pump station and portions of collection system. Project is approved to move forward. SRF FDEP loan for design $2.1M and construction $22.5M.
2020	• Contract D/EWSL project is complete with only one remaining connection which is under mandatory connection status. AB-2 is complete with only 4 remaining connections under mandatory connection status. • Design completed and bid awarded for AB-1/Ackerman pump station and Zones 1 and 2; construction to begin in 2021. Connections to be started by late 2022. Design in progress for LPS Area and Zones 3 and 4. • Construction of El Jobean pump station has been completed. El Jobean collection system is under construction (2020-2021). Connections to start mid-to-late 2021 and continue through 2022. • Regional Transmission System design and construction: Harbor Blvd. Force Main completed; Olean/Gertrude/Aaron under construction; Deep Creek Force Main under construction; Loveland Grand Master Lift Station and Interceptor under construction. • East Port WRF facility Stages 3 and 4 designs in process of being updated with plans to be constructed by 2024. • Board approved project to provide sewer connections to certain properties along the US 41 corridor between Enterprise Dr. and the Sarasota County line. Project to be completed by 2021/22. • Board approved moving ahead with formal planning for AB-3/Lakeview Midway septic to sewer area. • There were an additional 19 connections completed that were not in the 2007 CIP areas, Alligator Basin, Manchester Basin, or the projects listed in Table 5. These connections were completed through the mandatory connection policy.
2021	• El Jobean collection system completed construction in 2021. Connections are underway and will be completed Mid-2022. • Complete Regional Transmission System design and construction: Midway Lakeview to Ellicott Force Main design continuation in 2022. At the time of this update, scope of design services is complete. • Olean/Gertrude completion in 2021. • Loveland Grand Master Lift Station completed in December of 2021. • Olean Force Main Project is in the planning stages for design in 2022. • The Charlotte County Board of County Commissioners (BCC) approved funding to design and construct improvements to meet Advanced Wastewater Treatment standards for the East Port WRF. This will be added to the expansion to 9MGD. • All EWSL Septic to Sewer On-site connection contracts are complete and closed. • AB-1/Ackerman vacuum station, Zone 1 and 2 construction contract awarded November 2020. Construction began in March 2021.
2022	• El Jobean connections performed by CCU contractor have been completed, several remain due to redevelopment of certain properties or agreement not being signed. • Complete Regional Transmission System design and construction: Deep Creek • Force Main nearing completion. Midway Lakeview to Ellicott Force Main design continuation in 2023. At the time of this update, scope of design services is

	complete. • East Port WRF facility Stages 3, 4 and AWT added to the design. • Construction for the AB-1/Ackerman vacuum station and Zones 1 and 2 is in progress. The design for Zones 3 and 4 and the LPS area are being finalized. • AB-3/Lake View Midway septic to sewer project preliminary engineering is in progress.
2023	• Construction for the AB-1/Ackerman vacuum station and Zones 1 and Zone 2 has been completed and connections in Zone 1 and Zone 2 started in Mid-2023. • Regional Transmission System design and construction: Deep Creek Force Main was completed in early 2023. • East Port WRF expansion facility Stages 3 and 4 design, including Advanced Wastewater Treatment completed, bid was awarded end of 2023. • AB-3/Lake View Midway septic to sewer project preliminary engineering was completed Mid 2023.
2024	• Lake View Midway septic to sewer project design commenced in mid-2023 and expected to be finished with design in mid-2025. First construction phase to start in 2025 to 2026. • Regional Transmission System design and construction: Midway Lakeview to Ellicott Force Main design 2025-2026 • East Port WRF facility Stages 3 and 4, including Advanced Wastewater Treatment, construction starting 2024. Completion estimated for 2026. • Construction for the AB-1/Ackerman Zones 3 & 4 and the LPS Area should start in late 2024. Connections in Zones 1 and 2 will continue in 2024. • Proceed with 5-year Sewer Master Plan priority areas based upon funding availability.

The Strategy for the Future

The main obstacle to proceeding further with all S2S projects is affordability. Based upon affordability calculations performed by the CCSMP consultant, Charlotte County property owners have a threshold of affordability towards contributing towards the cost of sewer infrastructure. The CCSMP cost analysis has shown that certain areas are more economical to provide service such as densely occupied properties located near or adjacent to existing facilities compared to others that are less densely populated and not located near existing facilities. The final CCSMP was completed in 2017 and provided an analysis and recommendation on the method for funding sewer infrastructure projects. Until that time, funding is limited based upon projected and existing CCU fiscal resources. CCU is applying for assistance through water quality improvement grants and legislative appropriation as well as the RESTORE Act. However, there is a substantial funding gap between available grants, the affordable amount to be paid by the property owners, and total project costs. SRF loans provide a significant relief on financing costs and will continue to be pursued, however CCU resources are at a threshold for obtaining additional financing.

Below summarizes the highlights planned for the coming year to address the FY 2007-11 CIP areas:

- Continue construction in AB-1/Ackerman Zones 1 and 2. Complete the design and bid award for AB-1/Ackerman Zones 3 and 4 and LPS area adjacent to AB-1.
- In AB-3/Lake View Midway continue work on the utility design and work toward forming a MSBU to help cover construction costs.

Additional S2S project areas will continue in the coming year as follows:

- Board approved project to provide sewer connections to certain properties along the US 41 corridor between Enterprise Dr. and the Sarasota County line. Project to be completed by 2025. Additional US 41 FDOT project sewer connections will occur with line extensions as developers move into the largely undeveloped areas and existing commercial properties connect to the system under the mandatory connection requirements. The US 41 project services commercially zoned properties.
- The Ackerman (areas adjacent and external to AB-1 per Table 5) LPS area and Zones 3 and 4 will follow construction of Zones 1 and 2 which have been constructed in 2023.
- Line extension program continues as funded by private development.

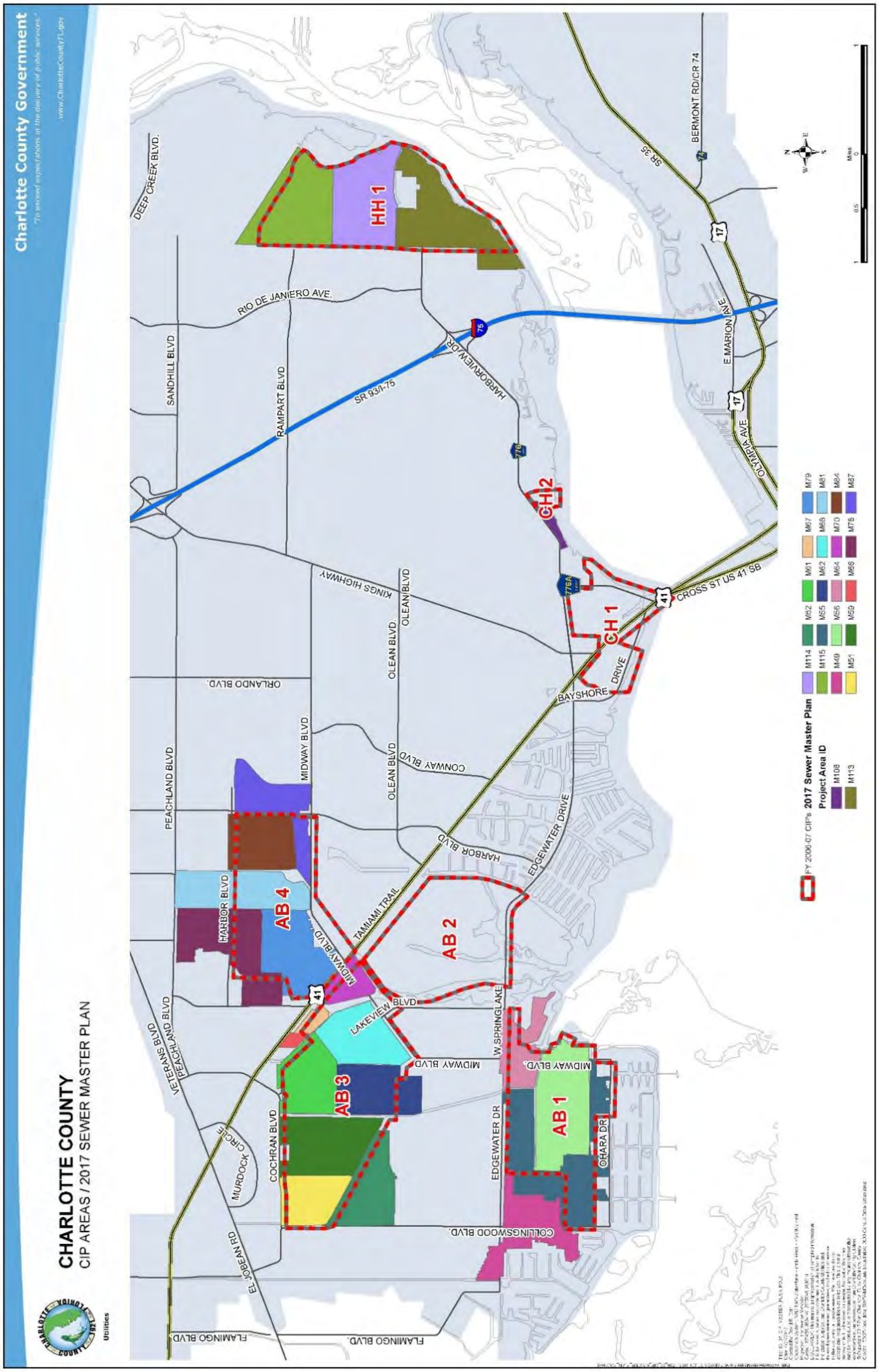
For all other areas where there are occupied lots with sewer facilities available, CCU will continue to proceed with enforcing the County's mandatory connection ordinance. The ordinance, section 3-8-41 in Charlotte County code, provides for a notification of service availability requirements and stepwise procedures for compliance.

Contact

The contact person responsible for implementing Specific Condition No. 18 is the following:

E. Dave Watson
Utilities Director
Charlotte County Utilities Department
3110 Loveland Blvd.
Port Charlotte, FL 33980
Tel. 941-883-4502
e-mail: Dave.Watson@charlottecountyfl.gov

APPENDIX A Map 2007-11 CIP Areas to Sewer Master Plan Areas



Cross-Reference Table:

Sewer Master Plan 15-year Priority Areas to 2007-11 CIP Areas

*A designation of M is for Mid County, S is for South County, and W is for West County

AB-1 Consists of These Sewer Master Plan Areas

AREA	ENVIRONMENTAL IMPACT SCORE				AVERAGE PRIORITY
	PROXIMITY	SEPTIC AGE	N LOADING	OVERALL	
M49	5	3	2	3-3.4	Not Considered a Fifteen Year Priority
M55	5	4	4	4-5	First Five Years
M56	5	4	5	4-5	First Five Years
M64	5	4	2	3.5-3.9	Not Considered a Fifteen Year Priority

SMP areas M49 and M64, formally known as regions of CIP area AB-1, did not meet the fifteen year priority criteria, because they are the least densely populated areas in this region. These two areas also contributed the least Nitrogen loading in the region, while the area with the highest average septic tank age in the region, was M49.

AB-3 Consists of These Sewer Master Plan Areas

AREA	ENVIRONMENTAL IMPACT SCORE				PRIORITY
	PROXIMITY	SEPTIC AGE	N LOADING	OVERALL	
M51	5	4	4	4-5	Third Five Years
M52	5	4	4	4-5	Third Five Years
M59	5	4	5	4-5	Second Five Years
M61	5	4	5	4-5	First Five Years
M62	5	4	5	4-5	First Five Years
M66	5	4	1	3-3.4	Not Considered a Fifteen Year Priority
M67	5	4	5	4-5	First Five Years
M68	5	4	5	4-5	First Five Years
M70	5	4	5	4-5	First Five Years

SMP area M66, formally known as a region of CIP area AB-3, did not meet the fifteen year priority criteria, because it is the least densely populated area, and contributes the least amount of Nitrogen loading in this region.

AB-4 Consists of These Sewer Master Plan Areas

AREA	ENVIRONMENTAL IMPACT SCORE				PRIORITY
	PROXIMITY	SEPTIC AGE	N LOADING	OVERALL	
M78	5	4	4	4-5	Second Five Years
M79	5	4	5	4-5	Second Five Years
M81	5	4	5	4-5	First Five Years
M84	5	4	5	4-5	Second Five Years
M87	5	4	5	4-5	Second Five Years

CH-2 Consists of Theses Sewer Master Plan Areas

AREA	PRIORITY
M108	Not Considered a Fifteen Year Priority, but discusses as future utility connection in Sewer Master Plan

HH-1 Consists of Theses Sewer Master Plan Areas

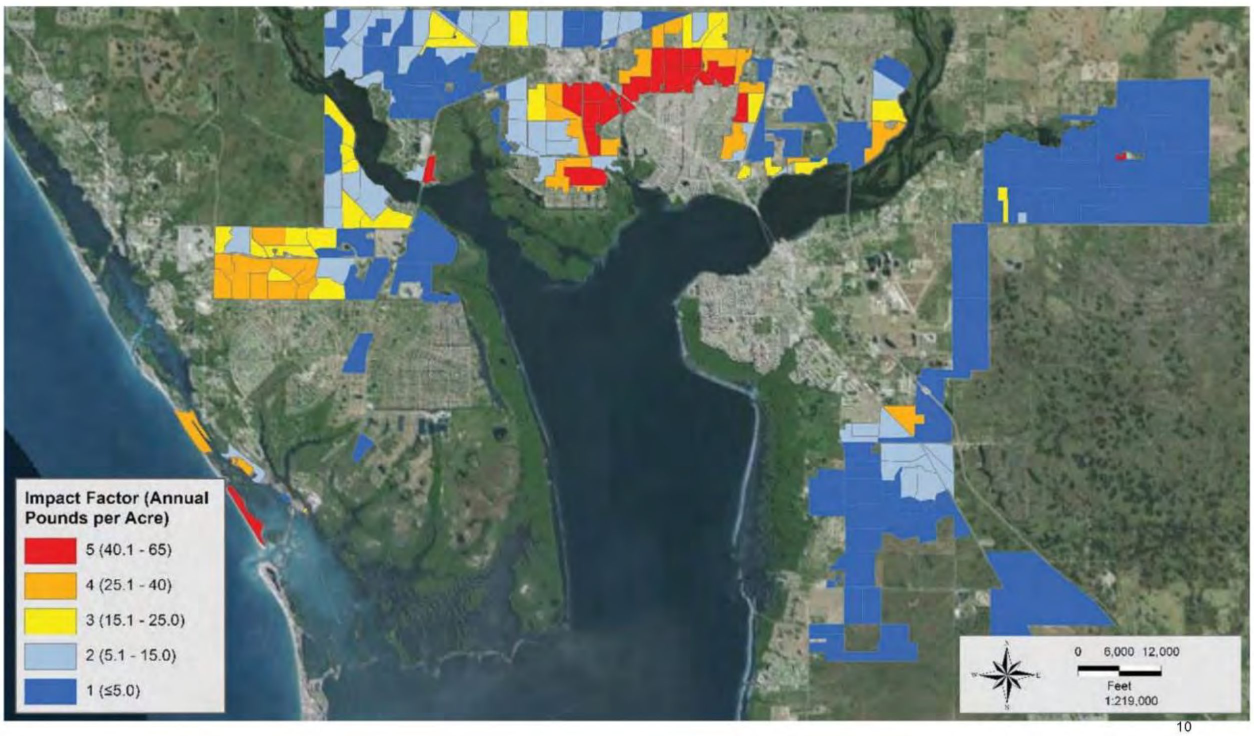
AREA	ENVIRONMENTAL IMPACT SCORE				PRIORITY
	PROXIMITY	SEPTIC AGE	N LOADING	OVERALL	
M113	5	4	2	4-5	Third Five Years
M114	5	4	3	3.5-3.9	Not Considered a Fifteen Year Priority
M115	5	3	4	3-3.4	Not Considered a Fifteen Year Priority

These ranking criteria were prepared by our consultant Jones Edmunds as part of the Charlotte County Utilities Sewer Master Plan.

APPENDIX C Sewer Master Plan Priority Ranking Criteria

11/3/2017

Nitrogen Loading



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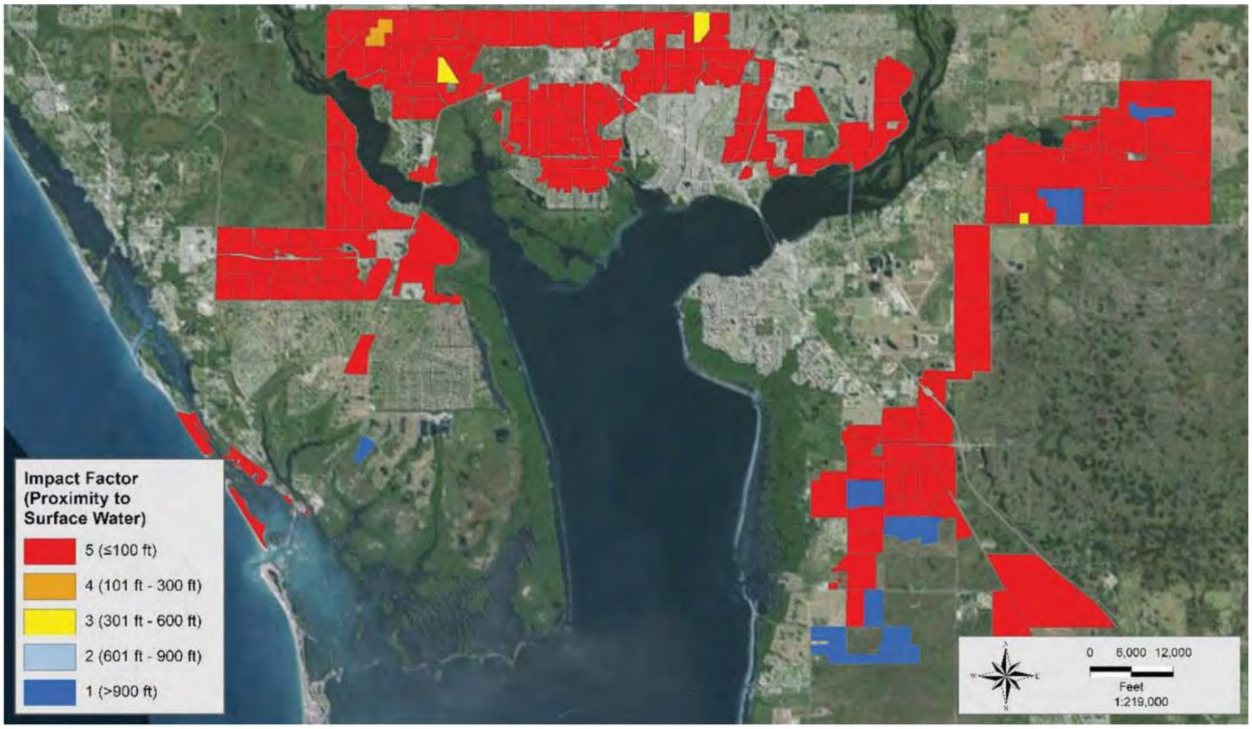
Proximity to Surface Waters

11/3/2017



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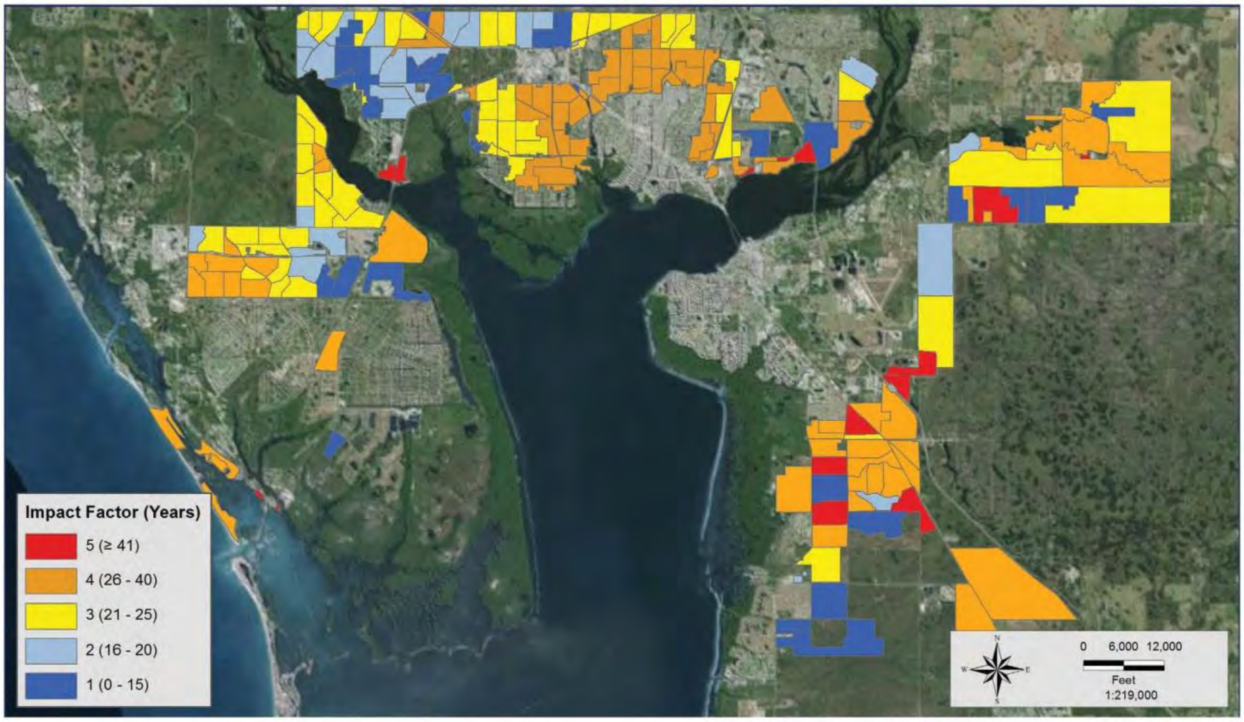
Age of Septic Tank

11/3/2017



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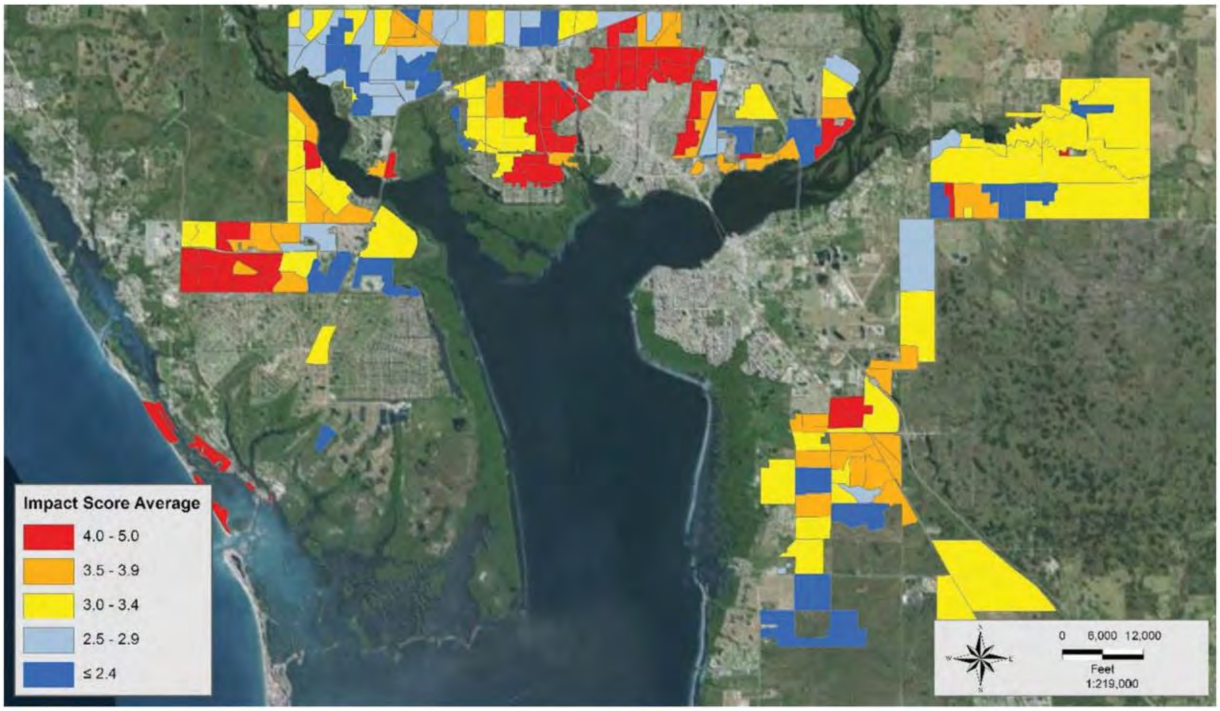
11/3/2017

Overall Impact Score



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Appendix E

West Port Water Reclamation Facility Expansion, Condition Assessment of Rotonda and West Port WRFs Technical Memorandum

West Port Water Reclamation Facility Expansion

Condition Assessment of Rotonda and West Port WRFs

FINAL

Charlotte County, FL
December 6, 2023

Prepared for:

CHARLOTTE COUNTY
FLORIDA

Table of Contents

Tables

Photos

Acronyms and Abbreviations

AADF	annual average daily flow
CCC	chlorine contact chambers
CCU	Charlotte County Utilities
CMOM	Capacity, management, operations, and maintenance
DO	dissolved oxygen
DP	distribution panel
EQ	equalization
ERP	Environmental Resource Permit
FDEP	Florida Department of Environmental Protection
FRP	fiber reinforced plastic
gph	gallons per hour
gpm	gallons per minute
GST	ground storage tank
HSPS	high service pump station
I&C	instrumentation and controls
LOF	likelihood of failure
MBR	membrane bioreactor
MCC	motor control center
MDF	maximum daily flow
MGD	million gallons per day
NEC	National Electric Code
RAS	return activated sludge
UV	ultraviolet
VFD	variable frequency drive
WAS	waste activated sludge
WBS	water booster station
WO	work order
WRF	Water Reclamation Facility
WTP	Water Treatment Plant

1 Introduction

In 1991, Charlotte County, Florida, formed the initial core of the Charlotte County Utilities (CCU) system in Mid County and in the Gulf Cove and South Gulf Cove areas of West County. The original water infrastructure included three water booster stations (WBSs), three ground storage tanks (GSTs), and approximately 610 miles of water mains serving approximately 28,500 water connections. The wastewater infrastructure included three water reclamation facilities (WRFs) (South Port and East Port in Mid County and West Port in West County) along with associated transmission lines and collection systems consisting of 140 miles of gravity and low-pressure mains, 56 lift stations, and 61 miles of force mains serving approximately 11,000 sewer connections. CCU eventually grew to operate wastewater, potable water, and leachate treatment plants. Over the years CCU has continued to acquire, upgrade, and construct facilities such as water treatment plants (WTPs), WBSs, and WRFs, and expand its collection and distribution system infrastructure as necessary to serve residents, meet demands, treat flows, and maintain permit requirements. CCU now owns and operates a total of four WRFs. The purpose of this report is to evaluate the condition of the West Port and Rotonda WRFs located in West County.

The West Port WRF is located in the Gulf Cove area of West Charlotte County at 15005 Cattle Dock Point Road, Port Charlotte. This WRF was purchased by Charlotte County in 1996. Its current permitted capacity is 1.2 million gallons per day (MGD) annual average daily flow (AADF). Reclaimed water production, reclaimed disposal, and reuse applications at the West Port WRF are regulated and operated through Florida Department of Environmental Protection (FDEP) Permit No. FLA014048. The West Port WRF is permitted to dispose of its treated effluent through either unrestricted-public-access reuse sites (the master reuse system) or deep injection wells. The West Port WRF currently shares the master reuse system allocation of 8.79 MGD AADF with the East Port and Rotonda WRFs. The reclaimed water use is permitted for 1.244 MGD AADF and the deep well injection has a capacity of 4.75 MGD maximum daily flow (MDF). There was a previously permitted spray field system at West Port; however, in April 2016, the system was removed from the permit and is no longer in service. The West Port WRF utilizes an activated sludge process to treat domestic wastewater. The treatment system includes screening, aeration basins with biological treatment, secondary treatment using clarifiers, filtration, disinfection, and a reclaimed water, spray field, and deep well effluent disposal system. The deep well disposal is shared with the Rotonda WRF. The waste activated sludge (WAS) is stored and gravity thickened on site, and then hauled to the East Port WRF for aerobic digestion, dewatering, and disposal.

The WRF located in West County that was assessed is the Rotonda WRF located at 3740 Kendall Road, Rotonda West. The facility was purchased by Charlotte County in 2000 and operates under FDEP Permit No. FLA014098. The Rotonda WRF has a rated treatment capacity of 2.0 MGD AADF and a rated reclaimed water disposal capacity of 1.005 MGD AADF. This WRF uses activated sludge in a membrane bioreactor (MBR) configuration coupled with high-level chlorination to treat wastewater. WAS pumped to the sludge holding/aerobic digesters is gravity thickened on site and then hauled to the East Port WRF for aerobic digestion and dewatering. Decanted supernatant recirculates to the headworks. Reclaimed water enters the on-site GST and a reclaimed water storage pond. An on-site pump station provides flow to the reclaimed water transmission system that is interconnected with the West Port WRF to increase reclaimed distribution in West Charlotte County.

The deep injection well (IW-1) is permitted as a Class I underground injection system U-001. It serves as the primary backup for handling excess reclaimed water produced at the West Port WRF. The injection well can also be used to accept excess reclaimed water flows produced from the Rotonda WRF. The maximum permitted West Port IW-1 combines West Port WRF and Rotonda WRF flows to reach the total 4.75 MGD MDF. Therefore, effluent from both WRFs can be distributed as reclaimed water to the unrestricted-public-access master reuse system or transferred to West Port WRF for injection into the deep well system.

HDR was selected by Charlotte County to evaluate options to maintain the existing capacity at the Rotonda WRF with necessary improvements and upgrades with projected future flows transferred to West Port WRF, or expand capacity at the Rotonda WRF to account for both existing and projected flows. The West Port WRF will be upgraded and expanded after an evaluation of treatment alternatives is conducted, as well as the evaluation for determination of the future of the Rotonda WRF.

This report describes major findings from on-site visual observations as well as a review of supplemental data provided by the County. HDR performed a site visit at both the West Port and Rotonda WRFs on June 21, 2023, to assess the overall physical condition of the current infrastructure and equipment. Staff interviews were also conducted to gain more insight and their input is reflected within this assessment. The facilities were evaluated based on their current structural, mechanical, electrical, and instrumentation condition along with remaining useful life, and previous work order (WO) count. These WO counts were provided by the County and include both corrective and preventative WO counts from the last 18 months. The WO counts were collected for each unit process at the plant and tallied. The facilities were not drained prior to the site visit, so HDR's assessment of infrastructure below the water surface was based on staff interviews. Visible above-ground and accessible areas were assessed.

This assessment will be used for further evaluation in the potential phasing, expansion, and decommissioning of these facilities.

2 Historical Data Review

HDR professional engineers with experience and qualifications in four major disciplines (structural, mechanical, electrical, and instrumentation) were onsite and reviewed historical data to conduct this condition assessment. The following documents provided by Charlotte County were reviewed prior to the site visit:

- Sewer Master Plan (Jones Edmunds, 2017)
- Potable Water Master Plan (Jones Edmunds, 2023)
- Reclaimed Water Master Plan (Jones Edmunds, 2023)
- SCADA Master Plan (McKim & Creed, 2020)
- Annual Report (Jones Edmunds, 2022 & 2023)
- CMOM (Kimley Horn, 2021)
- Previous 18-month WO Count for Rotonda WRF

3 Condition Assessment Framework and Criteria

The West Port WRF condition assessment was reviewed on a four-tiered asset hierarchy consisting of the following:

- Level 1: Facility (Rotonda and West Port WRFs)
- Level 2: Process (Preliminary Treatment, Secondary Treatment, Disinfection, etc.)
- Level 3: System (Influent Pump Station, Aeration Basins, Chlorine Contact Chamber, etc.)
- Level 4: Discipline (Structural, Process, Mechanical, Electrical, Instrumentation)

Scores for each Level 4 asset were provided from 1 to 5, with 1 being the best condition and 5 being the worst. As mentioned in the previous section, scores were based on a combination of observed conditions and comments on functionality and performance from accompanying Rotonda and West Port WRF staff. Table 3-1 presents further explanations of likelihood of failure (LOF) scores.

Table 3-1: LOF Scoring Explanations

Score	Meaning	Explanation
1	Excellent	Fully operable, well maintained, and consistent with current standards. Little wear or deterioration shown.
2	Satisfactory	Sound and well maintained, but showing slight signs of early wear. Delivering full efficiency with little or no performance deterioration. Only minor renewal or rehabilitation may be needed in the near term.
3	Moderate	Functionally sound and acceptable showing normal signs of wear. May have minor failures or diminished efficiency with some performance deterioration or increase in maintenance cost. Moderate renewal or rehabilitation needed in near term.
4	Severe	Functions, but requires a high level of maintenance to remain operational. Shows significant wear and is likely to cause significant performance deterioration in the near term. Replacement or major rehabilitation needed in the near term.
5	Unsafe/Non-Operational	Effective life exceeded and/or excessive maintenance cost incurred. A high risk of breakdown or imminent failure/or abandoned with serious impact on performance. No additional life expectancy with immediate replacement needed.

Table 3-2 provides the criteria used for assigning an LOF score to each asset. The LOF score is based on the condition assessment scores, the WO counts, and the estimated remainder of service life. All scores are provided from 1 to 5, with 1 indicating the best condition and 5 indicating the worst condition. The LOF score for each Level 4 asset is a weighted average of these three scores.

Table 3-2: LOF Scoring Criteria

Category	Weight	Excellent = 1	Satisfactory = 2	Moderate = 3	Severe = 4	Unsafe/Non-Operational = 5
Remainder of Service Life	30%	>90% of useful life remaining	>75% of useful life remaining	>60% of useful life remaining	>45% of useful life remaining	<30% of useful life remaining
18-Month WO Count	20%	**<10% LOF** *Structural:* 0 - 5 WOs *Mechanical:* 0 - 8 WOs *Electrical:* 0 - 5 WOs *Instrumentation:* 0 - 5 WOs	**<20% LOF** *Structural:* 6 - 10 WOs *Mechanical:* 9 - 16 WOs *Electrical:* 6 - 10 WOs *Instrumentation:* 6 - 10 WOs	**<30% LOF** *Structural:* 11 - 15 WOs *Mechanical:* 17 - 24 WOs *Electrical:* 11 - 15 WOs *Instrumentation:* 11 - 15 WOs	**<40% LOF** *Structural:* 16 - 20 WOs *Mechanical:* 25 - 32 WOs *Electrical:* 16 - 20 WOs *Instrumentation:* 16 - 20 WOs	**>50% LOF** *Structural:* >20 WOs *Mechanical:* >32 WOs *Electrical:* >20 WOs *Instrumentation:* >20 WOs
Condition Assessment	50%	• Like new • Reliable performance • Ample redundancy	• Minor defects • Mostly reliable performance • Fair amount of redundancy	• Moderate defects • Semi-reliable performance • Some redundancy	• Severe defects • Poor performance • Little redundancy	• Unsafe/non-operational • No redundancy

Each unit process at the WRFs was scored from 1 to 5 based on its structural, mechanical, electrical, and instrumentation condition. These condition scores were then considered alongside the remainder of service life and the WO counts to achieve the final LOF score. As shown in Table 3-2, each of these three criteria is weighted differently. These weights were assigned based on their respective importance, but can be adjusted based on client preference.

WO counts for each LOF level are higher for the mechanical discipline because most plant equipment is mechanical, so a higher WO count should be expected.

Remainder of Service Life was calculated based on how long each piece of equipment has been in operation in comparison to its intended life cycle. The longer a process unit has been in operation, the less time it has in its remaining useful life, thus resulting in a score closer to 4 or 5.

4 Rotonda WRF Condition Assessment

An overall summary of the Rotonda WRF condition assessment findings by the HDR team is shown through the LOF scores. Detailed information by key plant components used to derive the overall summary is provided in Sections 4.1 through 4.6 below. Overarching LOF scores for each discipline were calculated to inform planning for projects across process areas.

Table 4-1 shows the average LOF scoring for each Level 3 Discipline sorted by Level 4 Discipline. Blank cells indicate areas that were not assessed, or a scoring did not apply. Color was added for a better visual understanding of the resulting LOF scores based on Table 3-2. Color-coding is explained below:

- **Green** – Excellent (n < 1.5)
- **Yellow** – Satisfactory (1.5 ≤ n < 2.5)
- **Orange** – Moderate (2.5 ≤ n < 3.5)
- **Red** – Severe (3.5 ≤ n < 4.5)
- **Gray** – Unsafe/Non-Operational (n ≥ 4.5)

Table 4-1: LOF Scoring for Rotonda WRF

Area No.	Area Name	Average LOF Score				
		Structural	Mechanical	Electrical	Instrumentation	All
1	Flow Equalization	1.8	2.3	1.8	1.8	1.9
2	Headworks	2.6	3.3[1]	2.9	2.6	2.9
3	Anoxic/Aeration Basins	2.6	3.0	2.6	3.0	2.8
4	Membrane Bioreactors	2.4	4.0[2]	2.1	3.1	2.9
5	Chlorine Contact Basins & Chemical System	2.9	2.9	1.8	1.8	2.4
6	Reclaimed Water Storage Tank	1.9	1.3	1.3	1.3	1.5
7	Lined Reject Storage Pond	1.3		1.8		1.6
8	Unlined Reclaimed Storage Pond	3.7	3.7			3.7
9	Sludge Holding Tanks	1.8	1.8	1.8	1.8	1.8
10	RAS/WAS Pumps	1.3	2.3	1.8	1.8	1.8
11	Plant Drain Collection & Pumping System	1.8	1.8	1.8	1.8	1.8
12	Effluent Pump Station #1	1.8	1.8	1.8	1.8	1.8
13	Effluent Pump Station #2	2.3	1.8	1.8	1.8	1.9
14	Transfer Pumps	2.3	1.8	1.8	1.8	1.9
15	MCC Building #1	1.8		1.8	1.8	1.8
16	MCC Building #2	2.1		2.6		2.4
17	MCC Building #3	1.8	1.8	2.1	1.8	1.9

[1] Upgrades are pending construction.

[2] Existing membranes nearing end of useful life.

18	Administration Building	2.8	2.3		2.3	2.5
19	General Grounds	1.5				1.5

Based on the results of this condition assessment as shown in Table 4-1, the filtration processes at the Rotonda WRF and the unlined reclaimed storage pond are the most in need of upgrades. This aligns well with HDR's discussions with plant staff, in which it was generally communicated that the efficiency of Rotonda WRF's membranes and biological treatment processes could be significantly improved with upgrades.

Despite the unlined storage pond operating at poor conditions, the other storage equipment is in good shape and is operating effectively. It was noted by operational staff that the unlined storage pond has not been utilized in recent years and dredging as well as other upgrades will need to be performed if the pond is to be fully functional again.

Table 4-1 also indicates a need for overall headworks improvements. CCU is currently implementing a headworks upgrade project that will improve these scores following completion.

It is noted that the LOF scores are not generally poor. Although some of the equipment shows signs of wear and tear, 18-month WO counts and performance commentary from Rotonda WRF personnel indicate that much of the existing equipment is operational.

The following sections describe the condition of each component observed on June 21, 2023. Photos and detailed tables are included throughout.

4.1 Primary Treatment

4.1.1 Flow Equalization

The flow equalization (EQ) tank is a 0.3 MG above-ground storage tank with a capacity of approximately 247,000 gallons. The tank is a Crom Corp Prestressed Composite Tank (Gainesville FL), and was originally installed in 1977.

The team observed minor corrosion on the blower discharge accessories. The structure is in overall satisfactory condition along with the accompanying transfer pumps to the aeration basin. The fiber reinforced plastic (FRP) grating has ultraviolet (UV) sun damage and has lost some of its tread grit surface.

Photo 1: Rotonda WRF Flow EQ Tank

Table 4-2: Condition Assessment Results - Flow EQ Tank

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	2	1	1.8
Mechanical	3	2	1	2.3
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.1.2 Headworks

The headworks structure consists of two Baycor rotary drum fine screens, two grit cyclones, one grit "snail" washer, dumpsters, and overflow weirs. An improvement project is currently underway with all equipment, except the grit pumps, to be replaced as well as the additional piping to be reconfigured. CCU staff noted that the construction start date is dependent on the headworks screen delivery schedule; therefore, the timeline for completing the improvement project is unknown.

Both rotary drums are in operation; however, actuator valves for rotary drum screens are clogged and cannot fully close. The concrete foundation blocks under the rotary drum screens also showed signs of cracking and deterioration. Surficial rusting stains on the concrete near the dumpsters was observed and there is wear and tear on the overall instrumentation.

Overall, the structure shows no signs of settlement and only one minor hairline crack was observed in the concrete foundation. The structure is in moderate condition, but could use replacement of the FRP grating as included in the current headworks design.

Photo 2: Rotonda WRF Headworks Structure

Table 4-3: Condition Assessment Results - Headworks Structure

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	3[3]	3	1	2.6
Mechanical	3	4	3	3.3
Electrical	3	4	1	2.9

[3] Upgrades are pending construction.

Instrumentation	3	3	1	2.6

4.2 Secondary Treatment

4.2.1 Anoxic/Aeration Basins

The aeration/anoxic basins consist of an aerobic zone, an anoxic zone, a swing zone, four multi-stage centrifugal Hoffman blowers, fine-bubble diffusers, and dissolved oxygen (DO) probes. It was noted by CCU staff that the swing zone is often utilized as an anoxic zone.

The four blowers provide more air supply/capacity than what is currently required. The degree of redundancy with one blower out is uncertain. The MCC building for the blowers is no longer used and instead the blowers now operate out of MCC building 2. Overall, the blower station is in satisfactory condition with moderate corrosion on the system piping and electrical fittings.

There is some wear on the instrument display screens from sun exposure and there is little-to-no remote control offered; therefore, instrumentation and controls (I&C) could use upgrades due to UV sun damage. There is minor cracking on the FRP gratings that requires upgrades. Additional issues noted include corrosion on the electrical equipment, minor plant growth on the staircase, minor paint chips, and cracking of one area on the primary walkway. Structurally, the aeration basins are in satisfactory condition.

Photo 3: Rotonda WRF Anoxic/Aeration Basins

Table 4-4: Condition Assessment Results - Anoxic/Aeration Basins

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	3.5	2	1	2.6
Mechanical	3.5	3	2	3.0

Electrical	3.5	2	1	2.6
Instrumentation	3.5	3	2	3.0

4.3 Filtration

4.3.1 Membrane Bioreactors

The Rotonda WRF has four MBR trains, each containing three cassettes. Therefore, a total of 12 membranes are currently in use and the MBR basins are sized to handle 24 cassettes. The current cassettes were installed in 2009 and have an average life expectancy of about 10 years; therefore, they are beyond their useful life and are recommended for replacement. A discussion with plant staff indicated that new cassettes are being planned for installation with Memcor MemPulse membranes. The new membrane system is more efficient and could increase the permeate capacity of each cassette by approximately 60%.

The blowers were installed in 2009 and were observed to be in satisfactory condition. There was corrosion observed on the return gate valve. The acid room pump supports has noticeable corrosion. It was noted by plant staff that new stainless steel lines are to be installed in the acid room. All of the control panels mounted outside are showing signs of wear and UV sun damage. Plant staff indicated that one chlorine pump is being replaced. The current chemical storage area does not have overhead protection and although this is not required by code, the chemical storage totes could incur UV damage and impacts from weather. Overhead coverage is recommended to prevent further wear and damage. CCU also uses citric acid, which comes in 55-gallon drums, to clean the membranes once a year to remove the inorganics.

The overall structure of the trains is in satisfactory condition, but it is important to note that the membranes themselves could not be inspected. The FRP grating has UV sun damage and has lost some of its tread surface. It was observed that some edges of the waterstop are exposed and should be repaired.

Photo 4: Rotonda WRF MBR Membranes

Photo 5: Rotonda WRF MBR System

Table 4-5: Condition Assessment Results - Membrane Bioreactors

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	4	1	2.4
Mechanical	4[4]	4	4	4.0
Electrical	2	3	1	2.1
Instrumentation	3	4	2	3.1

[4] Existing membranes nearing end of useful life.

4.4 Disinfection

4.4.1 Chlorine Contact Basins and Chemical Storage and Feed System

There are currently two chlorine contact chambers (CCC) at the Rotonda WRF. The older one is slightly smaller with a capacity of 38,300 gallons and the newer one is larger with a capacity of 39,400 gallons. The two concrete CCCs contain splitter boxes, UV filter cloths, three chlorine feed pumps with a design maximum flow of 60 gallons per hour (gph) each, and three sodium hypochlorite storage tanks with a total volume of 5,100 gallons (1,700 gallons each).

The older, smaller CCC is in moderate condition and requires cleaning. The newer, larger unit is in satisfactory condition and no defective equipment was noted by operations. The high service pump station (HSPS) that sits atop the unit is further discussed in Section 4.6.5 below. Overall, the chambers themselves are clean, but minor hairline cracks were noted and the HACH equipment racks are deteriorating. Some exposed edges of waterstop should be repaired and the FRP grating appeared worn.

The chemical system accompanying the CCCs is in severe condition. The sodium hypochlorite is fed at 5mg/L and gets delivered to the plant at 2,500 gallons on a weekly basis. The chemical system enclosure should be rehabilitated due to hurricane damage, and it is suggested that the room be upgraded or completely replaced along with the corroded systems. The addition of a redundant system is highly recommended. Picture 7 below highlights the corroding system.

Photo 6: Rotonda WRF Chlorine Contact Basin

Photo 7: Rotonda WRF CCC Chemical System Room

Table 4-6: Condition Assessment Results - Chlorine Contact Basins and Chemical Storage and Feed System

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	3	4	1	2.9
Mechanical	3	4	1	2.9
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.5 Reuse, Disposal, and Storage

4.5.1 Reclaimed Water Storage Tank

The reclaimed water storage tank has a current capacity of 3 million gallons with a 110-foot-interior diameter and a wet elevation of 42 feet, 3inches. The tank was installed in 2007 and is a Precon Corporation tank (New Berry, FL).

Overall the tank itself is in excellent shape and showed no visible cracks or rusting. The structure was recently painted and is showing some hairline cracks in the new paint, but this does not appear to be a concern at present.

Photo 8: Rotonda WRF Reclaimed Water Storage Tank

Table 4-7: Condition Assessment Results - Reclaimed Water Storage Tank

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	1	4	1	1.9
Mechanical	1	2	1	1.3
Electrical	1	2	1	1.3
Instrumentation	1	2	1	1.5

4.5.2 Lined Reject Storage Pond

The lined reject storage pond has a current capacity of 2.6 million gallons. No liner issues or wear and tear were observed and the access opening to the pond is wide enough for the entry and exit of trucks.

Photo 9: Rotonda WRF Lined Reject Storage Pond

Table 4-8: Condition Assessment Results - Lined Reject Storage Pond

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	1	2	1	1.3
Mechanical	N/A	N/A	N/A	N/A
Electrical	2	2	1	1.8
Instrumentation	N/A	N/A	N/A	N/A

4.5.3 Unlined Reclaimed Storage Pond

The unlined reclaimed water storage pond is intended for a current capacity of 2.6 million gallons; however, major plant overgrowth is causing issues and decreasing the storage capacity of the pond. Sedimentation is visibly present, and dredging is needed for access and future usage of the pond. Overall, the pond is in severe condition. It is recommended that the pond be cleaned or filled in and replaced with a new reclaimed storage tank similar in size to the existing tank on site.

Photo 10: Rotonda WRF Unlined Reclaimed Water Storage Pond

Table 4-9: Condition Assessment Results - Unlined Reclaimed Water Storage Pond

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	4	5	1	3.7
Mechanical	N/A	5	1	3.7
Electrical	N/A	N/A	N/A	N/A
Instrumentation	N/A	N/A	N/A	N/A

4.5.4 Sludge Holding Tanks

The biosolids handling system onsite consists of two sludge holding tanks, which were previously converted from old clarifiers with center surface aerators in 2009. The two sludge holding tanks are currently operating in series in which one tank is used for decanting and one is used for thickening. Plant staff noted that they have the ability to decant out of both tanks if need be and flow can be transferred between the two. Sludge is transferred to sludge hauling vehicles via onsite quick connect hose, which is in satisfactory working condition.

Photo 11: Rotonda WRF Sludge Holding Tanks

Table 4-10: Condition Assessment Results - Sludge Holding Tanks

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	2	1	1.8
Mechanical	2	2	1	1.8
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.6 Miscellaneous

4.6.1 RAS/WAS Pumps

Sludge produced in the treatment process is pumped to two locations: first to the aeration basins as return activated sludge (RAS) to support microbial activities, and second to the two sludge-= holding tanks as WAS. Minor corrosion was present at each of the pump assemblies.

Photo 12: Rotonda WRF RAS Pump

Photo 13: Rotonda WRF WAS Pump

Table 4-11: Condition Assessment Results - RAS/WAS Pumps

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	1	2	1	1.3
Mechanical	3	2	1	2.3
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.6.2 Plant Drain Collection and Pumping System

The plant drain collection and pumping system was reported by CCU staff to not operate often due to low flows. When it is operating, it collects wastewater from the plant drain system and is in satisfactory condition.

Photo 14: Rotonda WRF Plant Drain Collection and Pumping System

Table 4-12: Condition Assessment Results - Plant Drain Collection and Pumping System

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	2	1	1.8
Mechanical	2	2	1	1.8
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.6.3 Effluent Pump Station #1

Effluent Pump Station #1 is from the unlined reclaimed pond. It is a high service pump station consisting of Flygt submersible pumps with 100 HP variable frequency drives (VFDs). Overall, it is in satisfactory condition.

Photo 15: Rotonda WRF Effluent Pump Station #1

Table 4-13: Condition Assessment Results - Effluent Pump Station #1

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	2	1	1.8
Mechanical	2	2	1	1.8
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.6.4 Effluent Pump Station #2

Effluent Pump Station #2 is from the ground storage tank. It is a high service pump station consisting of two vertical turbine pumps and one jockey pump that acts as a priming pump. This pump station does not operate at full capacity and can be expanded in the future to double its capacity. Besides expansion upgrades, the pump station showed minor rusting and some paint chipping.

Photo 16: Rotonda WRF Effluent Pump Station #2

Table 4-14: Condition Assessment Results - Effluent Pump Station #2

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	3	2	1	2.3
Mechanical	2	2	1	1.8
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.6.5 Transfer Pumps

There are effluent transfer pumps located on the chlorine contact chamber. This pump station helps transfer flow from the CCC to either the reclaimed storage tank or the reclaimed pond. Currently, there are only three pumps operating but a fourth pad is already constructed (as shown in Photo 16), indicating the stations ability to readily expand and add an additional pump. Overall, the pumps are in satisfactory condition, but minor rusting was observed, and one potential pump bearing may need replacement as indicated by the loud noise it generates while operating. Structurally, there is some corrosion on the pump support brackets mounted to the equipment pad.

Photo 17: Rotonda WRF Transfer Pumps

Table 4-15: Condition Assessment Results - Transfer Pumps

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	3	2	1	2.3
Mechanical	2	2	1	1.8
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.6.6 MCC Building #1

MCC Building #1 is located near the onsite generators closer to the headworks structure. This building experienced significant damage from Hurricane Ian in 2022, including damage to the roof, damage to the fascia boards or soffit, and loose hanging interior overhead lights. This impacts the structural integrity of the building; however, most electrical equipment is not outdated and in satisfactory condition. The main electrical components that are housed in this building include the main switchboard, panelboards, transformers, and controls for the grit pumps and WAS pumps.

Photo 18: Rotonda WRF MCC Building #1 - Main Electrical Building Exterior

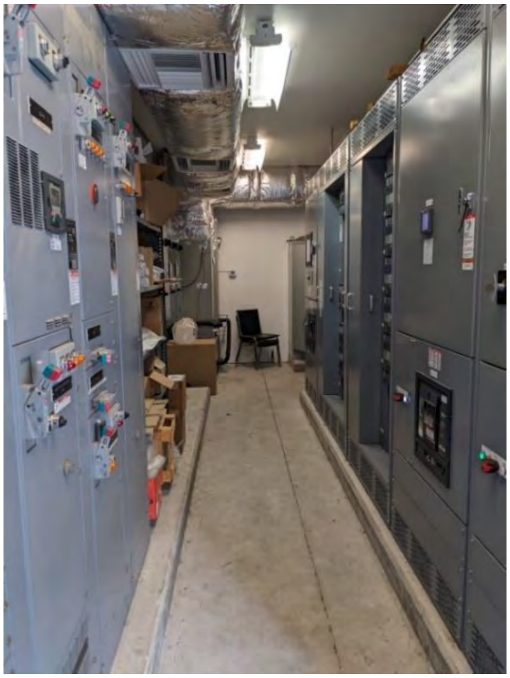


Photo 19: Rotonda WRF MCC Building #1 - Main Electrical Building Interior

Table 4-16: Condition Assessment Results - MCC Building #1 - Main Electrical Building

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	2	1	1.8
Mechanical	N/A	N/A	N/A	N/A
Electrical	2	2	1	1.8
Instrumentation	2	2	1	1.8

4.6.7 MCC Building #2

MCC Building #2 is located in the center of the facility close to the chlorine contact chambers and is referred to as ”Existing Control Building” according to the 2009 construction plans. This is the oldest MCC building of the three and it was built in 1995. The electrical equipment housed in this building includes the Distribution Panel (DP) and transformers. The DP itself was in unsafe/non-operational condition as shown in Photo 21 and was individually given a condition assessment score of 5, indicating a need for immediate replacement. The 135-LP-1 was given an individual condition assessment score of 3, and the Transformer Panel was given a score of 2. Overall, this equated to an electrical score of 3 for MCC Building #2. Structurally, the building itself is in moderate condition, but the electrical equipment inside the building requires attention.

Photo 20: Rotonda WRF MCC Building #2 - Existing Control Building

Photo 21: Rotonda WRF MCC Building #2 - Existing Control Building Interior- DP

Table 4-17: Condition Assessment Results - MCC Building #2 - Existing Control Building

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	3	1	2.1
Mechanical	N/A	N/A	N/A	N/A
Electrical	3*	3	1	2.6
Instrumentation	N/A	N/A	N/A	N/A

*based on the average score for the DP, the 135-LP-1, and the Transformer Panel

4.6.8 MCC Building #3

MCC Building #3 is located near the reclaimed storage tank and is referred to as the "West Electrical Building" according to the 2009 construction plans. The electrical equipment housed in this building includes panelboards, transformers, the controls for HSP 2 and 3, and the controls for VFD Stations 1 and 2. Overall the electrical equipment is in moderate condition, but the controls for HSP 2 and 3 require attention.

Photo 22 Rotonda WRF MCC Building #3 - West Electrical Building

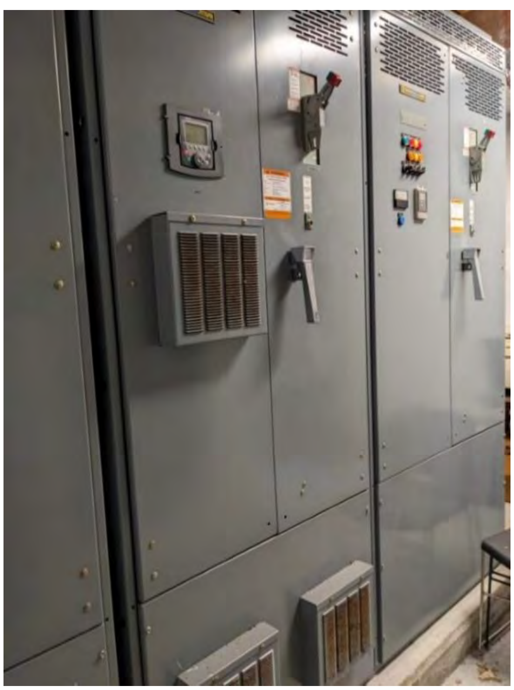


Photo 23: Rotonda WRF MCC Building #3 - West Electrical Building - HSP 2 and 3 Controls

Table 4-18: Condition Assessment Results - MCC Building #3 - West Electrical Building

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	2	1	1.8
Mechanical	2	2	1	1.8
Electrical	2	3	1	2.1
Instrumentation	2	2	1	1.8

4.6.9 Administration Building

The administration building consists of a small laboratory, the chief plant operator's office, a meeting room, restrooms, and a control room. The control room allows staff to utilize the SCADA network and evaluate plant operations from a central location. This is beneficial for plant analysis and real-time updates on plant functionality. The building is 13 years old and in satisfactory condition.

Table 4-19: Condition Assessment Results - Administration Building

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	4	2	1	2.8
Mechanical	3	2	1	2.3
Electrical	N/A	N/A	N/A	N/A
Instrumentation	3	2	1	2.3

4.6.10 General Grounds

Overall, the general grounds are well kept and in satisfactory condition. There is available area for limited expansion and added infrastructure. When deciding on future buildout, this available acreage will be strategically utilized.

Table 4-20: Condition Assessment Results - General Grounds

Level 4 - Discipline	Condition Assessment Score	Remaining Service Life Score	18-Month WO Score	LOF Score
Structural	2	N/A	1	1.5
Mechanical	N/A	N/A	N/A	N/A
Electrical	N/A	N/A	N/A	N/A
Instrumentation	N/A	N/A	N/A	N/A

5 Rotonda WRF Summary

The condition assessment of the existing Rotonda WRF infrastructure highlights several key areas where improvements are needed to optimize overall system performance and capacity. Overall the Rotonda WRF is in satisfactory condition, but there are three main processes that need the most attention in addition to minor upgrades throughout the plant.

The headworks equipment needs to be replaced, specifically screening components. The County is already in the process of ordering new Huber screens to replace the two current Baycor drum screens.

The membranes within the membrane bioreactor system also need replacing. The current membranes are over 10 years old and are operating past their intended useful life. The County is planning to replace the membranes after the headworks upgrades are complete. The County is currently evaluating potential membrane options, specifically Memcor MemPulse membranes, which would increase efficiency and plant capacity. Addressing the requirement for improved air supply to the MBR system is also crucial, as enhancing the air supply will significantly boost its processing capabilities and overall effectiveness. To support this, the compressors should be upgraded to maintain a reliable air supply, thus contributing to higher treatment efficiency.

Another major component of the Rotonda WRF that requires updates is the chemical feed system. The condition assessment shows this system is outdated and in severe condition. Immediate repair is suggested for optimal plant performance.

To enhance treatment efficiency, the addition of a second EQ tank is recommended, enabling better management and balance of influent flows. It has been observed that the MBR system operates more effectively with steady influent flows, underscoring the need to ensure a consistent flow pattern to enhance treatment outcomes.

Operational challenges also include scum accumulation in the aeration basin, necessitating the implementation of effective scum removal mechanisms. Addressing the foam issue in the aeration basin is essential. Furthermore, the recent slab failure in the aeration tank highlights the importance of reconfiguring flow through the aeration basin to prevent further structural issues.

The possibility of converting the Rotonda WRF storage ponds into usable space for future infrastructure is an option, although it necessitates careful design and planning due to the need for alternative stormwater storage solutions. The reclamation pond requires clearing, grubbing, and dredging to meet County requirements. Moreover, the County's interest in adding another tank for reclaimed water storage should be taken into consideration during planning.

In conclusion, these recommendations encompass various aspects of the treatment system and infrastructure, aiming to enhance efficiency, capacity, and overall functionality while adapting to the specific needs and opportunities of the Rotonda WRF site.

6 West Port WRF Condition Assessment

A condition assessment was performed at the West Port WRF; however, an in-depth analysis is not required, as the facility will be completely reconstructed and upgraded as a part of the expansion project to provide additional treatment capacity. Key features of the West Port WRF are shown in Photos 24 through 28 below. With the current infrastructure, most components are not appropriate for the future plant due to size or age and will need to either be removed or replaced. The aeration basin, however, will be assessed further for reuse, and HDR assumes that the grit drying pads, injection well, and monitoring well will not be removed. HDR also recommends that the Administrative Building be replaced with a new one built on the property.

A new chemical treatment system was recently installed, serving as a pretreatment for the plant influent. This system effectively reduces hydrogen sulfide (H2S), leading to better odor control and reduced corrosion issues within the plant. The operators have expressed positive feedback on the system's performance and its overall impact on plant operations. Additionally, the onsite sprayfields have been removed from the permit and taken offline, discontinuing their use in the plant's processes.

The upcoming expansion project requires careful consideration of several aspects. Firstly, a new hurricane-rated building is essential for administrative and operational purposes. While the existing building may be repurposed as a construction staging area during the project, plans for its possible demolition after construction need to be addressed. To improve efficiency, it is a possibility that the existing aeration basins will be retrofitted into an equalization tank. Ensuring appropriate sizing requirements and comparing them to the volume in existing basins will be crucial in this regard.

Moreover, the headworks at the West Port WRF require updates. Removal of the existing Parkson Rotary drum screens is proposed, and instead, Hydro-Dyne Great White center flow band fine screens will be installed as part of the expansion. The consideration of Lakeside Equipment products, known for their longevity at a previous plant in New Jersey, is being evaluated. However, specific details about the type of screen from Lakeside Equipment remain unspecified and require further analysis.

Regarding clarification processes, the expansion project favors the use of concrete units as opposed to the current metal clarifiers. For effluent disposal, the existing deep well's capacity of 4.75 MGD is deemed sufficient to handle the typical flow rate of 1,200 to 1,500 gallons per minute (gpm) from the Rotonda WRF, which corresponds to approximately 1.7 to 2.2 MGD. Nevertheless, a thorough review of pipe sizes is necessary, and considerations for pumping and piping upgrades should be made to accommodate potential capacity increases. Furthermore, exploring the possibility of directly piping Rotonda WRF effluent to the deep well is recommended.

To enhance sludge handling capabilities, the expansion project will include the installation of a new sludge filter press.

Electrical infrastructure also requires attention, with the need for a new MCC building. The existing MCC building is at full capacity, contains outdated equipment, and fails to meet present-day National Electrical Code (NEC) standards. Additionally, the building suffered damage during Hurricane Ian in 2022, necessitating its replacement.

The assessment highlights some uncertainties surrounding stormwater provisions and Environmental Resource Permit (ERP) information. Surrounding moats and effluent ponds are prevalent around delineated wetlands at West Port WRF, as described in HDR’s Environmental Assessment report, provided separately. However, the ERP for the original plant could not be found online, and only the ERP for the expansion of effluent ponds is available. It may be necessary to submit a special request to FDEP for the original ERP. The extent of stormwater provisions required for the new design remains unknown and requires further assessment.

In conclusion, the condition assessment provides essential insights for the successful implementation of West Port WRF expansion project. The identified measures aim to enhance the plant's efficiency, safety, and overall performance while addressing the increased demands on its wastewater treatment capacity. To finalize the expansion project plan and ensure its successful execution, comprehensive treatment technology evaluations will be required.

Photo 24: West Port WRF Headworks

Photo 25: West Port WRF Aeration Basins

Photo 26: West Port WRF Clarifiers

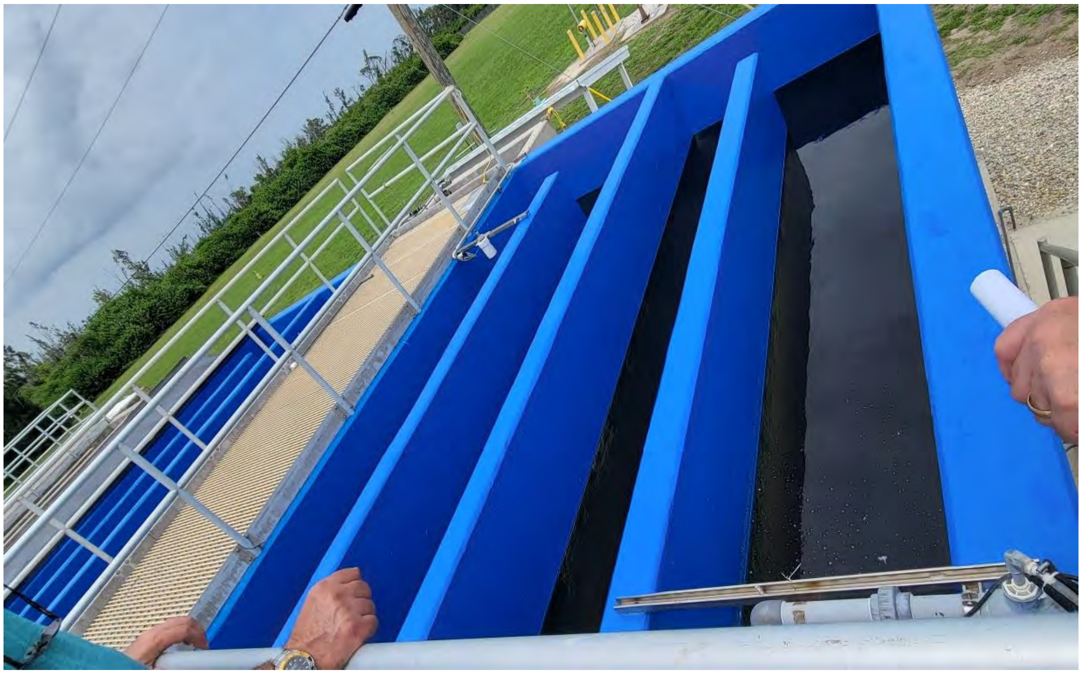


Photo 27: West Port WRF Chlorine Contact Chambers

Photo 28: West Port WRF Chemical Injection System

7 Review Comments

Overall, at the Rotonda WRF most of the equipment is in fair shape based on age, but will need regular, ongoing maintenance and repairs. A higher score is expected for the Rotonda WRF once certain repairs including the replacement of the headworks screens and the membrane upgrades are completed. The County noted that the Administration Building score for Rotonda WRF should not be a 1, it should be closer to a 3 or 4, which has been updated in the text. This TM can be considered final.

Appendix F

West Port Water Reclamation Facility Expansion Project, Rotonda WRF Multi-Decision Criteria Evaluation Technical Memorandum

West Port Water Reclamation Facility Expansion Project

Rotonda WRF Multi-Decision Criteria Evaluation

Technical Memorandum

FINAL

Charlotte County, FL

December 6, 2023

Contents

Tables

1. Introduction

Charlotte County Utilities (CCU) owns and operates two water reclamation facilities (WRFs) within its West County borders. The first WRF is the West Port WRF, which is currently permitted for 1.2 million gallons per day (MGD) annual average daily flow (AADF). The second WRF is the Rotonda WRF, which is currently permitted for 2.0 MGD AADF and a rated RCW disposal capacity of 1.005 MGD AADF.

The County is considering expanding or eliminating the Rotonda WRF. Rotonda WRF includes use of a membrane bioreactor (MBR). The MBR cassettes are nearing the end of their useful life and will require replacement. Though the WRF's AADF flows have been observed to be within 61% of its permitted 2 MGD design, the WRF capacity has observed peak hour flows (PHF) within 93% of the plant's hydraulically limiting MBR process of 4 MGD design permeate flow. indicating the facility needs to be expanded or flows transferred to an expanded West Port WRF. This Technical Memorandum evaluates the options for the future of the Rotonda WRF. A multi-criteria decision analysis (MCDA) was used to evaluate the options for Rotonda, which is described below.

The team attended a site visit on June 21, 2023 to assess the condition of the Rotonda WRF with regards to the quantity of necessary improvements to continue operating. The Condition Assessment of Rotonda and West Port WRFs, August 2023, has been submitted separately. An initial workshop was held on July 20, 2023 to review the preliminary criteria and alternatives developed.

1.1. Multi-Criteria Framework Approach

The MCDA is a semi-quantitative evaluation process that compares alternatives, projects or programs which have multiple objectives (e.g., regulatory complexity, affected landowners, ease of operations) and costs. HDR utilizes a customizable software called "Decision Spaces" to support MCDA tasks. The Decision Spaces program was used to assess project objectives, budgets, and goals against the key criteria developed during the initial workshop.

The MCDA process typically begins with a workshop including Owner staff, and key stake-holders. The group works together to identify the most important criteria for the particular project, in this case the criteria needed to assess the best solution for the future of the Rotonda WRF. Once the criteria are identified, they are weighted against each other using the pairwise system, which compares each criteria against one another to assess which is most important. The ranking of each criteria is calculated through the Decision Spaces program.

The next step is scoring the alternatives against the criteria with a score of 0-10, which is then applied to the ranking factor. The result will be a weighted score between 0-10 for each alternative, identifying the strongest alternative.

For this project, the relative budgetary cost estimate is critical in the evaluation. HDR performed a preliminary assessment of the criteria and alternatives and compared it to the budgetary estimate, which is summarized in this TM.

2. Multi-Criteria Decision Workshops

The first MCDA workshop was held on July 20, 2023. Attachment A includes the meeting minutes from the workshop. Prior to the workshop, HDR had drafted preliminary criteria that the County could utilize, shown in Table 2-1.

Table 2-1 Preliminary Criteria

Criteria
Maintain Reduced Staffing Hours
Reduce Impacts to Residents
Ease of Implementation (Permits)
Standardization of Equipment
Process Operation Complexity
Operational Flexibility

Alternative 1 is to eliminate the Rotonda WRF and build a 2.5 million gallon per day (MGD) AADF pump station in its place. This would require demolition of the Rotonda WRF infrastructure, expansion of the West Port WRF to 5.0 MGD (with advanced wastewater treatment [AWT]), a 2.5 MGD force main to be constructed between Rotonda and West Port, a 1.0 MGD reclaimed force main to be installed from West Port to Rotonda, and a second deep well to be installed at West Port.

Alternative 2 is to expand the existing Rotonda WRF infrastructure to 2.5 MGD with AWT. This would require a new reclaimed storage tank, a new equalization storage tank, new membranes to be installed in 2025 and 2040, expansion of the West Port WRF to 2.5 MGD (with AWT), and a new deep well installed at Rotonda. The membranes are past the end of their service life and would need immediate replacement in advance of any other facility upgrades at Rotonda. The Rotonda WRF infrastructure that needs to be expanded to achieve 2.5 MGD capacity includes, but may not be limited to, expanding the biological process system, adding additional MBR cassettes to increase permeate capacity, increasing effluent pumping capacity , and potentially adding additional equalization.

Beyond 2.5 MGD AADF, the level of needed infrastructure begins to escalate to all treatment processes, including headworks additions, potentially additional blower capacity, and additional disinfection capacity. This could begin to require major site adjustments or process reconfigurations that will drastically increase construction cost and complexity. Thus, 2.5 MGD AADF is projected to be a reasonable plant buildout capacity.

3. Rotonda Assessment Criteria

HDR and the County discussed seven criteria for the Rotonda WRF evaluation and performed an initial weighting using the Decision Spaces tool. Table 3-1 identifies the criteria, the description, and the weighting. The higher the % indicates that criteria is more important when scoring the Alternatives. Process Operation Complexity was identified as the most important criteria, and east of implementation in terms of permitting was identified as the least important criteria.

Table 3-1 Criteria Weighting

Criteria	Characteristics	Weighting
Maintain Reduced Staffing Hours	Keeps staffing numbers and hours to a minimum based on regulated flows and loads.	16%
Reduce Impacts to Residents	Reduces construction impacts to neighborhoods.	18%
Ease of Implementation (Permits)	No significant issues identified for permitting. Can site new facilities without need for additional right-of-way or easements.	13%
Standardization of Equipment	Consistency and similarity throughout different facilities and plants across Charlotte County.	16%
Process Operation Complexity	Minimizes likelihood of downtime for process + maintenance.	20%
Operational Flexibility	Maintain operations at multiple sites to balance flows and loads. Opportunity for treatment flexibility and emergency resilience if one plant is offline for a period of time.	17%

4. Alternatives Analysis

The final step in the analysis is to apply the criteria to each alternative and assess the overall score of each. Each criteria was given a score of 'Very low', 'Low', 'Moderate', 'Strong', or 'Very Strong'. Table 4-1 summarizes the comparison that was completed.

Table 4-1 Alternative Evaluation

Criteria	Alternative 1 – Eliminate Rotonda	Alternative 2 – Expand Rotonda to 2.5 MGD
Maintain Reduced Staffing Hours	Eliminating Rotonda requires West Port to be expanded to greater than 3.0 MGD, requiring the plant to need 24/7 operation by 2026. **[Very Low]**	Maintain Rotonda allows Rotonda to stay below the 3.0 MGD threshold, and allows West Port WRF to delay needing the 24/7 operation until 2045. **[Strong]**
Reduce Impacts to Residents	Eliminating Rotonda requires a new 9-mile pipeline to be installed between Rotonda and West Port, greatly impacting the residents. **[Very Low]**	Maintaining Rotonda does not directly impact the residents before 2045, since no new pipelines need to be installed. **[Very Strong]**
Ease of Implementation (Permits)	Eliminating Rotonda requires additional permitting for the new 9-mile pipeline to be installed between Rotonda and West Port, reducing the ease of implementation. **[Very Low]**	Maintaining Rotonda does not require the additional pipeline permitting, but will still require some permitting for the WRF expansion. **[Moderate]**
Standardization of Equipment	Eliminating Rotonda improves the County's goal of standardizing their equipment because it would eliminate the MBR system, which is only used at Rotonda. **[Very Strong]**	Maintaining Rotonda does not meet the County's goal of standardizing the equipment because it maintains the use of the MBR system. **[Very Low]**
Reduces Process Operation Complexity	Eliminating Rotonda reduces the process operation complexity because the proposed process at West Port will be similar to existing facilities. **[Strong]**	Maintaining Rotonda increases the process operation complexity because it keeps the MBR system in place, which is a more complex process versus existing facilities and is more energy consumptive. **[Low]**
Operational Flexibility	Eliminating Rotonda reduces Operational Flexibility because there is only one facility for treatment in West County. During storms, or large maintenance, there is no flexibility to treat all the flow. **[Very Low]**	Maintaining Rotonda increases operational flexibility because flow can be sent to either station and if a storm impacts one facility, the County can divert flow to the other WRF. **[Strong]**

Each criteria weight is multiplied by the score given to each alternative. The value of the score is assessed by the Decision Spaces program and summarized in Table 4-2. Alternative 1 – Eliminating Rotonda scored lower than Alternative 2 – Expanding Rotonda.

Table 4-2 Alterative Scoring

Criteria	Criteria Weight	Alternative 1 – Eliminate Rotonda		Alternative 2 – Expand Rotonda to 2.5 MGD	
Maintain Reduced Staffing Hours	16%	13	2	88	14
Reduce Impacts to Residents	18%	10	2	90	16
Ease of Implementation (Permits)	13%	17	2	83	11
Standardization of Equipment	16%	90	14	10	2
Reduces Process Operation Complexity	20%	70	14	30	6
Operational Flexibility	17%	13	2	88	15
SCORE	100.00%	36		64	

5. Engineers Opinion of Probable Construction Cost

A Relative Budgetary estimate range was developed for both alternatives based on the elements that are to be upgraded, following Class 5 AACE practices. Table 5-1 summarizes the costs for each alternative. The estimate is provided in a range because there are still a variety of project elements that are not defined. The intent of the budgetary estimate is to provide an understanding of the extent to which certain critical elements will cost, which may become the deciding factor in this decision. The backup to the estimate is provided in Table 5-2.

Table 5-1 Relative Budgetary Estimate

	Relative Budgetary Estimate
Alternative 1 – Eliminate Rotonda	$180M -$230M
Alternative 2 – Expand Rotonda to 2.5 MGD	$100M-$150M

Table 5-2 Budgetary Estimate Backup

Alternative 1 - Eliminate Rotonda		Alternative 2 - Expand Rotonda to 2.5 MGD	
Demolish Rotonda	$6M	3 new membrane trains	$1.5M
Expand West Port to 5MGD	$150M	Expand West Port to 2.5 MGD	$75M
Reclaimed Water Line back to Rotonda 1 MGD (16")	$15M	Rotonda AWT Improvements 2.5 MGD	$35M
Rotonda Pump Station 2.5 MGD	$8M	reclaimed storage tank 5MG + remove pond	$1M
Sewer Forcemain to West Port 2.5MGD (24")	$20M	New Rotonda Deep Well + monitoring well	$5M
New West Port Deep Well	$5M	New EQ Tank + pumping	$8M
		Membrane Replacement in 10 years	$1.5M
	$204M		**$127M**

6. Recommended Alternative

Based on the Relative Budget estimate difference of $80M, HDR recommends Alternative 2 of expanding the Rotonda WRF to 2.5 MGD. Beyond 2045, an additional evaluation of flow demands will be required to assess pumping od excess flows from Rotonda WRF to West Port WRF.

7. Review Comments

The County agrees with the recommendation of keeping the Rotonda WRF and maximizing its existing value. The County is in the process of replacements to the headworks screen and upgrading the membranes. These projects and other investments, as well as the high cost and neighborhood impact of installing a repump station and force main are the major drivers in the decision to keep and maintain operation of Rotonda WRF. The target capacity for Rotonda WRF will be between 2.0 and 2.5 MGD due to Class 1 Reliability requirements, and capacity beyond this will require substantial improvements and additions. The Rotonda WRF will also need to be upgraded to AWT standards amongst other improvements. It is being considered to add a deep well at the Rotonda WRF.

Additional operational cost analysis for the two options was prepared and is included in Attachment B.

During the review meeting, HDR presented the critical items needed to be updated at Rotonda to keep it operational in the time being, however, there are no items that need to be updated at Rotonda prior to the overall upgrade project, since the County is already making modifications to the headworks and membranes. The items noted in Table 5-2 for Alternative 2 outline the key elements to be replaced that will be covered in the design. Upgrades to the chlorination system, and chlorination building are included in the costs for the AWT upgrades item.

ATTACHMENT A

Meeting Minutes

Project:	**West Port Water Reclamation Facility Expansion**
Subject:	**Progress Meeting #1**
Date:	Thursday, July 20, 2023
Location:	Teams
Attendees:	Bruce Bullert – Charlotte County Basia Baster – Charlotte County Dan Atkinsson – Charlotte County Cory Schulte – Charlotte County Jamie Zimmermann – HDR Ryan Messer – HDR Jamie Fischer – HDR David O'Connor – HDR Rich Atoulikian – HDR Anthony Holmes – Jones Edmunds Chris Makransky – Jones Edmunds Luis Castro – Jones Edmunds

	Topic	*Facilitator*
1	**Sewer Master Plan Project Update** *See separate project meeting minutes.*	Chris Makransky
2	**West Port Expansion Project Update**	Jamie Zimmermann

Work progress to date:

- Site Visit conducted 6/21 to West Port and Rotonda with Design Team
- Developed 3D layout model and process models for West Port Expansion options and Rotonda Expansion options.
- Preparing Treatment Summary slides for AWT at West Port – to be presented at next progress meeting (8/17)

The next progress meeting will be scheduled for 8/17/23. Treatment alternatives will be presented.
HDR to set up recurring monthly progress updates on the third Thursday between 10am-12pm.

Additional discussion is needed on targeted nutrient removal limits. Bruce noted that the Charlotte County Board has directed all plant upgrades to follow AWT requirements. Per Section 403.086(10)(b), F.S., AWT provides a reclaimed water product that contains, on an annual average basis, not more than

- 5 mg/L Biochemical Oxygen Demand (cBOD5),
- 5 mg/L total suspended solids (TSS),
- 3 mg/L total nitrogen (TN),
- and 1 mg/L total phosphorus (TP) if phosphorus of an impacted water body is the limiting nutrient.

Though no studies have documented Charlotte County's reclaimed water distribution system's impact on Charlotte Harbor, Charlotte Harbor is not phosphorus-limited. East Port WRF expansion project includes ferric sulfate addition at the re-aeration stage secondary treatment for chemical phosphorus removal as needed. Bruce noted phosphorus removal is not a current priority but requested the West Port WRF Expansion and Rotonda WRF Evaluation project should include room and design considerations for future phosphorus removal.

To achieve AWT requirements at the Rotonda WRF, the HDR Team will evaluate the feasibility for additional secondary biological treatment facilities on the site.

Bruce desires consistency between the County's facilities; in particular equipment standardization.

Bruce noted that the Rotonda WRF has additional surrounding property owned by the County that could be used for expansion, or potable reuse. At West Port, the County could work to obtain more property if needed. The available property will be included in the environmental assessment.

More reclaimed water storage is needed at the Rotonda WRF and the existing unlined pond that has known issues should be considered to be filled and replaced with additional onsite ground storage tanks.

The County noted to include in the evaluation to install a new Deep Injection Well for effluent disposal at the Rotonda WRF. Presently, the location cannot be assessed until the decision has been made of whether to keep Rotonda WRF or convert it to a pump station. Once that decision is made, an onsite deep well location can be evaluated. This will be included in the PER.

Bruce asked what the expected life of the MBR is. HDR noted that it should be 10-15 years for the cassette, but this is dependent on the quality of the filtering upstream. The concrete basin is expected to last longer, typically up to 50 years if designed, construced, and maintained adequately. The new Memcore system being planned for installation is a more modern cassette assembly and has a higher through-put potential.

Bruce asked if a permanent crane system had been considered for removal/replacement of cassettes. This will be evaluated prior to the PER if Rotonda WRF is to be upgraded to AWT and expanded.

The service area for the Rotonda WRF is being reviewed under the Sewer Master Plan (SMP) Update Project. Once the SMP Update has the sewersheds confirmed, this project will utilize the flow projection. This project is not evaluating sewersheds. Bruce noted there are two other utilities nearby (Sandal Haven and Gasparilla Island) that could be routed to the Rotonda WRF in the future.
This project, in conjunction with the SMP flow projections, will look at the flow limitations of the existing Rotonda WRF facilities.
Operations is using a new collection system odor control strategy for mitigating the issues in the East Port WRF Master Lift Station Influent Interceptor.
The condition assessment report is being drafted. At a high level, the site visit observed the following:

- Rotonda WRF:
    - Most equipment in good shape
    - Some minor repairs needed
- West Port WRF:
    - Most equipment is in fair shape but undersized and should not be incorporated into the expansion project.
    - Aeration basins are in good condition and could be reused for EQ

- Administration buildings is in good condition and should be considered for being incorporated into the WRF.

Project Schedule

- Environmental Assessment TM – August 2023
- Draft Flows & Loads TM – August 2023
- Progress Meeting 8/17/2023
- Draft Treatment Alternatives TM – September 2023
- 2nd Rotonda Evaluation Workshop – 9/21/2023
- Rotonda Evaluation TM – October 2023
- Begin BODR – October 2023

3	**Rotonda Multi-Criteria Decision Assessment (MCDA) – Workshop 1**	Jamie Zimmermann

Jamie presented the preliminary MCDA assessment program results.
Higher Scoring is better.
Some assumptions were discussed prior to the assessment:

- Costs are preliminary and should be considered for comparative purposes only.
- Pipeline between the two WRFs for conveyance of Rotonda WRF to West Port WRF assumes 36" nominal diameter for Rotonda WRF Replacement with pump station option.
- Rotonda WRF Expansion – Preliminary site plan and preliminary costs shown did not conceptualize upgrading to AWT.
- West Port WRF Expansion – Preliminary site plan and preliminary costs shown did not conceptualize upgrading to AWT.
- Flow projections are not finalized yet. West Port WRF capacity is adjusted based on current Rotonda WRF flows.

The criteria proposed for the MCDA are as follows:

- Resiliency/Redundancy
- Minimize Operational Effort
- Reduce Impacts to residents.
- Ease of Implementation
- Standardization of Equipment
- Phasing Flexibility

An additional criterion around staffing was added (see below), and some definitions of the criteria were modified. Staffing is a concern. It is difficult to obtain new hires, and depending on the size of the plants, additional staffing may be required. One question was – can central operations operate the facilities remotely? The team needs to review Florida statutes. The statue states a Class A facility at 3.0 MGD or above requires 24hour/day, 7days/week operator onsite. A Class B facility, between 0.5 MGD and 3.0 MGD quires 16hour/day, 7day/week Operator onsite.

A second concern was the potential for the main processes to go down, and the effort to maintain them. These will be re-defined and evaluated through the decision matrix.

Bruce noted with the growing low-pressure systems, odors may become an issue at West Port WRF. This can be further discussed during West Port WRF preliminary design.

This was a preliminary run-through to discuss the options and key criteria. HDR has completed the matrix again and has included as an attachment.

The overall equipment age is important to consider during Condition Assessment Report to identify if there are any immediate changes that need to occur at either plant to keep them running until construction starts in 2025.

Bruce would like to see a list of equipment replacement needs and costs associated (based on the findings of the condition assessment). These could be considered as rehabilitation and replacement needs to keep the facilities operational as the plant improvements design and implementation is moving forward.

4 **Action Items**

1. Schedule Monthly Progress meeting.

West Port Water Reclamation Facility Expansion

July Progress Meeting + Rotonda Evaluation

July 20, 2023

AGENDA

- Sewer Master Plan (JE) Progress Update
- West Port Expansion Progress Update
  - Models
  - Condition Assessment
  - Schedule
- Rotonda MCDA

West Port Expansion Progress Summary

- Site Visit conducted 6/21 to West Port and Rotonda
- Developed 3D layout model and process model
- Preparing Treatment Summary slides for AWT at West Port – to be presented at next progress meeting (8/17)

West Port Phasing Plan (1)

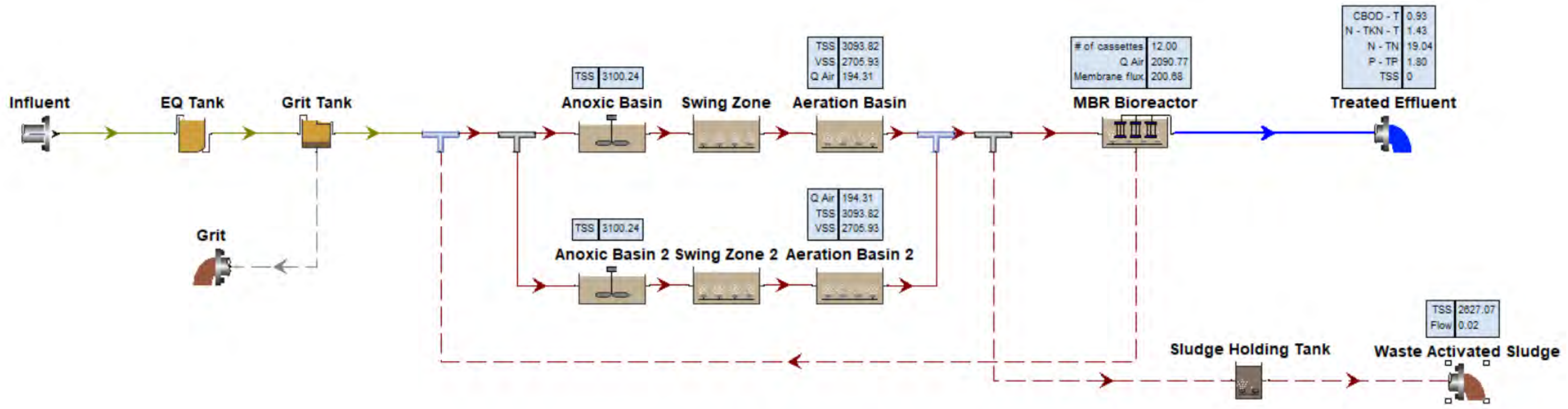
- MLE

West Port Phasing Plan (2)

- AGS

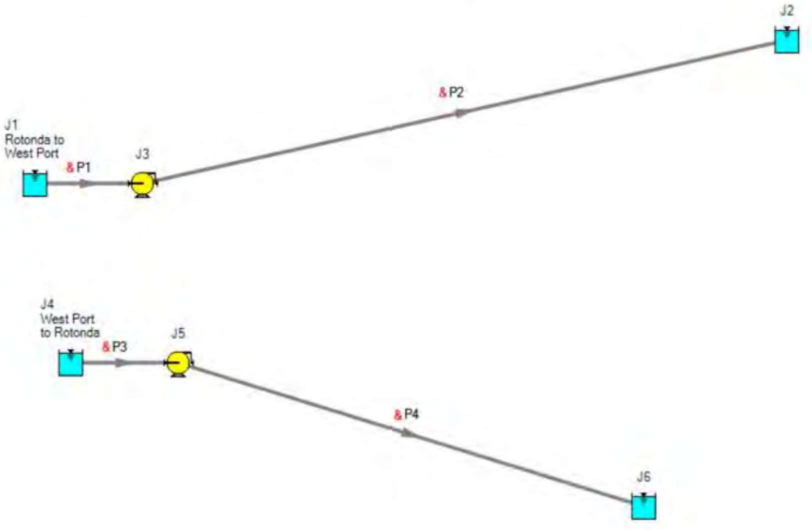
Rotonda Expansion Plan

Biowin Model



Fathom – Pipe Flow

Pipe	Name	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	P Static Max (psia)	P Static Min (psia)	Elevation Inlet (feet)	Elevation Outlet (feet)	dP Stag. Total (psid)	dP Static Total (psid)	dP Gravity (psid)	dH (feet)	P Static In (psia)	P Static Out (psia)	P Stag. In (psia)	P Stag. Out (psia)
1	Pipe	13,889	5.851	26.59	25.98	18.00	16.00	0.6103	0.6103	-0.8654	3.410	26.59	25.98	26.82	26.21
2	Pipe	13,889	5.851	91.35	27.53	16.00	26.00	63.8148	63.8148	4.3270	137.481	91.35	27.53	91.58	27.76
3	Pipe	8,333	9.693	30.55	26.45	10.00	10.00	4.1045	4.1045	0.0000	9.486	30.55	26.45	31.18	27.08
4	Pipe	8,333	9.693	316.31	14.93	10.00	32.00	301.3761	301.3761	9.5193	674.506	316.31	14.93	316.94	15.56



Score	Meaning
1	Very Good
2	Good
3	Average
4	Poor
5	Very Poor

Condition Assessment Summary

Rotonda Components	Condition Rating
EQ Tank	2
Headworks	3*
Anoxic/Aeration Basins	3.5
MBR	4**
Chlorine Contact Basins & Chemical System	2.5
Reclaimed Water Storage Tank	1
Lined Reject Storage Pond	1
Unlined Reclaimed Water Storage Pond	4
Biosolids Handling	2
RAS/WAS Pumping	2.5
Plant Drain Collection and Pumping System	2
Reclaimed HSPS	2
MCC Buildings	
Admin Building	1
General Grounds	2
*Upgrades are pending construction ** Existing Membranes nearing end of useful life.	
Total	**2**

- Rotonda:
  - Most equipment in good shape
  - Some minor repairs needed
- West Port:
  - Most equipment is in good shape, but too small to be reused for upgrade
  - Aeration basins are in good shape, and could be reused for EQ

Project Schedule

- Environmental Assessment TM – 8/1
- Draft Flows & Loads TM – 8/16
- Progress Meeting + Effluent Criteria Workshop – 8/17 (?)
- Draft Treatment Alternatives TM – 8/31
- 2nd Rotonda Evaluation Workshop – 9/21
- Rotonda Evaluation TM – 10/11
- Begin BODR - October

MCDA Assumptions

- Higher Scoring is better.
- Costs are preliminary and should be considered for comparative purposes only
- Pipeline line for conveyance is assuming 36” for Rotonda Replacement option, 30” for Keeping Rotonda option
- Rotonda Expansion – Not upgrading to AWT (not in permit yet)
- West Port Expansion – Is upgrading to AWT (Assuming MLE)
- Demand projections are not finalized yet. West Port capacity is adjusted based on current Rotonda flows.

Questions for CCU

- Is CCU is open to the team evaluating PVC and DIP for the force main ?

- Rotonda – reclaimed pond issues
  - Maybe forgo and build tank – conserve space?

Title	Characteristics	Impact: Very Low	Impact: Low	Impact: Moderate	Impact: Strong	Impact: Very High
Resiliency/Redundancy	Resilient to changes in regulations; end user demands; public perception; weather; and cost factors. Can store/ divert if end use is interrupted. Critical component reliability. Resilient for natural disasters	Limits West County to only 1 treatment plant which could be impacted by storms.			Provides county with redundant treatment abilities with 2 plants operating, however Rotonda size is limited and additional piping is needed for flows to West Port during growth	Provides county with redundant treatment abilities with 2 plants operating that are sized for growth.
Minimize Operational Effort	Reduces county operational maintenance and reduces daily operational effort.	Maintains 2 separate facilities, requiring additional staff and doubles site maintanance activities.				Condenses operations into 1 facilities for West County.
Reduces Impacts to Residents	Construction impacts to neighborhoods with pipeline installation	Installation of pipeline impacts many neighboring residents, and impacts traffic through both towns.				Alternative does not impact neighborhoods with construction activites.
Ease of Implementation	Can obtain permits/approvals and amend environmental docs. Can acquire land/ROW and site new facilities. Can negotiate agreements and implement on time.	Requires difficult permitting for pipeline installation	Several changes to current permits. Some new land/ROW acquisition for new facilities. New agreements with moderate negotiating effort and longer durations	Minor change in current permits. Some new land/ROW acquisition for new facilities. New agreements with moderate negotiating	Minor change in current permits. Minimal new land/ROW acquisition for new facilities. Easily negotiated new agreements with longer durations	No change in current permits and agreements.
Standardization of Equipment	Consistency and similarity throughout different facilities and plants across Charlotte County. All operations on one SCADA system.	Each facility/site continues to utilize its own unique operational system and is not compatible with other sites within the county.	Only a few facilites operate on the same system. Rotonda remains with Membrane system.	Some uniformity between operating systems.	Most facilities operating on the same system with few exceptions.	Creates uniformity across Charlotte County systems.
Phasing Flexibility	Easily adjustable future buildout plan while maintaining current plant operations.	Sequence of Construction is complicated with needing to build out West Port first, before the pump station at Rotonda can be constructed	Sequence of Construction is somewhat complicated with needing to build out West Port first, before the pump station at Rotonda can be constructed. However	Individual projects are on a planned builodout schedule with some room for flexibility.	West Port can be constructed with complete flexibility, rotonda expansion has some sequence conflict with aeration tanks.	Sequence of construction allows for continued operation of facilities without interruption. Buildout is easily adjustable.

Resiliency/Redundancy

Resilient to changes in regulations; end user demands; public perception; weather; and cost factors. Can store/ divert if end use is interrupted. Critical component reliability. Resilient for natural disasters

is as important as	Minimize Operational Effort	• Reduces county operational maintenance and reduces daily operational effort.
is as important as	Reduces Impacts to Residents	• Construction impacts to neighborhoods with pipeline installation
is less important than	Ease of Implementation	• Can obtain permits/approvals and amend environmental docs. Can acquire land/ROW and site new facilities. Can negotiate agreements and implement on time.
is less important than	Standardization of Equipment	• Consistency and similarity throughout different facilities and plants across Charlotte County. All operations on one SCADA system.
is extremely less important than	Phasing Flexibility	• Easily adjustable future buildout plan while maintaining current plant operations.

Minimize Operational Effort

Reduces county operational maintenance and reduces daily operational effort.

is less important than	Reduces Impacts to Residents	• Construction impacts to neighborhoods with pipeline installation
is more important than	Ease of Implementation	• Can obtain permits/approvals and amend environmental docs. Can acquire land/ROW and site new facilities. Can negotiate agreements and implement on time.
is less important than	Standardization of Equipment	• Consistency and similarity throughout different facilities and plants across Charlotte County. All operations on one SCADA system.
is as important as	Phasing Flexibility	• Easily adjustable future buildout plan while maintaining current plant operations.

Reduces Impacts to Residents

Construction impacts to neighborhoods with pipeline installation

is as important as	Ease of Implementation	• Can obtain permits/approvals and amend environmental docs. Can acquire land/ROW and site new facilities. Can negotiate agreements and implement on time.
is more important than	Standardization of Equipment	• Consistency and similarity throughout different facilities and plants across Charlotte County. All operations on one SCADA system.
is as important as	Phasing Flexibility	• Easily adjustable future buildout plan while maintaining current plant operations.

Criterion	Comparison	Compared criterion	Description
Ease of Implementation Can obtain permits/approvals and amend environmental docs. Can acquire land/ROW and site new facilities. Can negotiate agreements and implement on time.	is less important than	Standardization of Equipment	• Consistency and similarity throughout different facilities and plants across Charlotte County. All operations on one SCADA system.
	is as important as	Phasing Flexibility	• Easily adjustable future buildout plan while maintaining current plant operations.

Standardization of Equipment

Consistency and similarity throughout different facilities and plants across Charlotte County. All operations on one SCADA system.

is as important as	Phasing Flexibility	• Easily adjustable future buildout plan while maintaining current plant operations.

General

Phasing Flexibility

Easily adjustable future buildout plan while maintaining current plant operations.

Criteria Weighting Summary

1	**Reduces Impacts to Residents** Construction impacts to neighborhoods with pipeline installation	23%
2	**Phasing Flexibility** Easily adjustable future buildout plan while maintaining current plant operations.	22%
3	**Standardization of Equipment** Consistency and similarity throughout different facilities and plants across Charlotte County. All operations on one SCADA system.	21%
4	**Minimize Operational Effort** Reduces county operational maintenance and reduces daily operational effort.	13%
5	**Ease of Implementation** Can obtain permits/approvals and amend environmental docs. Can acquire land/ROW and site new facilities. Can negotiate agreements and implement on time.	13%
6	**Resiliency/Redundancy** Resilient to changes in regulations; end user demands; public perception; weather; and cost factors. Can store/ divert if end use is interrupted. Critical component reliability. Resilient for natural disasters	8%

Project Alternatives

1	1. Rotonda Elimination	New Pump Station (3MGD) New Pipeline to West Port (3MGD) Demolition of Rotonda New Reclaimed Pipeline from West Port to Rotonda (1.5 MGD)
2	2. Rotonda Expansion	New Aeration Tanks New EQ Tank West Port to 2 MGD Future to 10, 15 MGD
3	3. Rotonda no change	New Pump Station (2MGD) New Pipeline to West Port (2MGD) West Port to 3 MGD Future to 10, 15 MGD

Considering Criteria

Resiliency/Redundancy

Yardstick | Pairwise

1. Rotonda Elimination	New Pump Station (3MGD) New Pipeline to West Port (3MGD) Demolition of Rotonda New Reclaimed Pipeline from West Port to Rotonda (1.5 MGD) West Port to 4 MGD	Very Strong	50%
2. Rotonda Expansion	New Aeration Tanks New EQ Tank West Port to 2 MGD Future to 10, 15 MGD	Low	17%
3. Rotonda no change	New Pump Station (2MGD) New Pipeline to West Port (2MGD) West Port to 3 MGD Future to 10, 15 MGD	Moderate	28%

Considering Criteria

Minimize Operational Effort

Yardstick | Pairwise

1. Rotonda Elimination	New Pump Station (3MGD) New Pipeline to West Port (3MGD) Demolition of Rotonda New Reclaimed Pipeline from West Port to Rotonda (1.5 MGD) West Port to 4 MGD	Very Strong	75%
2. Rotonda Expansion	New Aeration Tanks New EQ Tank West Port to 2 MGD Future to 10, 15 MGD	Very Low	8%
3. Rotonda no change	New Pump Station (2MGD) New Pipeline to West Port (2MGD) West Port to 3 MGD Future to 10, 15 MGD	Very Low	8%

Considering Criteria

Reduces Impacts to Residents

Yardstick | Pairwise

1. Rotonda Elimination	New Pump Station (3MGD) New Pipeline to West Port (3MGD) Demolition of Rotonda New Reclaimed Pipeline from West Port to Rotonda (1.5 MGD) West Port to 4 MGD	Very Low	8%
2. Rotonda Expansion	New Aeration Tanks New EQ Tank West Port to 2 MGD Future to 10, 15 MGD	Very Strong	75%
3. Rotonda no change	New Pump Station (2MGD) New Pipeline to West Port (2MGD) West Port to 3 MGD Future to 10, 15 MGD	Very Low	8%

Considering Criteria

Ease of Implementation

Yardstick | Pairwise

Alternative	Components	Rating	Score
1. Rotonda Elimination	New Pump Station (3MGD) New Pipeline to West Port (3MGD) Demolition of Rotonda New Reclaimed Pipeline from West Port to Rotonda (1.5 MGD) West Port to 4 MGD	Very Low	13%
2. Rotonda Expansion	New Aeration Tanks New EQ Tank West Port to 2 MGD Future to 10, 15 MGD	Moderate	63%
3. Rotonda no change	New Pump Station (2MGD) New Pipeline to West Port (2MGD) West Port to 3 MGD Future to 10, 15 MGD	Very Low	13%

Considering Criteria

Standardization of Equipment

Yardstick | Pairwise

Alternative	Components	Rating	Score
1. Rotonda Elimination	New Pump Station (3MGD) New Pipeline to West Port (3MGD) Demolition of Rotonda New Reclaimed Pipeline from West Port to Rotonda (1.5 MGD) West Port to 4 MGD	Very Strong	56%
2. Rotonda Expansion	New Aeration Tanks New EQ Tank West Port to 2 MGD Future to 10, 15 MGD	Low	19%
3. Rotonda no change	New Pump Station (2MGD) New Pipeline to West Port (2MGD) West Port to 3 MGD Future to 10, 15 MGD	Low	19%

Considering Criteria

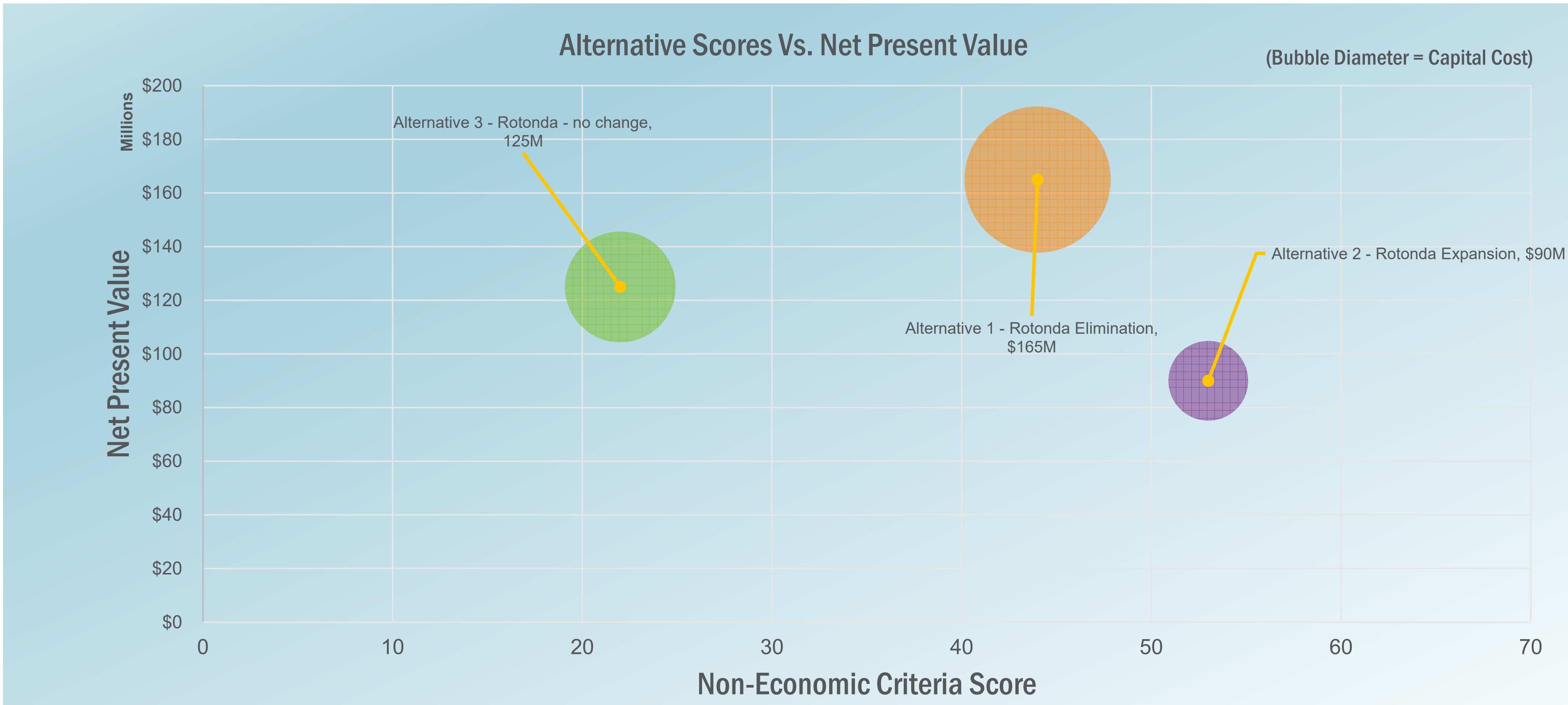
Phasing Flexibility

Yardstick | Pairwise

Alternative	Components	Rating	Score
1. Rotonda Elimination	New Pump Station (3MGD) New Pipeline to West Port (3MGD) Demolition of Rotonda New Reclaimed Pipeline from West Port to Rotonda (1.5 MGD) West Port to 4 MGD	Very Low	8%
2. Rotonda Expansion	New Aeration Tanks New EQ Tank West Port to 2 MGD Future to 10, 15 MGD	Strong	58%
3. Rotonda no change	New Pump Station (2MGD) New Pipeline to West Port (2MGD) West Port to 3 MGD Future to 10, 15 MGD	Low	25%

Alternative Final Scores

	Alternative	Score	Capital Cost	Annual O&M	Net Present Value
2	2. Rotonda Expansion	53	$90,000,000	$0	
1	1. Rotonda Elimination	44	$165,000,000	$0	
3	3. Rotonda no change	22	$125,000,000	$0	



Alternative Scores Vs. Net Present Value
(Bubble Diameter = Capital Cost)
Net Present Value
Millions
$200
$180
$160
$140
$120
$100
$80
$60
$40
$20
$0
0
10
20
30
40
50
60
70
Non-Economic Criteria Score
Alternative 3 - Rotonda - no change, 125M
Alternative 1 - Rotonda Elimination, $165M
Alternative 2 - Rotonda Expansion, $90M

ATTACHMENT B

West Port Expansion Project Cost Analysis Alternative 1 and 2

Introduction

Two alternatives were presented to CCU for the future of the West Port WRF and Rotonda WRF. A high-level operational cost analysis was completed for each alternative. This analysis includes power consumption, labor, and maintenance costs calculated from 2022 operational costs provided by the County. This analysis allows for a comparison between the two alternatives and will aid in the final design decisions.

Alternative 1

Alternative 1 involves the demolition of the current Rotonda WRF and the construction of a 2.5 MGD pump station in its place to send all flows to the West Port WRF.

This alternative includes:

- 9-mile force main between Rotonda and West Port
- 9-mile Reclaimed force main between Rotonda and West Port
- Expansion of the West Port WRF to 5 MGD
- Deep well at Rotonda
- Increase in staff shifts at West Port (24-hr operation)
- Staffing Rotonda Pump Station for 16 hours/day.

West Port 5 MGD Expansion					
Year	2025	2030	2035	2040	2045
Flow (MGD)	2.3	3.3	4.1	4.8	5
Power	$ 162,917	$ 233,750	$ 290,417	$ 340,000	$ 354,167
Labor	$ 1,051,200	$ 1,255,188	$ 1,455,107	$ 1,686,867	$ 1,955,542
Maintenance	$ 191,667	$ 222,194	$ 257,584	$ 298,610	$ 346,171
Total	**$ 1,405,783**	**$ 1,711,132**	**$ 2,003,107**	**$ 2,325,478**	**$ 2,655,880**

Rotonda 2.5 MGD Pump Station					
Year	2025	2030	2035	2040	2045
Flow (MGD)	1.5	1.8	2.1	2.2	2.3
Power	$ 19,200	$ 23,040	$ 26,880	$ 28,160	$ 29,440
Labor	$ 350,400	$ 406,210	$ 470,908	$ 545,912	$ 632,861
Maintenance	$ 50,000.0	$ 57,963.7	$ 67,195.8	$ 77,898.4	$ 90,305.6
Total	**$ 419,600**	**$ 487,213**	**$ 564,984**	**$ 651,970**	**$ 752,607**

Alternative 2

Alternative 2 involves keeping both the Rotonda WRF and West Port WRF with necessary upgrades.

This alternative includes:

- Expansion of West Port WRF to 2.5 MGD
- Expansion of Rotonda WRF to 2.5 MGD
  - AWT upgrades
  - New reclaimed storage tank
  - New EQ tank
  - New membrane installation
  - Deep well at Rotonda

West Port 2.5 MGD Expansion										
Year		2025		2030		2035		2040		2045
Flow (MGD)		1.2		1.4		1.8		2		2.3
Power	$	85,000	$	99,167	$	127,500	$	141,667	$	162,917
Labor	$	700,800	$	812,419	$	941,817	$	1,091,824	$	1,265,723
Maintenance	$	200,000	$	231,855	$	268,783	$	311,593	$	361,222
Total	**$**	**985,800**	**$**	**1,143,441**	**$**	**1,338,100**	**$**	**1,545,084**	**$**	**1,789,862**

Rotonda 2.5 MGD Expansion										
Year		2025		2030		2035		2040		2045
Flow (MGD)		1.2		1.4		1.8		2		2.3
Power	$	190,000	$	221,667	$	285,000	$	316,667	$	364,167
Labor	$	700,800	$	812,419	$	941,817	$	1,091,824	$	1,265,723
Maintenance	$	100,000	$	115,927	$	134,392	$	155,797	$	180,611
Total	**$**	**990,800**	**$**	**1,150,013**	**$**	**1,361,208**	**$**	**1,564,287**	**$**	**1,810,501**

Comparison

Overall, the power consumption, labor, and maintenance costs between the two alternatives are similar. Since Alternative 1 involves converting Rotonda into a pump station rather than upgrading the existing plant, the power costs are much lower and therefore help lower the total costs. However, construction costs for Alternative 1 are much higher than the construction costs of Alternative 2. This is due to the fact that Alternative 1 involves demolition of the Rotonda plant and new pump station construction in its place and installation of two 9-mile long force mains. Alternative 2 only involves plant upgrades to each facility. Therefore, Alternative 2 is recommended because the savings on construction costs will be significantly greater than the savings on power, labor, and maintenance.

Summary of Operational Costs					
	2025	2030	2035	2040	2045
Alternative 1	$ 1,825,383	$ 2,198,345	$ 2,568,091	$ 2,977,448	$ 3,408,487
Alternative 2	$ 1,976,600	$ 2,293,454	$ 2,699,308	$ 3,109,371	$ 3,600,362

Appendix G

West Port WRF Expansion, Design Flows and Loads Technical Memorandum

West Port Water Reclamation Facility Expansion

Charlotte County, FL

DESIGN FLOWS & LOADS

Technical Memorandum

Charlotte County Utilities | November 30, 2023

Contents

Tables

Figures

1 Introduction

Charlotte County Utilities (CCU) owns and operates two water reclamation facilities (WRF) within its West County service area. The West Port WRF is currently permitted for 1.2 million gallons per day (MGD) annual average daily flow (AADF), and the Rotonda WRF is currently permitted for 2.0 MGD AADF.

This Technical Memorandum (TM) establishes design flows and loads for the two CCU WRFs that serve the West County service area. For the West Port WRF, the County has initially planned to expand the treatment capacity by constructing a new plant and decommissioning the existing plant. For the Rotonda WRF, the County is evaluating the future use of the Rotonda WRF as part of this project; future options include (1) maintaining the current treatment capacity, (2) expanding the current treatment capacity, or (3) decommissioning and rerouting future flows to West Port WRF.

This TM establishes historical influent flows and loads, future flow projections, and effluent water quality criteria. Together, these items provide a basis for establishing design flows and loads for the future planning and design of the West Port WRF and the Rotonda WRF.

2 Flows and Loads

The historical flow experienced by domestic wastewater treatment facilities in Florida are monitored and permitted by means of the Florida Department of Environmental Protection (FDEP Rule Chapter 62-600 of the Florida Administrative Code (FAC). Influent wastewater flows vary hourly, daily, monthly, and seasonally due to diurnal generation rates, tourists, and seasonal variations in infiltration and inflow (I/I). The influent flow characterization parameters for the West Port WRF and Rotonda WRF were analyzed using historical influent flow data reported to FDEP by CCU as outlined in Chapter 62-600 FAC, and the FDEP July 2006 Guidelines for Permitting Wastewater Facilities.

- AADF – The average daily flow is the arithmetic mean of the 12-monthly average daily flows calculated during any consecutive 12-month period, expressed in MGD.
- Maximum Daily Flow (MDF) – The maximum flow occurring over a 24-hour period based on AADF data, expressed in MGD.
- Monthly Average Daily Flow (MADF) – The total volume of wastewater flowing into a wastewater facility during a calendar month divided by the number of days in a month, expressed in MGD.
- Maximum Monthly Average Daily Flow (MMADF) – The highest recorded MADF recorded during a 12-month period, expressed in MGD.
- Three-Month Average Daily Flow (TMADF) – The arithmetic mean of the three monthly average daily flows calculated during any consecutive three-month period, expressed in MGD.
- Maximum Three-Month Average Daily Flow (MTMADF) – The maximum TMADF during a 12-month period, expressed in MGD.
- Minimum Daily Flow (MinDF) – The minimum flow occurring over a 24-hour period based on AADF data, expressed in MGD.
- Peak Hourly Flow (PHF) – The average flow rate during the one-hour of the day when the wastewater flows are maximum, expressed in MGD.
- Peak Instantaneous Flow (PIF) – The maximum recorded flow rate at any instance of time based on continuously recorded flow monitoring data.

Historical influent flow data for the West Port and Rotonda WRFs were obtained from Discharge Monitoring Reports (DMRs) submitted to FDEP for the historical period of January 1, 2018, through May 30, 2023. PHF and PIF were derived from data obtained from CCU on August 25, 2023, using historical supervisory control and data acquisition (SCADA) flow data compiled at 15-minute intervals during each day over the historical period from January 1, 2018, through May 30, 2023.

2.1 Wastewater Characterization and Influent Concentrations

Raw wastewater influent historically treated at the West Port WRF and the Rotonda WRF consists of residential and commercial contributions with no industrial contributions. Table 2-1 presents raw wastewater characteristics for low-strength, medium-strength, and high-strength wastewater. Table 2-1 also presents the observed influent CBOD5 and TSS levels compared with observed data for the West Port WRF and the Rotonda WRF (See Section 2.3 for data).

Table 2-1. Typical and Observed Raw Wastewater Characteristics

Parameter	Low-strength[1]	Medium-strength[1]	High-strength[1]		Observed West Port WRF	Observed Rotonda WRF
Carbonaceous Biochemical Oxygen Demand (CBOD)	110 mg/L	190 mg/L	350 mg/L		110 mg/L[2]	100 mg/L[2]
Total Suspended Solids (TSS)	120 mg/L	210 mg/L	400 mg/L		190 mg/L[2]	110 mg/L[2]
Total Kjeldahl Nitrogen (TKN)	20 mg/L	40 mg/L	70 mg/L		60[3]	25[3]
Total Phosphorus (TP)	4mg/L	7 mg/L	12 mg/L		10[3]	3[3]

Note: (1.) Source: Biological Nutrient Removal (BNR) Operation in Wastewater Treatment Plants (Water Environment Federation [WEF] Manual of Practice No. 30). (2.) Represents a five-year annual average from 2018 to 2022. (3.) Values represented as conservative average concentrations from CCU field sampling conducted from 08-14-2023 through 08-25-2023 (ten total samples).

Historical influent CBOD and TSS concentrations were obtained from DMRs. Influent TKN and TP were obtained from field sampling as described below (FDEP does not require TKN and TP monitoring for permit compliance at West Port and Rotonda WRFs).

The HDR team contacted CCU staff to conduct field sampling of raw wastewater to determine various influent concentrations for use in planning and design process. The sampling was conducted by CCU from Monday through Friday for 2 weeks (August 14, 2023, through August 25, 2023). The analytical laboratory results from the ten (10) field samples are summarized as average concentrations in Table 2-2.

Table 2-2. Raw Wastewater Characterization

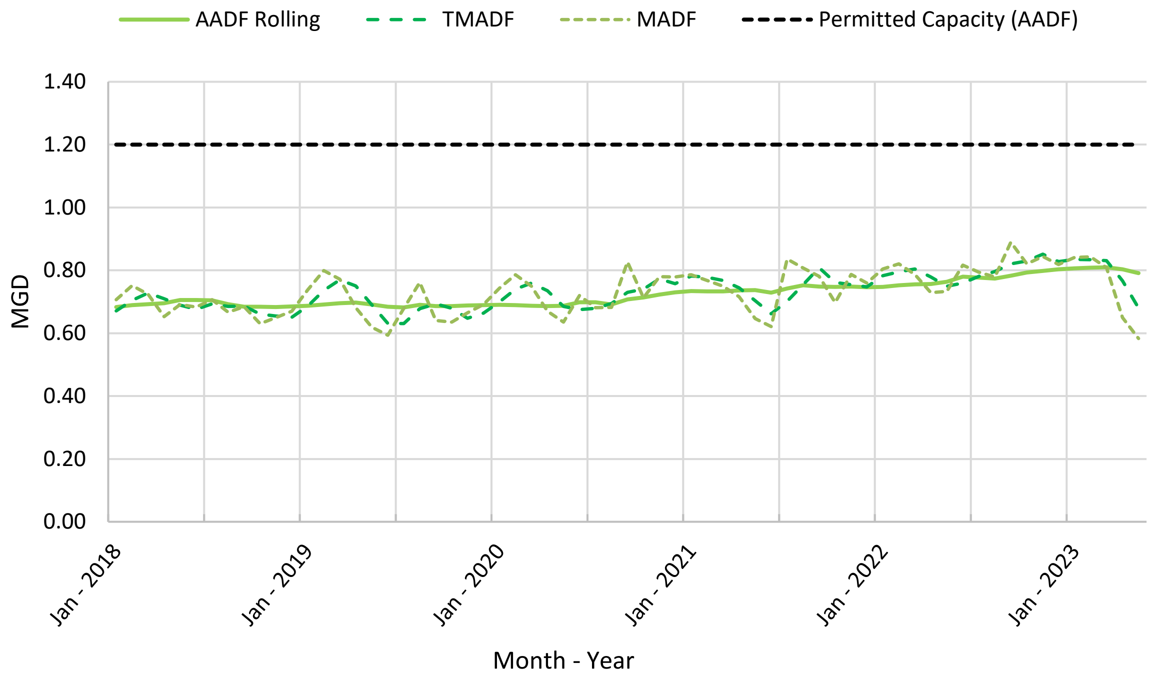
Parameter	Observed Average West Port WRF (mg/L)	Observed Average Rotonda WRF (mg/L)
Chemical Oxygen Demand (COD)	257	143
$CBOD_5$	144	115
TSS	170	96
Volatile Suspended Solids (VSS)	110	66
Total Nitrogen (TN)	59.8	23.1
Total Kjeldahl Nitrogen (TKN)	59.3	23.1
Ammonia (NH3-N)	46.2	17
Organic Nitrogen	13.1	6.1
Total Phosphorus (TP)	8.6	1.9
Ortho-phosphorus (OP)	5.1	0.5
Bound Phosphorus	3.5	1.4

2.2 Historical Influent Flows

2.2.1 West Port WRF

Figure 2-1 graphically represents the West Port WRF historical influent AADF, MADF, and TMADF with respect to permitted WRF capacity for the past 5 years – from 2018 to 2022 and the first 5 months of 2023.

Figure 2-1. West Port Historical Influent Flow



Influent flow was characterized using historical data to evaluate AADF. Table 2-3 summarizes influent flows for West Port WRF. In 2022, the AADF was 0.80 MGD or 67 percent of the WRF's permitted capacity (1.2 MGD AADF), and the MTMADF was 0.85 MGD or approximately 71 percent of the WRF's permitted capacity.

Table 2-3. West Port WRF Historical Flows

Year	AADF (MGD)	MMADF (MGD)	MTMADF (MGD)	MDF (MGD)	MinDF (MGD)	PHF (MGD)	PIF (MGD)
2018	0.68	0.75	0.73	0.98	0.52	2.26	3.58
2019	0.69	0.80	0.77	0.93	0.56	2.35	3.01
2020	0.73	0.83	0.77	1.37	0.60	2.59	2.98
2021	0.75	0.84	0.81	1.45	0.60	2.46	2.77
2022	0.80	0.89	0.85	1.16	0.57	3.20	3.82
2023[1]	0.74	0.84	0.83	0.92	0.54	2.53	3.18

Notes: (1.) Data limited to January through May 2023; (2.) PHF and PIF values occurred from during Hurricane Ian in September 2022.

Table 2-4 presents the peaking factors with respect to AADF for the data presented above. Each flow characterization parameter is summarized below:

- The MMADF:AADF peaking factor ranges from 1.10 to 1.16 with an average of 1.13. For design, a typical MMADF:AADF peaking factor of 1.2 is recommended.
- The MTMADF:AADF peaking factor ranges from 1.06 to 1.12 with an average of 1.08. For design, an MTMADF:AADF peaking factor of 1.1 is recommended.
- The MDF:AADF peaking factor ranges from 1.35 to 1.93 with an average of 1.61. For design, an MDF:AADF peaking factor of 2.0 is recommended.
- The MinDF:AADF peaking factor ranges from 0.71 to 0.82 with an average of 0.77. For design, a peaking factor of 0.80 is recommended.
- The PHF:AADF peaking factor ranges from 3.28 to 3.99 with an average of 3.5. This PHF factor of 3.5 is reasonable for the current WRF operating at 0.80 MGD AADF. However, for the final design of the West Port WRF expansion, a PHF:AADF peaking factor of 3.0 should be considered in accordance with the final expansion size of the facility and collection system condition.

Table 2-4. West Port WRF Historical Peaking Factors

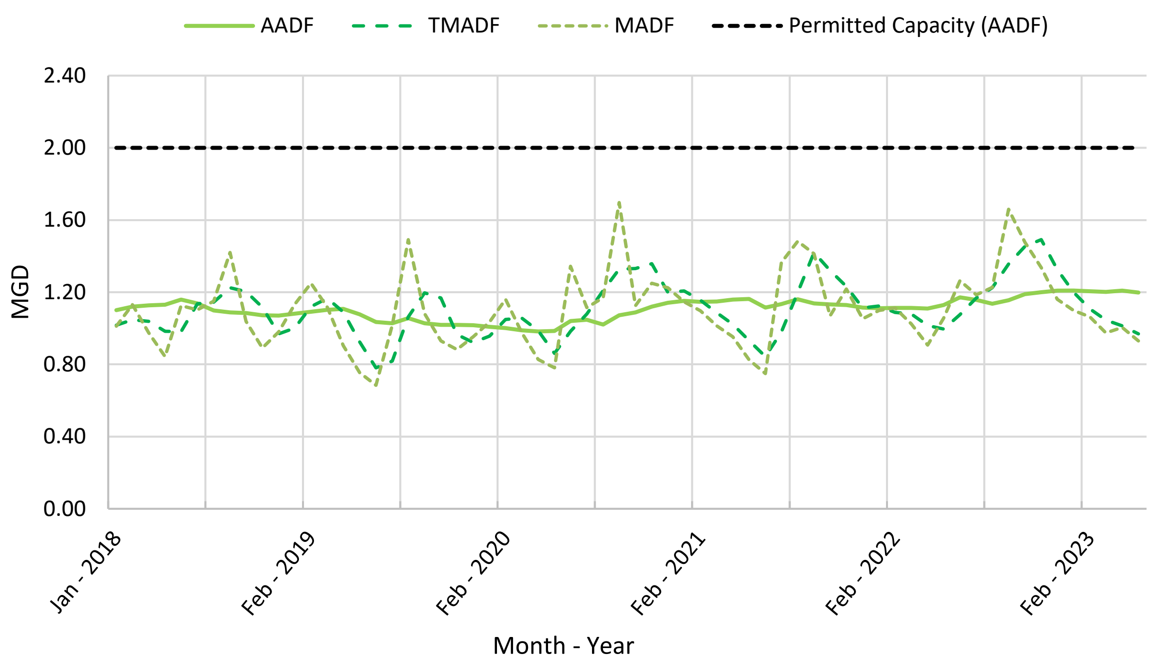
Year	MMADF/AADF [Month]	MTMADF/ AADF	MDF/AADF [Month]	MinDF/ AADF	PHF/ AADF
2018	1.10 [February]	1.07	1.44 [May]	0.76	3.32
2019	1.16 [February]	1.12	1.35 [January]	0.81	3.41
2020	1.14 [September]	1.05	1.88 [September]	0.82	3.55
2021	1.12 [July]	1.08	1.93 [July]	0.80	3.28
2022	1.11 [September]	1.06	1.45 [September]	0.71	3.99[2]
2023[1]	1.13 [January]	1.12	1.24 [January]	0.73	3.42

Notes: (1.) Data limited to January through May 2023; (2.) PHF value from period of Hurricane Ian in September.

2.2.2 Rotonda WRF

Figure 2-2 graphically represents the historical influent AADF, MADF, and TMADF with respect to permitted WRF capacity for the past 5 years – 2018 to 2022 – as well as the first 5 months of 2023.

Figure 2-2. Rotonda WRF Historical Influent Flows



Influent flow was characterized using historical data to evaluate AADF, MMADF, MTMADF, MDF, MinDF, PHF and PIF. Table 2-5 summarizes influent flows for Rotonda WRF. In 2022, the AADF was 1.21 MGD or approximately 61 percent of the WRF's permitted capacity (2.0 MGD AADF), and the MTMADF was 1.49 MGD or approximately 75 percent of the WRF's permitted capacity.

Table 2-5. Rotonda WRF Historical Influent Flows

Year	AADF (MGD)	MMADF (MGD)	MTMADF (MGD)	MDF (MGD)	MinDF (MGD)	PHF (MGD)	PIF (MGD)
2018	1.07	1.42	1.22	2.35	0.70	N/A	N/A
2019	1.02	1.49	1.20	2.25	0.62	N/A	N/A
2020	1.14	1.70	1.36	2.92	0.75	N/A	N/A
2021	1.12	1.48	1.42	2.46	0.65	3.73	4.26
2022	1.21	1.66	1.49	2.21	0.83	3.66[2]	4.12[2]
2023[1]	1.01	1.10	1.20	1.27	0.80	3.14	3.54

Notes: (1.) Data limited to January through May 2023; (2.) PHF and PIF values occurred during period of Hurricane Ian in September.

Table 2-6 presents the peaking factors with respect to AADF for the data presented above. Each flow characterization parameter is summarized below:

- The MMADF:AADF peaking factor ranges from 1.32 to 1.49 with an average of 1.39. For design, a typical MMADF:AADF peaking factor of 1.5 is recommended.
- The MTMADF:AADF peaking factor ranges from 1.14 to 1.27 with an average of 1.2. For design, an MTMADF:AADF peaking factor of 1.3 is recommended.
- The MDF:AADF peaking factor ranges from 1.83 to 2.56 with an average of 2.20. For design, an MDF:AADF peaking factor of 2.6 is recommended.
- The MinDF:AADF peaking factor ranges from 0.58 to 0.79 MGD with an average of 0.67. For design, a MinDF:AADF peaking factor of 0.7 is recommended.
- The PHF:AADF peaking factor ranges from 3.02 to 3.33 with an average of 3.15. For the final design of the WRF expansion, a PHF:AADF peaking factor of 3.0 should be considered in accordance with the final expansion size of the facility and collection system condition.

Table 2-6. Rotonda WRF Historical Peaking Factors

Year	MMADF/AADF [Month]	MTMADF/ AADF	MDF/AADF [Month]	MinDF/ AADF	PHF/ AADF
2018	1.33 [September]	1.14	2.20 [May]	0.66	N/A
2019	1.46 [August]	1.18	2.20 [August]	0.61	N/A
2020	1.49 [September]	1.19	2.56 [September]	0.66	N/A
2021	1.32 [August]	1.27	2.19 [August]	0.58	3.33
2022	1.37 [September]	1.23	1.83 [September]	0.69	3.02[2]
2023[1]	1.09 [January]	1.19	1.25 [February]	0.79	3.11

Notes: (1.) Data limited to January through May 2023; (2.) PHF value from period of Hurricane Ian in September.

2.3 Historical Influent Loads

2.3.1 West Port WRF

Weekly influent samples of CBOD and TSS were recorded for the West Port WRF. Figure 2-3 graphically represents historical loads for the West Port WRF based on average monthly CBOD and TSS concentrations and the MADF from January 2018 through May 2023. The CBOD and TSS concentrations fluctuate due to load variations from seasonal population and the West Port WRF collection system characteristics.

Figure 2-3. West Port WRF Historical Influent Loads

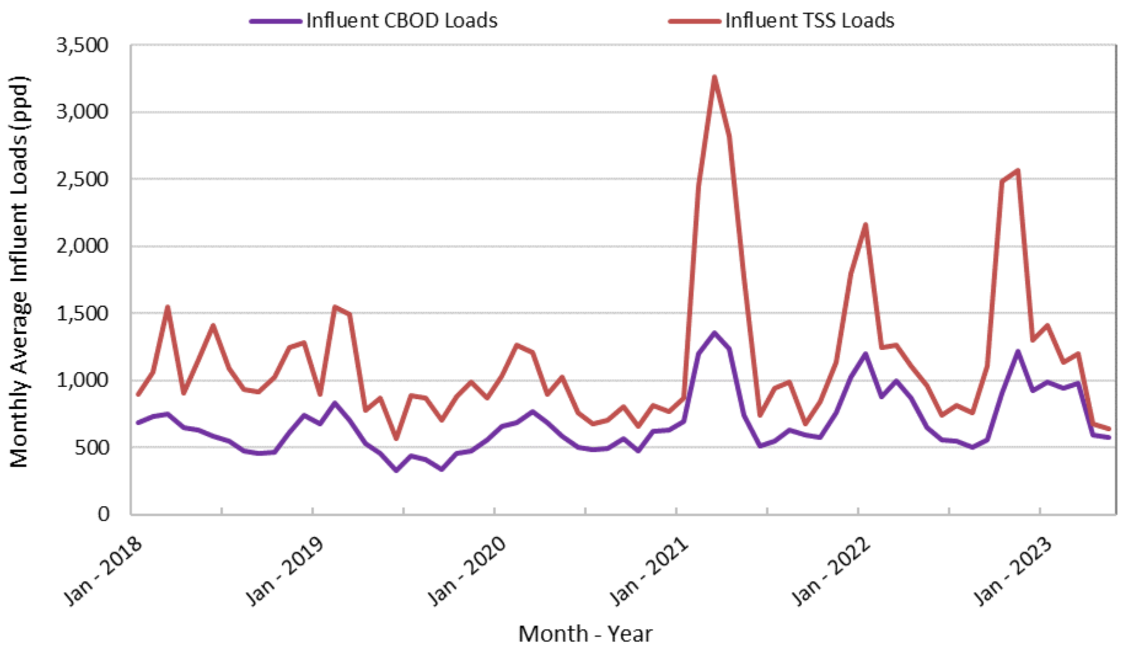


Table 2-7 summarizes the West Port WRF historical loads. The yearly average CBOD concentrations varied from 89 to 132 mg/L, equating to 510 to 820 pounds per day (ppd). The yearly average TSS concentrations varied between 150 and 250 mg/L, equating to 880 to 1,540 ppd.

Table 2-7. West Port WRF Historical Influent Loads

Year	AADF (MGD)	CBOD (mg/L)	CBOD Load (ppd)	TSS (mg/L)	TSS Load (ppd)
2018	0.68	106	600	196	1,120
2019	0.69	89	510	162	930
2020	0.73	98	600	145	880
2021	0.75	132	825	247	1,540
2022	0.80	122	815	204	1,360
2023[1]	0.74	129	800	159	990

Notes: (1.) Data limited to January through May 2023.

2.3.2 Rotonda WRF

Weekly influent samples of CBOD and TSS were recorded for the Rotonda WRF. Figure 2-4 represents historical loads for the Rotonda WRF based on average monthly

CBOD and TSS concentrations and the MADF from January 2018 through May 2023. The CBOD and TSS concentrations fluctuate due to load variations from seasonal population and periods of higher flow required for maintenance and compliance operations of the West Port WRF (additional flow may be diverted from the collection system to the Rotonda WRF if the West Port WRF experiences wastewater flow surges and/or high I/I). This typical fluctuation should be differentiated from the high-spike event that occurred in November 2020.

Figure 2-4. Rotonda WRF Historical Influent Loads

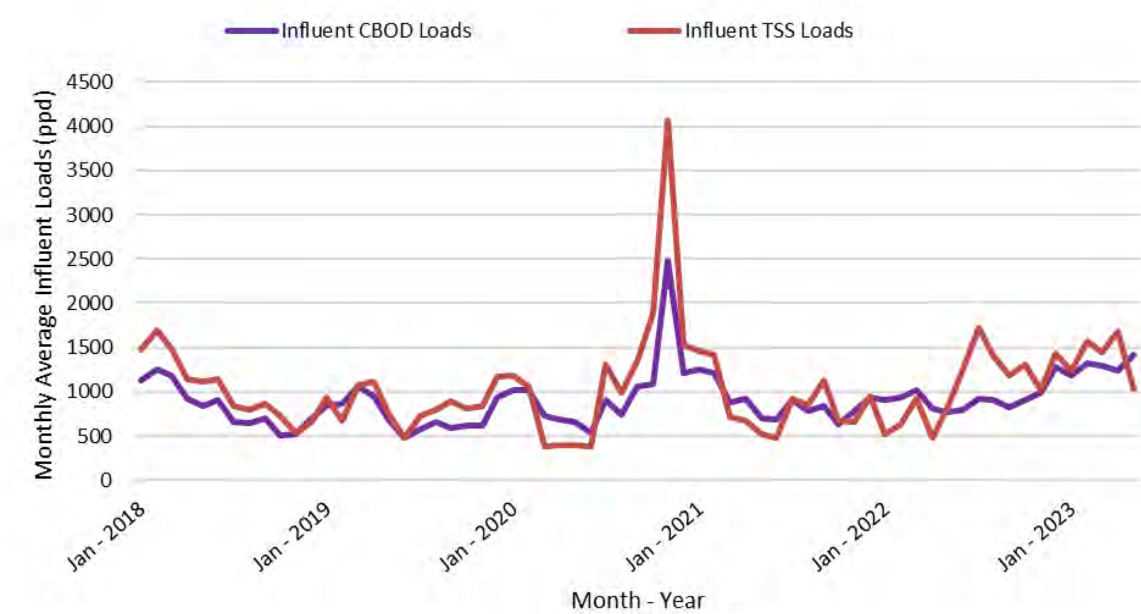


Table 2-8 summarizes the Rotonda WRF historical loads. The annual average CBOD concentrations from 2018 to 2022 varied from 90 to 110 mg/L, equating to 770 to 1,020 ppd. The annual average TSS concentrations from 2018 to 2022 varied between 90 and 120 mg/L, equating to 870 to 1,190 ppd.

Table 2-8. Rotonda WRF Historical Influent Loads

Year	AADF (MGD)	CBOD (mg/L)	CBOD (ppd)	TSS (mg/L)	TSS (ppd)
2018	1.07	100	860	120	1,070
2019	1.02	90	770	100	890
2020	1.14	110	1,020	120	1,190
2021	1.12	100	910	90	870
2022	1.21	100	960	110	1,060
2023	1.01	150	1,300	160	1,380

2.4 Design Wastewater Flow Projections

The West County sewer service area includes the Rotonda WRF and the West Port WRF sewer service areas. Future wastewater flow projections provided in this section are broken down by each WRF service area.

2.4.1 Base Flow Projections

Historical flow data from 2022 were used to establish current wastewater flows in the West County service area. Medium-growth rates developed by the University of Florida Bureau of Economic and Business Research (BEBR) were applied to the current year to forecast future wastewater flows in 2025 through 2045 at 5-year increments. Build-out demands are based on population projections and future land zoning within Charlotte County using the Southwest Florida Water Management District (SWFWMD) Geospatial Small-area Population Forecasting (GSAPF) Model Methodology. Table 2-9 presents projected wastewater flows that would be generated within the West County service area for the Rotunda and West Port WRFs assuming Charlotte County experiences medium growth. These flows were used as the base, or starting point, for wastewater flow projections in West County provided in terms of AADF and expressed in MGD.

Table 2-9. West County Service Area – Base Flow Projections

Service Area	Projected AADF Wastewater Flows (MGD)						
	Current 2022	2025	2030	2035	2040	2045	Buildout
Rotonda WRF	1.20	1.24	1.32	1.39	1.44	1.51	4.03
West Port WRF	.80	0.83	0.88	0.93	0.97	1.02	7.67
West County Total	**2.00**	**2.07**	**2.20**	**2.32**	**2.41**	**2.53**	**11.7**

BEBR and SWFWMD population projections are planning tools that serve as acceptable standards in Florida for evaluating and developing population growth and corresponding wastewater flow projections over large service areas.

However, wastewater flows from planned developments, utility acquisitions, and planned areas for septic to sewer conversions are not accurately represented in the BEBR and SWFWMD population projections. Therefore, the planned buildout year and number of residential and commercial units was obtained from CCU for the following to refine the accuracy of the base wastewater flow projections:

1. Planned Developments
2. Utility Acquisitions
3. Planned Areas for Septic-to-Sewer (S2S) Conversions
4. Areas with Historically Low Growth

The following sections describe the wastewater flow impacts in the West County service area.

2.4.2 Planned Developments

New developments planned in West County within the planning horizon from current through 2045 were added to the base flow projections presented in Table 2-9 based on the County's available information and knowledge of ongoing development projects and discussions with CCU. The data captured various developments phased between 2025 and 2040. Figure 2-5 identifies the locations of planned development in the West County service area.

Figure 2-5

Planned Developments

Charlotte County Wastewater Service Area

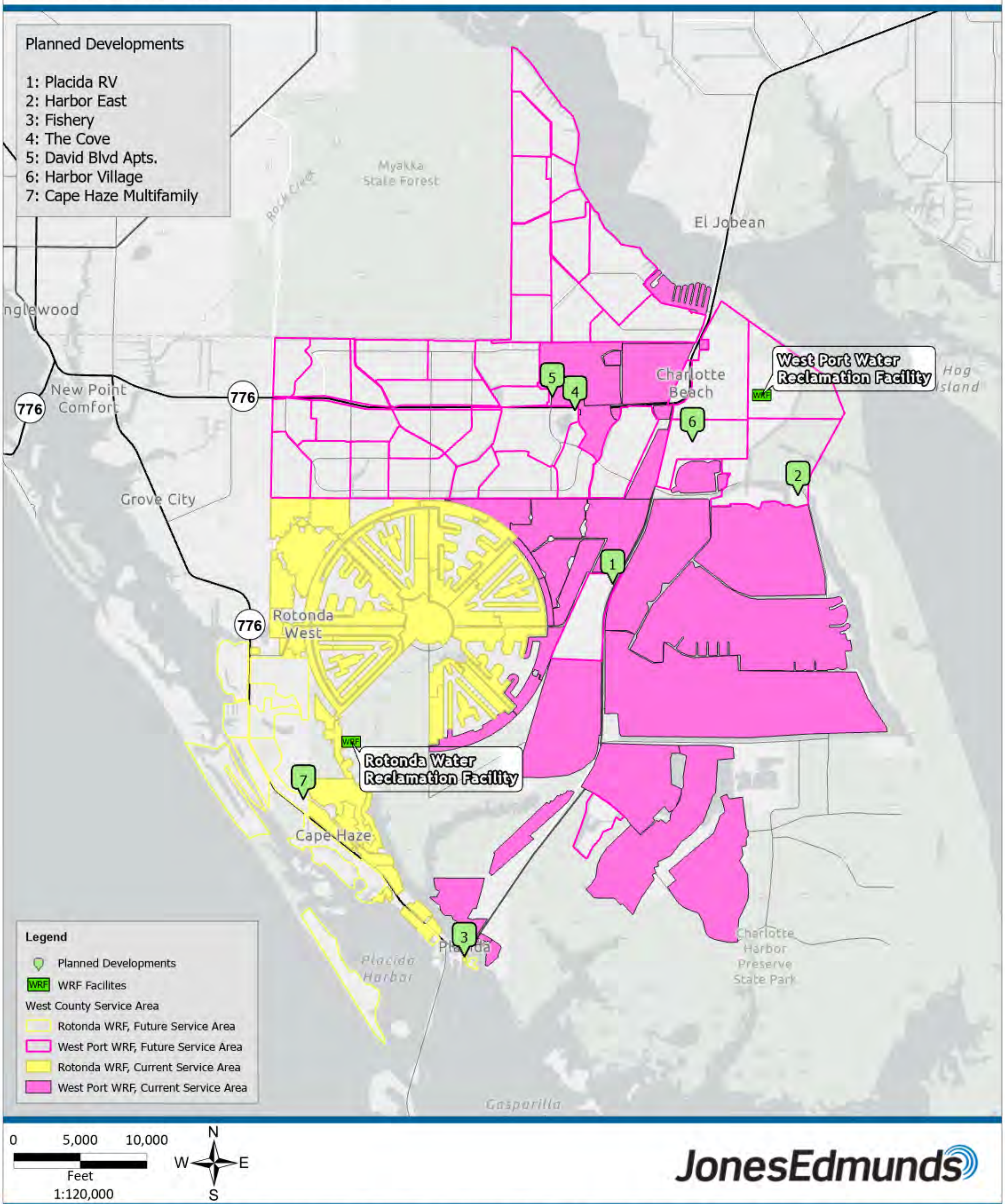


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Table 2-10 summarizes the planned developments, providing development name, WRF designation (West Port WRF or Rotonda WRF), number of residential units, wastewater flow estimation, and an estimated phasing year.

Planned Development No. 6: Harbor Village and Surrounding Areas is a mix of residential, commercial, hotel, and assisted living uses. This development is expected to make the greatest impact to future wastewater flows in the West County service area, estimated to contribute an additional 0.25 MGD AADF in each 2030, 2035, and 2040, for a total additional flow of 0.75 MGD AADF. Planned Development No. 5: David Boulevard Apartments and Surrounding Areas has an estimated flow of 0.25 MGD AADF by 2040. The other planned developments contribute significantly lower flow contributions. The total wastewater flow from planned developments in West County is 1.18 MGD AADF.

Table 2-10. Planned Development Flow Estimation

No	WRF	Development	Residential Units	Other Uses	Est. Flow (MGD AADF)	Est. Phasing Year
1	West Port	Placida RV	170	Commercial – 5,500 SF	0.03	2025
2	West Port	Harbor East	150	N/A	0.03	2025
3	Rotonda	Fishery	100	Hotel – 155 Rooms Rest. – 4,500 SF Non-residential – 7,500 SF	0.05	2030
4	West Port	The Cove	300	Amenities	0.05	2030
5	West Port	David Blvd Apts. and Surrounding Areas (SA)	174	N/A SA Commercial – 143 Acres (1500 GPD/Acre)	0.03 0.11 0.11	2025 2030 2035
6	West Port	Harbor Village and Surrounding Areas (SA)	1000	Hotel – 200 Rooms Assisted Living – 150 Beds Commercial – 430,000 SF SA SA	0.25 0.25 0.25	2030 2035 2040
7	Rotonda	Cape Haze Multifamily (SHU)	100	Amenities	0.02	2035
				Total	**1.18 MGD AADF**	

Table 2-11 summarizes estimated planned development flows that will be added to the base wastewater flow projections for each WRF and the West County Service Area. The estimated flows from planned developments for West Port WRF are 1.11 MGD. Projected flows to the Rotonda WRF are estimated at 0.07 MGD from planned development.

Table 2-11. Planned Development Flow Contributions by WRF

Year	Estimated Flow (MGD AADF)		Total (MGD AADF)
	Rotonda WRF	West Port WRF	West County Service Area
2025	--	0.09	0.09
2030	0.05	0.41	0.51
2035	0.02	0.36	0.38
2040	--	0.25	0.25
2045	--	--	0.00
Total	**0.07**	**1.11**	**1.18**

2.4.3 Utility Acquisitions

Figure 2-6 identifies four utility acquisitions (shown in red) near the West County service area (shown in black) that the County believes are likely to occur. Of the potential utility acquisitions shown, CCU provides water service to Little Gasparilla Island and Sandalhaven Utilities. Bocilla & Knight Island Utilities are currently provided water via bulk interconnect with the Englewood Water District (EWD).

Figure 2-6

Potential Utility Acquisitions

Charlotte County Wastewater Service Area

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Table 2-12 summarizes these potential utility acquisitions and estimates the wastewater flow contribution and phasing (onboarding) year. The flow estimates were compiled using available public information including SWFWMD Public Supply Annual Reports (PSARs) and FDEP Sanitary Surveys. It has been assumed that the island utilities are nearing build-out flow and will likely not experience high growth in the future.

Discussions with CCU indicate that the County has been approached by each utility for potential acquisition for wastewater treatment services. However, the County has also indicated no pending legal arrangements currently exist for acquisition of any of these utilities or their wastewater contributions.

Lastly, EWD is reported to be approaching wastewater treatment capacity and is addressing future growth through planning. The SR-776 Force Main modeling project included diversion of a small portion of wastewater flow along the SR-776 corridor from EWD to the West Port WRF. This project is indicative of EWD's current desire to reduce wastewater flows and free up additional treatment capacity. Therefore, Sandalhaven Utilities was included in the potential utility acquisition for CCU within the current planning horizon.

Table 2-12 shows an estimated 0.4 MGD AADF of wastewater flows to CCU's West County service area via utility acquisitions. These flows have been added to the base flow projections for the West Port WRF service area.

Table 2-12. Estimated Flow Summary for Potential Utility Acquisitions

Utility	Service Area	Estimated Flow (MGD AADF)					
		Current	2025	2030	2035	2045	Total
Bocilla & Knight Island	Rotonda	-	-	0.12	-	-	0.12
Little Gasparilla Island	Rotonda	-	-	0.05	-	-	0.05
Sandalhaven	Rotonda	-	-	-	0.23	-	0.23
West County Total		**0.00**	**0.00**	**0.17**	**0.23**	**-**	**0.40**

2.4.4 Septic-to-Sewer Conversions (S2S)

Charlotte County has prioritized recent efforts to improve water quality in the local water bodies including the Myakka and Peace Rivers, Charlotte Harbor, and various bays that connect the Harbor to the Gulf of Mexico. As a result, Charlotte County has priority plan for S2S conversions.

Information from the current CCU Sewer Master Plan (Jones Edmunds, 2017) and discussion with CCU staff were used as a baseline to determine priority areas for S2S conversion based on the 2017 evaluation, which ranked areas based on an impact score relative to TN loads, proximity to surface waters, and septic age.

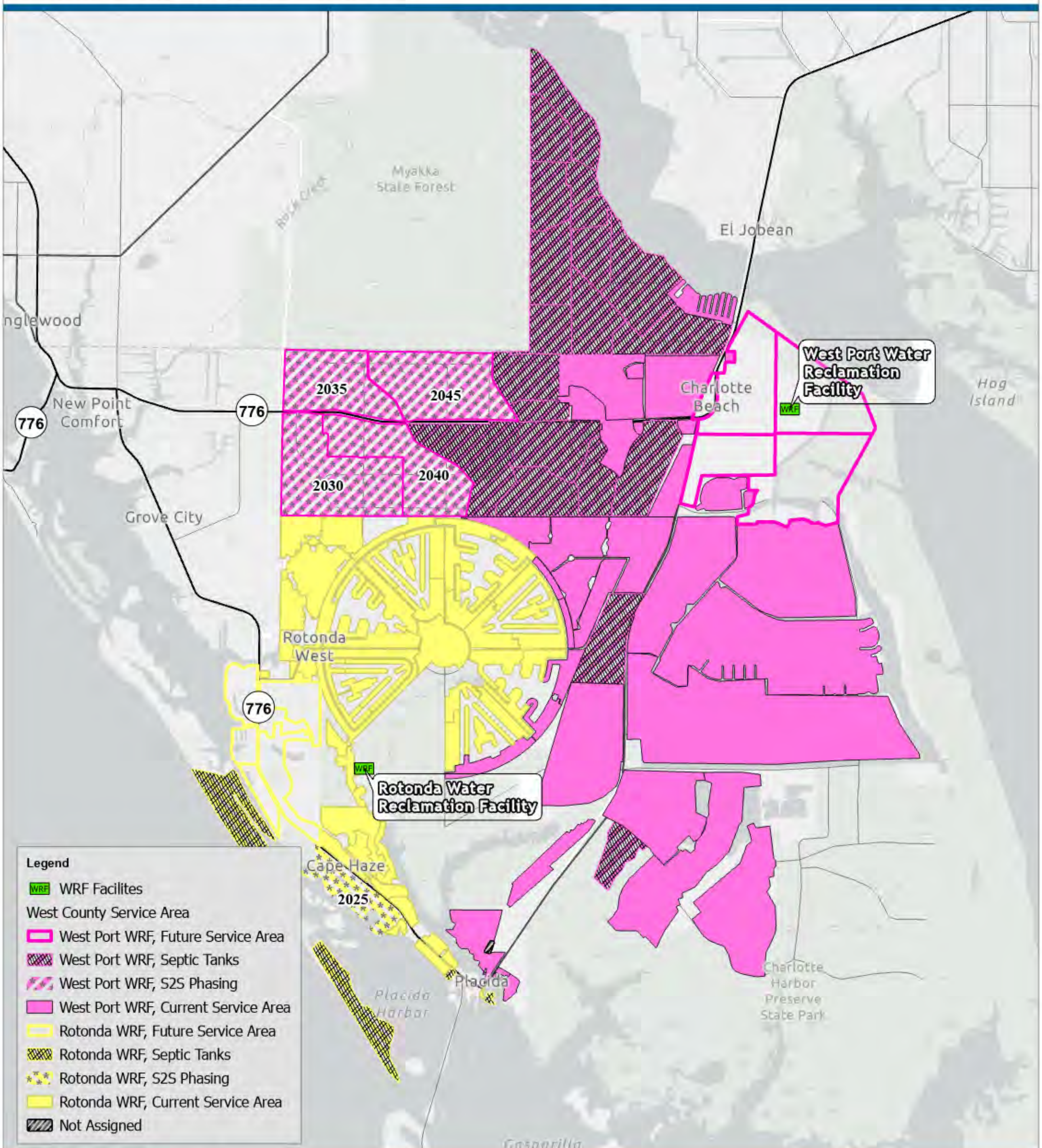
Figure 2-7 graphically represents S2S conversion phasing within the West County service area with respect to the West Port WRF and Rotonda WRF service areas. Areas planned for S2S conversion and future wastewater contributions to the West Port WRF and Rotonda WRF are indicated by the labels 2025, 2030, 2035, 2040, and 2045 in Figure 2-7. The Rotonda WRF service area is planning to phase in S2S conversion of the Cape Haze area in 2025, with no future additions within the planning horizon.

The West Port WRF service area is planning to phase in S2S conversion of several areas in the northwest area along the SR-776 corridor in 5-year block periods for 2030, 2035, 2040 and 2045 as shown in Figure 2-7.

Figure 2-7

Septic - To - Sewer (S2S) Phasing

Charlotte County Wastewater Service Area



0 5,000 10,000

Feet

1:120,000

N W E S

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Table 2-13 summarizes estimated wastewater flows (AADF) for each S2S conversion areas indicated in the figure by phasing year. The total wastewater flow from S2S conversions is 1.34 MGD AADF, with 1.29 MGD to West Port WRF and 0.05 MGD to Rotunda WRF.

Table 2-13. S2S Conversion Phasing

West County Service Area	Estimated Flow (MGD AADF)							
	Current	2025	2030	2035	2040	2045	Total	Buildout[1]
Rotonda WRF	0.00	0.04	-	-	-	-	0.04	0.05
West Port WRF	0.00	-	0.24	0.12	0.21	0.23	0.80	1.29
West County Total	**0.00**	**0.04**	**0.28**	**0.40**	**0.61**	**0.84**	**0.84**	**1.34**

Note: (1.) Build-out shown for reference only; Build-out flows are already included in base flow projection build-out totals.

2.4.5 Sewered Areas with Historically Low Growth

Several sewered areas within West County have experienced historically low in-fill growth. These areas have established roads, water, and sewer. The southeast region of West County was noted as having exceptionally low population and wastewater flows under both current and future conditions. These areas have low-pressure sewer systems (septic tanks with grinder pumps 4-inch sewer force mains) and include Basins 860, 861, 870, and 871 as shown in

Figure 2-7. These areas were discussed with CCU as examples of sewered areas with historically low growth. CCU noted that a developer could purchase the land and significantly alter (i.e., accelerate) the current planned growth; however, the County is not aware of such developer interest at this time. Ultimately, CCU noted the initially provided low flows as acceptable for planning purposes under the current assumptions of low-growth rates and lack of developer interest.

2.4.6 Projected Flow Summary

As Section 2.4.1 presents, base flow projections were established using BEBR and SWFWMD population projections. Additionally, the following factors were considered for further refinement of base flow projections:

1. Planned Developments
2. Potential Utility Acquisitions
3. S2S Conversions
4. Areas with Historically Low Growth

As a result, wastewater flow from the four sources listed above were added to the base flow projections.

Table 2-14 provides wastewater flow projections with respect to these additions. As the projections show, the West Port WRF has higher expected wastewater flows due to a larger number of planned developments and S2S conversions. No growth is assumed for utility acquisitions. Future flows to the Rotonda WRF are expected to remain steady pending the potential acquisition of utilities outside the CCU service area noted herein.

As show in Table 2-14, the West Port WRF is doubling the current AADF treatment (0.8 MGD) up to 1.6 MGD by 2030 and projected to need to treat up to approximately 3.0 MGD AADF of wastewater flows by 2045. The Rotonda WRF is projected to need to treat up to approximately 2.0 MGD AADF by 2045.

Overall, this totals a projected wastewater flow for the West County service area of approximately 5.0 MGD AADF by 2045.

Table 2-14. Summary of Flow Projections

Service Area	Estimated Flow (MGD AADF)							
	Current	2025	2030	2035	2040	2045	Total	Buildout
Base Rotonda WRF - Med. BEBR	1.20	1.24	1.32	1.39	1.44	1.51	**1.51**	**4.03**
(1) Planned Development	-	-	0.05	0.02	-	-	**0.07**	
(2) Utility Acquisitions	-	-	0.17	0.23	-	-	**0.40**	
(3) S2S Conversions	-	0.04	-	-	-	-	**0.04**	
Rotonda WRF Total	**1.20**	**1.28**	**1.58**	**1.86**	**1.94**	**2.02**	**2.02**	

Base West Port WRF - Med. BEBR	0.80	0.83	0.88	0.93	0.97	1.02	**1.02**	**7.67**
(1) Planned Development	-	0.09	0.41	0.36	0.25	-	**1.08**	
(2) Utility Acquisitions	N/A						**0.00**	
(3) S2S Conversions	-	-	0.24	0.12	0.21	0.23	**0.80**	
West Port WRF Total	**0.80**	**0.92**	**1.62**	**2.12**	**2.62**	**2.90**	**2.90**	
West County Total	**2.00**	**2.20**	**3.20**	**3.98**	**4.57**	**4.92**	**4.92**	**11.70**

The projected flows in Table 2-14 represent raw data used for accuracy in flow estimation. However, planning for the design of facilities in excess of 1 MGD does not require precision to the nearest 10,000 gallons. The projected flows have been rounded up to the nearest 100,000 gallons and are presented in Table 2-15.

Table 2-15. Proposed Design Flow Basis

Service Area	Estimated Flow (MGD AADF)						
	Current	2025	2030	2035	2040	2045	Buildout
Rotonda WRF	1.2	1.3	1.6	1.9	2.0	**2.0**	**2.5**[1]
West Port WRF	0.8	1.0	1.7	2.2	2.8	**3.0**	**10.0**
West County Total	**2.0**	**2.3**	**3.3**	**4.1**	**4.8**	**5.0**	**12.5**

Note: (1) Assumes rerated present Rotonda WRF capacity from 2.0 MGD AADF to 2.5 MGD AADF with advanced wastewater treatment (AWT).

The evaluation of the future use of the Rotonda WRF is part of this project scope. For this TM, initial plant process evaluations determined that the Rotonda WRF has the current capacity to be rerated to 2.5 MGD AADF in the future. Increasing capacity to above 2.5 MGD AADF would require improvements to treatment processes beyond what is needed for AWT compliance. A detailed summary of existing plant process condition has is included in a separate Condition Assessment TM as part of this project. The future use of the Rotonda WRF and proposed design for the West Port WRF are contingent on the completion of the Rotonda WRF evaluation to be provided in a separate TM.

In CCU's 2017 Sewer Master Plan, Jones Edmunds recommended a new plant expansion for the West Port WRF to 5.0 MGD AADF with two redundant 2.5-MGD trains for system flexibility and maintenance. As Table 2-15 shows, the West Port WRF flow projections are 3.0 MGD AADF within the 2045 planning horizon but increase significantly to 10 MGD at buildout. Discussion with CCU suggested that a 5.0-MGD AADF WRF with two 2.5-MGD trains may be preferred due to redundancy and ability to take down treatment trains for maintenance, cleaning, and repairs as well as having the ability to have additional treatment capacity that could be used as needed based on future development within Charlotte County. Additional capacity would be used to offset the flow to the Rotonda WRF (even temporarily) to perform maintenance, repairs, etc, as discussed in Section 2.5.

2.5 Flow Shifting

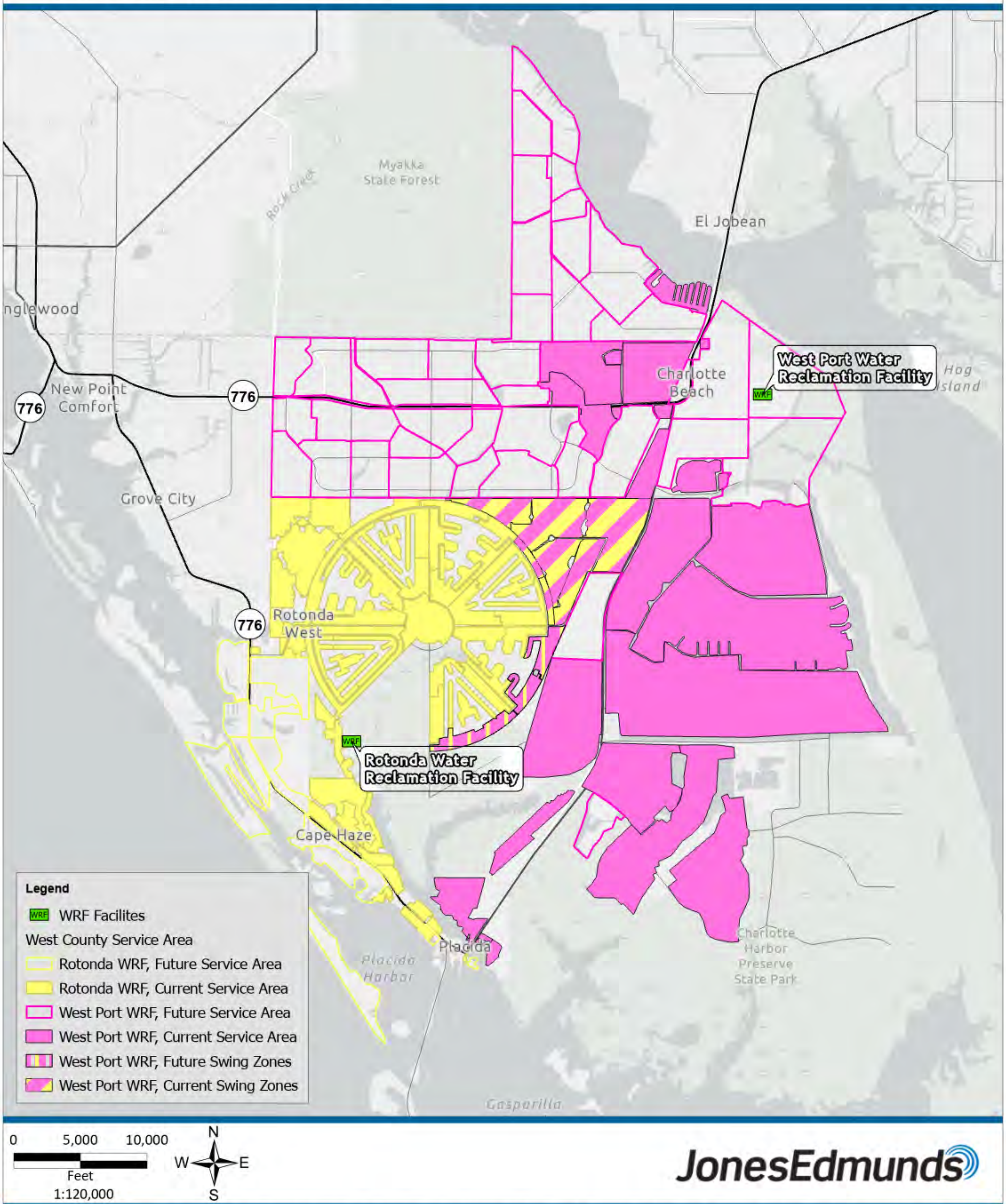
There are several lift stations (LS) in the West Port WRF service area that can shift flow to the Rotonda WRF, referred to as the *current swing zone*. From April to August 2023, CCU shifted nearly 0.12 MGD from West Port WRF to Rotonda WRF using the current swing zone. This zone includes LS-841 through LS-847 (seven stations total). Shifting flow requires operation of two valves in the field.

The swing zone was originally designed to also include LS-852, LS-853, and LS-858, but transmission system restrictions currently prevent flow shifting (capped force mains, untraceable closed valves, etc.). System maintenance and/or minor improvements could be made to reestablish LS-852, LS-853, and LS-858 into the swing zone. These three (3) LS are referred to as the *future swing zone.* Figure 2-8 graphically illustrates the current and future swing zones within the West County service area. Note under future scenarios, the current and future swing zones would serve as one.

Figure 2-8

West County Swing Zone

Charlotte County Wastewater Service Area



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Considering the expeditious nature of projected future flows at West Port WRF (as presented in Table 2-15), expanding the current swing zone to include the future swing zone could further reduce flow contributions to West Port WRF and benefit the timing of future plant expansions. Table 2-16 quantifies the flow shifting in the swing zone under the current and future swing zones, assuming the transmission system is improved to include the future swing zone LS's beginning in year 2025.

Table 2-16. Swing Zone Flow Contributions

Service Area	Estimated Flow (MGD AADF)						
	Current	2025	2030	2035	2040	2045	Buildout[4]
Current Swing Zone[1]	0.12	0.13	0.14	0.14	0.15	0.15	**0.9**
Future Swing Zone[2]	---	0.06	0.07	0.07	0.07	0.08	**0.1**
Total[3]	**0.12**	**0.19**	**0.20**	**0.21**	**0.22**	**0.23**	**1.0**

Note: (1) Includes LS-841 through LS-847. (2) System maintenance and/or minor improvements are required. Includes LS-852, LS-853, and LS-858. (3) Represents current swing zone (LS-841 through LS-847) and future swing zone (LS-852, LS-853, and LS-858). (4) Under buildout scenarios, it is assumed that total flow to Rotonda is capped at 2.5 MGD AADF. This would require a portion of flows to be shifted back to the new built-out West Port WRF plant.

Table 2-17 presents updated proposed design flow basis assuming the swing zone is used to maximize flow shifting to Rotonda WRF through 2045. However, for buildout scenarios, it is assumed that Rotonda WRF is capped at 2.5 MGD AADF. This would require a portion of flows to be shifted back to the new built-out West Port WRF plant. Note the flow quantities are presented as rounded approximate values for planning and design purposes.

Table 2-17. Proposed Design Flow Basis including Swing Zones

Service Area	Estimated Flow (MGD AADF)						
	Current	2025	2030	2035	2040	2045	Buildout
Rotonda WRF	1.3	1.5	1.8	2.1	2.2	2.3	**2.5[1]**
West Port WRF	0.7	0.8	1.5	2	2.6	2.7	**10**
West County Total	**2**	**2.3**	**3.3**	**4.1**	**4.8**	**5**	**12.5**

Note: (1) Assumes rerated present Rotonda WRF capacity from 2.0 MGD AADF to 2.5 MGD AADF with advanced wastewater treatment (AWT). Under buildout scenarios, it is assumed that total flow to Rotonda is capped at 2.5 MGD AADF. This would require a portion of flows to be shifted back to the new built-out West Port WRF plant.

2.6 Design Effluent Water Quality

In October 2021, the Charlotte County Board of County Commission voted to upgrade all County WRFs to AWT in support of the One Charlotte One Water Plan and the Florida SB 64 Legislation. The Burnt Store WRF and the East Port WRF have recently completed design and permitting for treatment expansion and upgrades to meet AWT standards. Both projects are pending completion of the contractor bid process and notice to proceed for construction, and the new WRFs are expected to be in operation by the end of 2027.

Table 2-18 shows the AWT effluent parameters and their respective concentrations that must not be exceeded on a permitted annual average basis to comply with FS 403.086. In addition to these requirements, effluent must also meet high-level disinfection requirements.

Table 2-18. Proposed Effluent Quality (AWT)

Parameter	Concentration (mg/L)
$CBOD_5$	5.0 maximum
TSS	5.0 maximum
Total Nitrogen (TN)	3.0 annual average
Total Phosphorous (TP)	1.0 annual average

2.7 Design Flows and Loads

This section presents the proposed design flows and loads for the West Port WRF and the Rotonda WRF. Proposed flows contained herein were reviewed and accepted by the County when they were presented in a progress meeting on November 9, 2023.

2.7.1 West Port WRF Design Flows

Table 2-19 shows the West Port WRF selected design flow ratios based on peaking factors established and discussed in Section 2.2.

Table 2-19. West Port WRF Proposed Design Flow Ratios

Parameter	Design Flow Ratio	Source
MMADF/AADF	1.2	Historical Data
MTMADF/AADF	1.1	Historical Data
MDF/AADF	2.0	Historical Data
MinDF/AADF	0.8	Historical Data
PHF/AADF	3.0	Estimated

Table 2-20 presents the proposed design flows at the current permitted capacity of 1.2 MGD AADF and the proposed expansion capacity of 5.0 MGD AADF. Design flows were determined using the selected design ratios and applying them to the proposed West Port WRF design flow of 5.0 MGD AADF as discussed in Section 2.4.6. The footnotes present the justification for selecting the proposed design flow ratios and provide the proposed flows to be used for the West Port WRF expansion to 5.0 MGD AADF.

Table 2-20. West Port WRF Proposed Design Flows

Parameter	Permitted Capacity (MGD)	Proposed Expansion (MGD)
AADF[1]	1.2	5.0
MMADF[2]	1.4	6.0
MTMADF[3]	1.3	5.5
MDF[4]	2.4	10
MinDF[5]	1.0	4.0
PHF[6]	3.6	15

(1) The proposed MMADF-to-AADF ratio selected for design is 1.2, representing the highest ratio recorded during the historical data review period. The design MMADFs (1.2 x AADF) were calculated to be 1.4 MGD for current and 6.0 MGD for 5.0-MGD AADF.

(2) The proposed MTMADF-to-AADF ratio selected for design is 1.1, representing the highest ratio recorded during the historical data review period (1.12, 2019). The design MTMADFs (1.1 x AADF) were calculated to be 1.3 MGD for current and 5.5 MGD for 5.0-MGD AADF.

(3) The proposed MDF-to-AADF ratio selected for design is 2.0, representing the highest ratio recorded during the historical data review period. The design MDFs (2.0 x AADF) were calculated to be 2.4 MGD for 1.2-MGD AADF and 10 MGD for 5.0-MGD AADF.

(4) The proposed MinDF-to-AADF ratio selected for design is 0.8, representing the lowest recorded ratio during the historical data review period. However, MinDF data from 2022 was disregarded due to impacts to influent flow meter readings caused by Hurricane Ian between September 28, 2022, and October 1, 2022. The design MinDFs (0.8 x AADF) were calculated to be 1.0 MGD for current AADF and 4.0 MGD for 5.0-MGD AADF.

(5) The proposed PHF-to-AADF ratio selected for design is 3.0. The highest recorded ratio during the historical data review period was 3.55 in 2021. The PHF data from 2022 was disregarded due to impacts to influent flow meter readings caused by Hurricane Ian between September 28, 2022, and October 1, 2022. The design PHFs (3.0 x AADF) were calculated to be 3.6 MGD for current and 15.0 MGD for 5.0-MGD AADF proposed expansion.

2.7.2 West Port WRF Design Loads

The historical influent CBOD and TSS loads from 2021 and 2022 were selected as representative values, averaged, and normalized by respective AADF to create design loads. For influent TKN and TP, the field sampling conducted by CCU was selected as representative values, averaged, and normalized by respective AADF to create design loads. However, due to the limited available samples for TKN and TP, these values will continue to be evaluated throughout the design process. Table 2-21 presents the proposed design normalized loads.

Table 2-21. West Port WRF Design Normalized Loads

Parameter	$CBOD_5$	TSS	TKN[1]	TP[1]
AAD Normalized Loads (ppd/MGD AADF)	1,100	1,900	400	65
MMAD Normalized Loads (ppd/MGD AADF)	1,300	2,300	450	75
PD Normalized Loads (ppd/MGD AADF)	2,120	3,800	750	125

Note: (1) Due to the limited available samples for TKN and TP, these values will continue to be evaluated throughout the design process.

Table 2-22 presents the proposed design loads and concentrations at the current permitted capacity of 1.2 MGD AADF and proposed expansion capacity of 5.0 MGD AADF. The design loads were determined by applying the design normalized loads to the proposed design flows presented from Table 2-20.

Table 2-22. West Port WRF Proposed Design Loads and Concentrations

Parameter	Design Loads (ppd) at 1.2 MGD AADF	Design Loads (ppd) at 5.0 MGD AADF	Design Concentration (mg/L)
CBOD			
AAD Normalized Loads (ppd/MGD AADF)	1,320	5,500	132
MMAD Normalized Loads (ppd/MGD AADF)	1,500	6,250	150
PD Normalized Loads (ppd/MGD AADF)	2,520	10,500	252
TSS			
AAD Normalized Loads (ppd/MGD AADF)	2,280	9,500	228
MMAD Normalized Loads (ppd/MGD AADF)	2,640	11,000	264
PD Normalized Loads (ppd/MGD AADF)	4,440	18,500	444
TKN			
AAD Normalized Loads (ppd/MGD AADF)	480	2,000	48
MMAD Normalized Loads (ppd/MGD AADF)	540	2,250	54
PD Normalized Loads (ppd/MGD AADF)	900	3,750	90
TP			
AAD Normalized Loads (ppd/MGD AADF)	78	325	8
MMAD Normalized Loads (ppd/MGD AADF)	90	375	9
PD Normalized Loads (ppd/MGD AADF)	150	625	15

2.7.3 Rotonda WRF Design Flows

Table 2-23 shows the Rotonda WRF selected design flow ratios based on peaking factor established and discussed in Section 2.2.

Table 2-23. Rotonda WRF Proposed Design Flow Ratios

Parameter	Design Flow Ratio	Source
MMADF/AADF	1.5	Historical Data
MTMADF/AADF	1.3	Historical Data
MDF/AADF	2.6	Historical Data
MinDF/AADF	0.7	Historical Data
PHF/AADF	3.0	Estimated

Table 2-24 presents the proposed design flows at the current permitted capacity of 2.0 MGD AADF and the proposed expansion capacity of 2.5 MGD AADF. Design flows were determined using the selected design ratios and applying them to the proposed Rotonda WRF design flow of 2.5 MGD AADF as discussed in Section 2.4.6. The footnotes present the justification for selecting the proposed design flow ratios and provide the proposed flows to be used for the Rotonda WRF expansion to 2.5 MGD AADF.

Table 2-24. Rotonda WRF Proposed Design Flows

Parameter	Permitted Capacity (MGD)	Proposed Expansion (MGD)
AADF[1]	2.0	2.5
MMADF[2]	3.0	3.75
MTMADF[3]	2.6	3.25
MDF[4]	5.2	6.5
MinDF[5]	1.4	1.75
PHF[6]	6.0	7.5

(1) The proposed MMADF-to-AADF ratio selected for design is 1.5, representing the highest ratio recorded during the historical data review period. The design MMADFs (1.5 x AADF) were calculated to be 3.0 MGD for 2.0-MGD AADF and 3.75 MGD for 2.5-MGD AADF.

(2) The proposed MTMADF-to-AADF ratio selected for design is 1.3, representing the highest ratio recorded during the historical data review period. The design MTMADFs (1.3 x AADF) were calculated to be 2.6 MGD for 2.0-MGD AADF and 3.25 MGD for 2.5-MGD AADF.

(3) The proposed MDF-to-AADF ratio selected for design is 2.6, representing the highest ratio recorded during the historical data review period. The design MDFs (2.6 x AADF) were calculated to be 5.2 MGD for 2.0-MGD AADF and 6.5 MGD for 2.5-MGD AADF.

(4) The proposed MinDF-to-AADF ratio selected for design is 0.7, which represents the current (2022) ratio. However, MinDF data between September 28, 2022, and October 1, 2022, was disregarded due to impacts to influent flow meter readings caused by Hurricane Ian. The design MinDFs (0.7 x AADF) were calculated to be 1.4 MGD for 2.0-MGD AADF and 1.75 MGD for 2.5-MGD AADF.

(5) The proposed PHF-to-AADF ratio selected for design is 3.0. The highest recorded ratio during the historical data review period was 3.33 in 2021. However, PHF data was not available for Rotonda WRF between 2018 and 2020. The design PHFs (3.0 x AADF) were calculated to be 6.0 MGD for 2.0-MGD AADF and 7.5 MGD for 2.5-MGD AADF proposed expansion.

2.7.4 Rotonda WRF Design Loads

The historical influent CBOD and TSS loads from 2021 and 2022 were selected as representative values, averaged, and normalized by respective AADF to create design loads. For influent TKN and TP, the field sampling conducted by CCU was selected as representative values, averaged, and normalized by respective AADF to create design loads. However, due to the limited available samples for TKN and TP, these values will continue to be evaluated throughout the design process. Table 2-25 presents the proposed design normalized loads for CBOD and TSS, and assumed design normalized loads.

Table 2-25. Rotonda WRF Design Normalized Loads

Parameter	CBOD	TSS	TKN[1]	TP[1]
AAD Normalized Loads (ppd/MGD AADF)	820	925	250	30
MMAD Normalized Loads (ppd/MGD AADF)	1225	1375	375	50
MD Normalized Loads (ppd/MGD AADF)	2120	2400	650	80

Note: (1) Due to the limited available samples for TKN and TP, these values will continue to be evaluated throughout the design process.

Table 2-26 presents the proposed design loads and concentrations at the current permitted capacity of 2.0 MGD AADF and proposed expansion capacity of 2.5 MGD AADF. The design loads were determined by applying the design normalized loads to the proposed design flows presented in Table 2-24.

Table 2-26. Rotonda WRF Proposed Design Loads and Concentrations

Parameter	Design Loads (ppd) at 2.0 MGD AADF	Design Loads (ppd) at 2.5 MGD AADF	Design Concentration(mg/L)
CBOD			
AAD Normalized Loads (ppd/MGD AADF)	1,640	2,050	98
MMAD Normalized Loads (ppd/MGD AADF)	2,450	3,063	147
MD Normalized Loads (ppd/MGD AADF)	4,240	5,300	254
TSS			
AAD Normalized Loads (ppd/MGD AADF)	1,850	2,313	111
MMAD Normalized Loads (ppd/MGD AADF)	2,750	3,438	165

MD Normalized Loads (ppd/MGD AADF)	4,800	6,000	288
TKN			
AAD Normalized Loads (ppd/MGD AADF)	500	625	30
MMAD Normalized Loads (ppd/MGD AADF)	750	938	45
MD Normalized Loads (ppd/MGD AADF)	1,300	1,625	78
TP			
AAD Normalized Loads (ppd/MGD AADF)	60	75	4
MMAD Normalized Loads (ppd/MGD AADF)	100	125	6
MD Normalized Loads (ppd/MGD AADF)	160	200	10

Appendix H

Current and Buildout Flow and Dwelling Unit Estimates for Charlotte County

APPENDIX H

CURRENT AND BUILDOUT FLOW AND DWELLING UNIT ESTIMATES FOR CHARLOTTE COUNTY

BACKGROUND

This Appendix documents the methodology used to update wastewater flow projections within the CCU service area. The wastewater flow projections were last updated as part of the 2017 Sewer Master Plan. The underlying data for the projections have since changed substantially, underscoring the need to update the data and improve the methodology where possible. Additionally, several large residential developments are being planned by the County for the future. The objective of this appendix is to develop parcel-level water and wastewater flow (and dwelling unit [DU]) estimates for current and buildout conditions, which can then be aggregated by geographic area such as pressure zone, sewer basin, or county region.

The approach for the 2024 estimates leveraged updated data and methodologies, along with some additional data sources such as developments, to produce current and buildout flow and DU estimates throughout the entire County. Rather than producing estimates only within the existing utility service areas or project focus areas, a County-wide approach was taken so that the same estimates can be used across multiple projects.

1 METHODOLOGY

The methodology used to produce parcel-level flow and dwelling unit (DU) projections for current and buildout conditions is outlined below.

1.1 CURRENT CONDITIONS

Current-condition DU assumptions and formulas were derived from the 2017 Sewer Master Plan. Three formulas were used to estimate DUs:

- Integer values: Either 0 or 1 or more DU based on current land use.
- The equation: $Estimated\ DUs = \frac{Parcel\ Level\ Population}{\frac{Census\ Poplation}{Census\ Housing\ Units}}$
- Number of occupied units from County property data.

Flow assumptions were as follows:

- Where DUs were equal to 1 or more:
    - Wastewater flows = 160 gallons per day (gpd) per DU.

- Supporting documentation for this assumption is provided as Appendix J, Hydrograph Decomposition & Wastewater Flow Contributions per Equivalent Residential Connection (ERC) (2024 CCU SMP, Jones Edmunds). Note ERC and DU may be interchangeable in some cases, such as how a typical residential home equals either 1 ERC or 1 DU.
- Where DUs were equal to 0:
  - Building square footage was used:
    - $\frac{Building\ Square\ Footage}{1000*120\ Gallons\ per\ day}$ for water and wastewater flows.

1.2 Buildout Conditions

Buildout condition DU assumptions were based largely on the Southwest Florida Water Management District (SWFWMD) parcel-level population projections. Current and future land uses were considered. Certain non-residential uses, such as industrial and commercial, had existing estimated flows carried forward but were scaled based on base to buildout year population growth. Flow estimates were developed in 5-year intervals using base-to-planning year growth rates for 2025, 2030, 2035, 2040, and 2045. Base-to-planning year growth rates were applied to flows at the parcel level using the University of Florida Bureau of Economic and Business Research (BEBR) medium growth rate. 2022 BEBR estimates for Residential future land use type show a growth rate of 130.6 percent from 2021 to 2050.

Two formulas were used to estimate DUs:

- Integer values: Either 0 or 1 or more DUs based on current and future land use and acreage.
- $Estimated\ DUs = \frac{Parcel\ Level\ Population\ BO\ Population\ Estimate}{\frac{Census\ Poplation}{Census\ Housing\ Units}}$

1.2.1 County Planned and Proposed Developments

County development information was downloaded and linked to an associated parcel identification (ID). Developments identified the planned square footage, number of units, etc., for the development.

Although the SWFWMD parcel-level population estimates contain some future developments (as identified by attribute), many of the County's developments were omitted.

For parcels containing a County planned and proposed development, the number of DUs and associated water and wastewater flows derived from the development information overrode values for the DUs or flows from the buildout conditions methodology in 2045, 2050, and buildout.

Additionally, some County planned and proposed development parcels were excluded from the final analysis because they were either missing from the County's Developments web app or lacked information required to estimate flows.

1.3 REVISIONS AND ENHANCEMENTS

Revisions and enhancements were made to the methodology under the following special circumstances:

- **Parcels containing a missing or zero census population and housing:** The Countywide average population/household was used (1.698 people per household).
- **Low-Demand Parcels:** When relying on attributes from several different data sources, gaps in the data will result in low or no-flow parcels that should clearly have flows associated with them. These gaps were filled by identifying the missing data and applying an alternate formula to capture flows for these parcels. These parcels were either assigned zero DUs, used the building area to estimate the number of dwelling units, or used the current/buildout population to estimate the number of DUs.
- **Buildout flows lower than current flows:** Although the total flows across all parcels increased at buildout, some individual parcels contain lower buildout flows than current flows. We evaluated these parcels and found that the parcels moved from a high- to low-intensity land use, which would expectedly decrease the buildout demands.
- **Future Land Use at Buildout for Public Land (PL) Parcels:** These values were changed to Medium Density Residential (MDR) based on County direction that no new public land or parks should be assumed. We assumed 10 DUs per acre based on the maximum density defined for the MDR future land use in the County's *FLU Appendix I Land Use Guide*. Some parcels experienced a decrease in flow based on the original assumptions used for PL parcels. We used the greater flow of the two approaches in the final buildout flow estimate for each parcel. If future developments were projected to occur on a PL parcel, the development information supersedes the assumed MDR designation.
- **Large Parcels with Low Flows:** These are parcels that are 10 acres or more with buildout water flows less than 1,000 gallons. Depending on the future land use designation, these flows were based on estimated methodologies outlined in previous sections, including future populations from SWFWMD or building square footages.
- To apply the flow projections to their associated Water Reclamation Facility (WRF) service area, a Basin ID was assigned to each SWFWMD parcel point. Plant assignments were then assigned by Basin ID based on the 2017 Sewer Master Plan.
- Although total flows across all parcels increased at buildout, some individual parcels contain lower buildout flows than current flows. Several of these were reviewed and reasonable explanations were discovered:
  - Multiple buildout scenarios were included in this analysis:
    - **Planning Buildout** is the primary buildout scenario, which includes the referenced buildout assumptions, with no adjustment for large low-flow parcels or change of public land to medium-density residential. This represents a moderate buildout scenario without significant adjustments made to the buildout assumptions and with data backed by SWFWMD projections and published County

    - assumptions and development data. This parcel level information is captured in the "Projections No Lg Low or PL MDR" tab.
    - The **Ultimate Buildout** scenario is an aggressive scenario that adjusts some assumptions on future land use at buildout as an attempt to capture the maximum flows at ultimate buildout. This scenario overrides data backed by SWFWMD and fills in future land use such as public land with medium-density residential. It also adjusts assumptions made on large low-flow parcels to increase their flows.
- Lastly and most importantly, a quality control process was completed as needed based on population projections and hydraulic modeling results. In other words, special cases occurred where adjustments to the typical methodology were required to achieve the desired level of accuracy.

1.4 Data Sources

Several data sources were used to develop the parcel-level flow and DU estimates:

- SWFWMD Parcel-Level Population Projections (downloaded January 31, 2023):
  - https://www.swfwmd.state.fl.us/resources/data-maps/section-c-population-projections-utility-and-parcel-layers
- Charlotte County Parcels and NAL data table (downloaded March 13, 2023):
  - https://www.charlottecountyfl.gov/gis/shapefile-gallery.stml
    - Accounts (Parcels)
  - https://www.ccappraiser.com/Downloads.aspx
    - NALWEB2022 (NAL Data table)
- Census blocks (2020) containing housing units and population by block:
  - https://www.census.gov/geographies/reference-maps/2020/geo/2020-census-block-maps.html
- County Planned and Proposed Developments (downloaded March 22, 2023):
  - https://ccbocc.maps.arcgis.com/apps/MapTour/index.html?appid=9a8a50d822654af8b48eeaf44346db4c
- Charlotte County Future Land Use definitions:
  - https://www.charlottecountyfl.gov/core/fileparse.php/376/urlt/01-FLU-AppI.pdf

- Charlotte County Municode Section 3-9, Arcticle II contains the percentage of lot area for all buildings (used in alternate buildout flow calculations):
  - https://library.municode.com/fl/charlotte_county/codes/code_of_ordinances?nodeId=PTIIILADEGRMA_CH3-9ZO_ARTIIDIRE_S3-9-48ENCHAIPAEC
- 2022 BEBR Residential Future Land Use Type Estimates:
  - https://www.bebr.ufl.edu/wp-content/uploads/2022/02/projections_2022.pdf

Appendix I

Capital Improvement Program Project Sheets

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **1-M-LS - Woodbury (LS-45) Pump Upgrade**

Priority Ranking: **1**

Plant Service Area: East Port WRF

Description: The project includes pump upgrades at existing LS-45. A review of the existing model found that the lift station currently experiences a level of service failure during the Max Day Scenario. The lift station currently houses two 10 HP pumps. Updates to the lift station may include an increase in pump size, discharge piping, and electrical upgrades.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

Project CIP Planning

From: Present

To: 2030

PROJECT DETAILS

Project Location

Murdock Circle

Force Main Length

N/A

Force Main Material

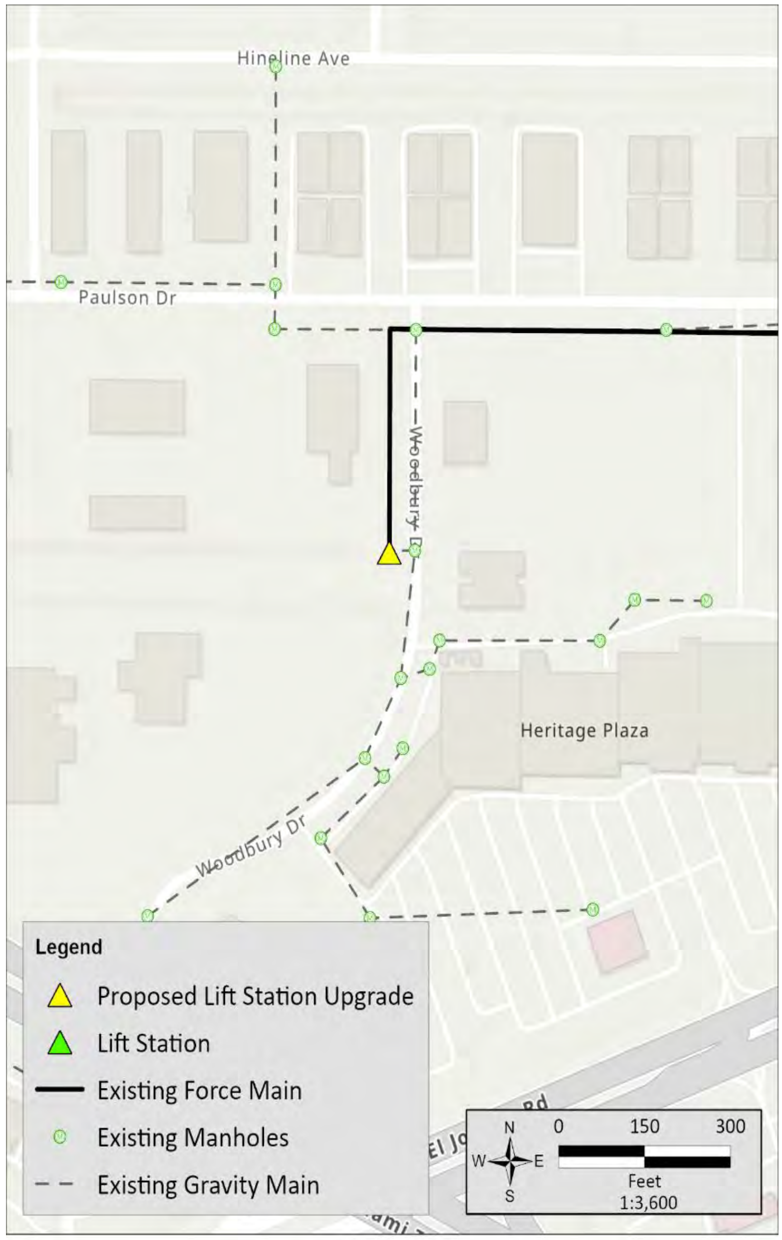
N/A

Force Main Size

N/A

PROJECT COMPONENTS

- ☑ Pump Station
- ☐ Force Mains
- ☐ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	40	40	40			120
Land (or ROW)						
Construction Cost			360	360	360	1,080
Total Project Cost	**40**	**40**	**400**	**360**	**360**	**1,200**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **2-M-FM - Altoona (LS 139) to Wawa (LS 93)**

Priority Ranking: 2 | **Plant Service Area:** **East Port WRF**

Description: The project includes constructing 8,100 linear feet (LF) of 16-inch force main and 3,100 LF of 24-inch force main from Altoona (LS-137) to where Wawa (LS-93) manifolds in Mid County.

Note: This FM is part of the Lakeview Midway S2S project.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: Present

To: 2030

PROJECT DETAILS

Project Location

Lake View Midway

Force Main Length

11,200

Force Main Material

PVC

Force Main Size

16/24

PROJECT COMPONENTS

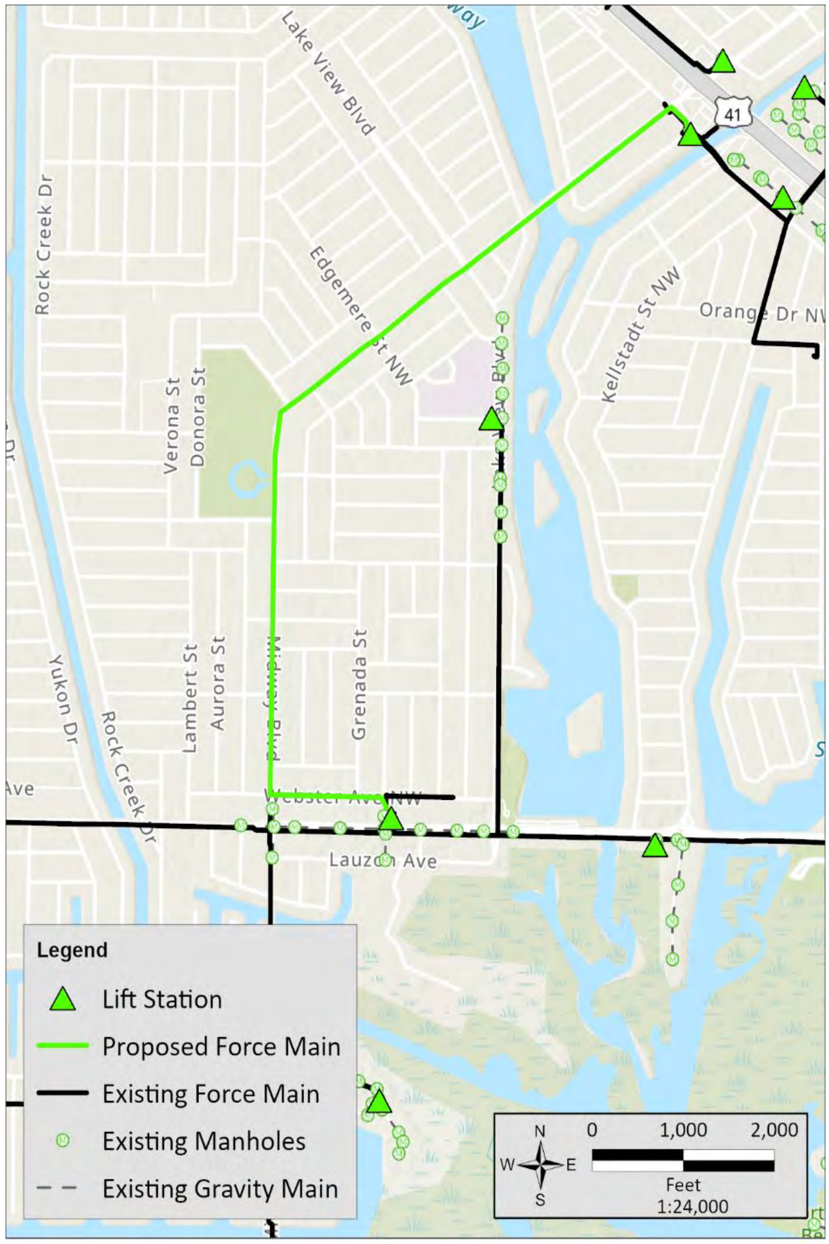
☐ Pump Station

☑ Force Mains

☐ Vacuum Mains

☐ Low Pressure Mains

☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	207	207	207			622
Land (or ROW)						
Construction Cost			1,866	1,866	1,866	5,598
Total Project Cost	**207**	**207**	**2,073**	**1,866**	**1,866**	**6,220**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **3-M-FM - Cochran Blvd from El Jobean Road to Midway Blvd**

Priority Ranking: 3 | **Plant Service Area:** East Port WRF

Description: The project includes construction of 16,030 linear feet (LF) of 20-inch force main along Toledo Blade Blvd, Cochran Blvd, and Lake View Blvd from El Jobean Road to Midway Blvd.
Note: The Lake View Blvd FM is part of the Lake View Midway S2S project and MSBU program. The Toledo Blade and Cochran Blvd FMs should be timed with West Port development phases to re-route flows from LS-37 to LS-93.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: Present

To: 2030

PROJECT DETAILS

Project Location
Lake View Midway

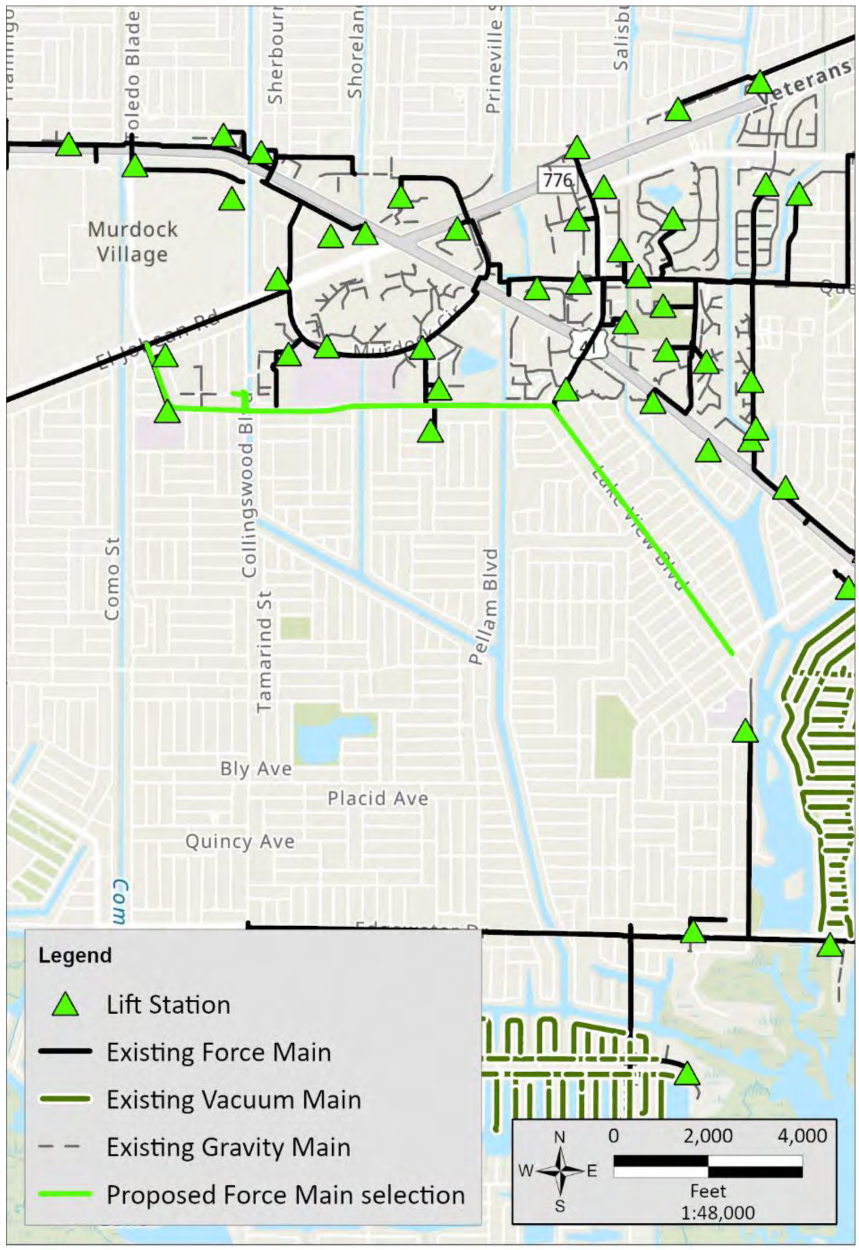
Force Main Length
16,030

Force Main Material
PVC

Force Main Size
20

PROJECT COMPONENTS

☐ Pump Station
☑ Force Mains
☐ Vacuum Mains
☐ Low Pressure Mains
☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	321	321	321			962
Land (or ROW)						
Construction Cost			2,885	2,885	2,885	8,656
Total Project Cost	**321**	**321**	**3,206**	**2,885**	**2,885**	**9,618**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **4-W-FM - Rotonda Blvd West (LS 816) to Boundary Boulevard**

Priority Ranking: **4** | **Plant Service Area:** **Rotonda WRF**

Description: The project includes upsizing 500 linear feet (LF) of 6-inch force main to 12-inch force main from Rotonda Blvd West (LS-816) to where it discharges into gravity on Boundary Boulevard in West County.

Note: The station's location is still being determined by CCU due to limited easement.

HYDRAULIC DETAILS

FM Capacity Improved from

6-inch

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

Project CIP Planning

From: Present

To: 2030

PROJECT DETAILS

Project Location

Rotonda West

Force Main Length

500

Force Main Material

PVC

Force Main Size

12

PROJECT COMPONENTS

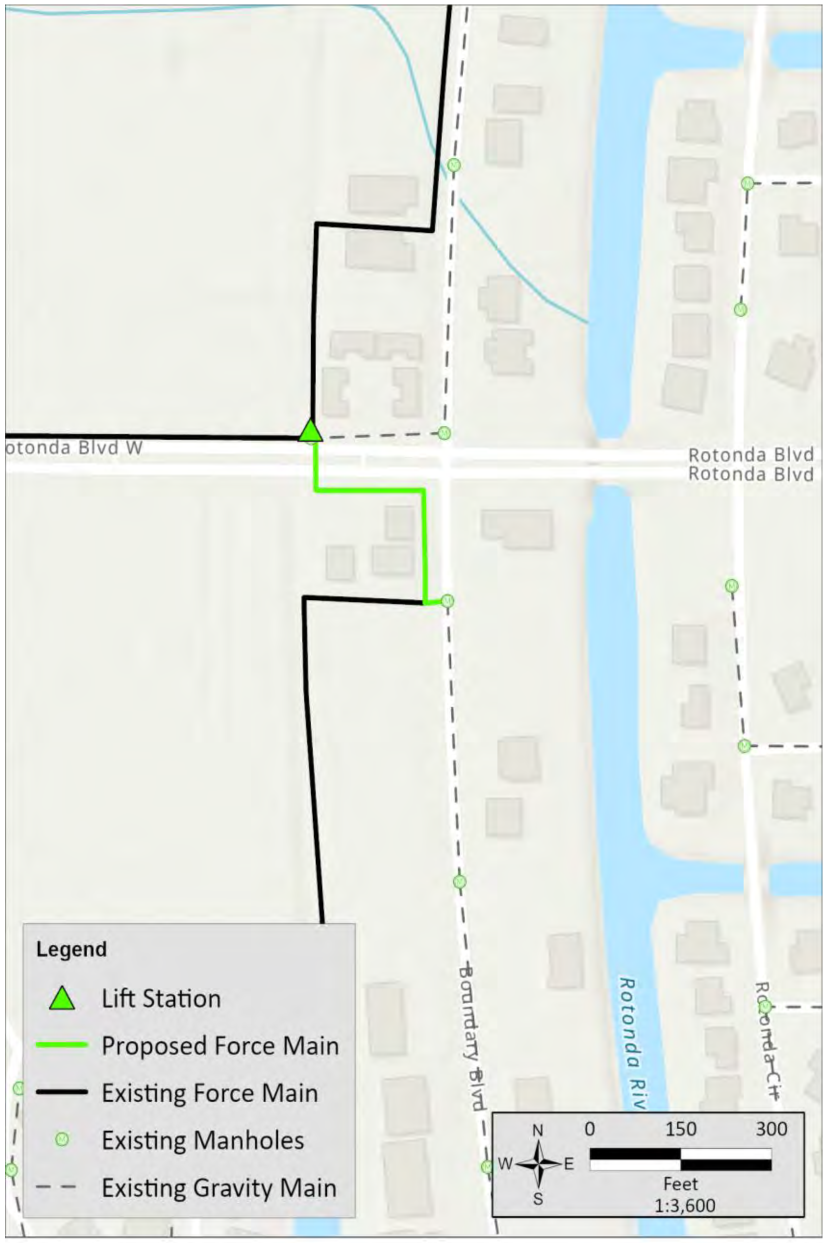
☐ Pump Station

☑ Force Mains

☐ Vacuum Mains

☐ Low Pressure Mains

☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	7	7	7			20
Land (or ROW)						
Construction Cost			60	60	60	180
Total Project Cost	**7**	**7**	**67**	**60**	**60**	**200**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **5-M-LS - Judd Lift Station SCADA Installation**

Priority Ranking: 5 | **Plant Service Area:** East Port WRF

Description: The project includes installation of a SCADA system at LS-8.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: Present

To: 2030

PROJECT DETAILS

Project Location
Port Charlotte

Force Main Length
N/A

Force Main Material
N/A

Force Main Size
N/A

PROJECT COMPONENTS

☑ Pump Station
☐ Force Mains
☐ Vacuum Mains
☐ Low Pressure Mains
☐ Gravity Mains

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services						-
Land (or ROW)						
Construction Cost	50					50
Total Project Cost	**50**					**50**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **6-W-FM - White Marsh-Boundary #1 (LS-852) Discharge Pipe**

Priority Ranking: **6** | **Plant Service Area:** **Rotonda**

Description: The project includes upsizing 45 linear feet (LF) of 4-inch force main to 8-inch force main downstream of White Marsh-Boundary #1 (LS-852) to where it manifolds with the 14-inch FM.

HYDRAULIC DETAILS

FM Capacity Improved from

4-inch

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2031

To: 2035

PROJECT DETAILS

Project Location

West White Marsh

Force Main Length

45

Force Main Material

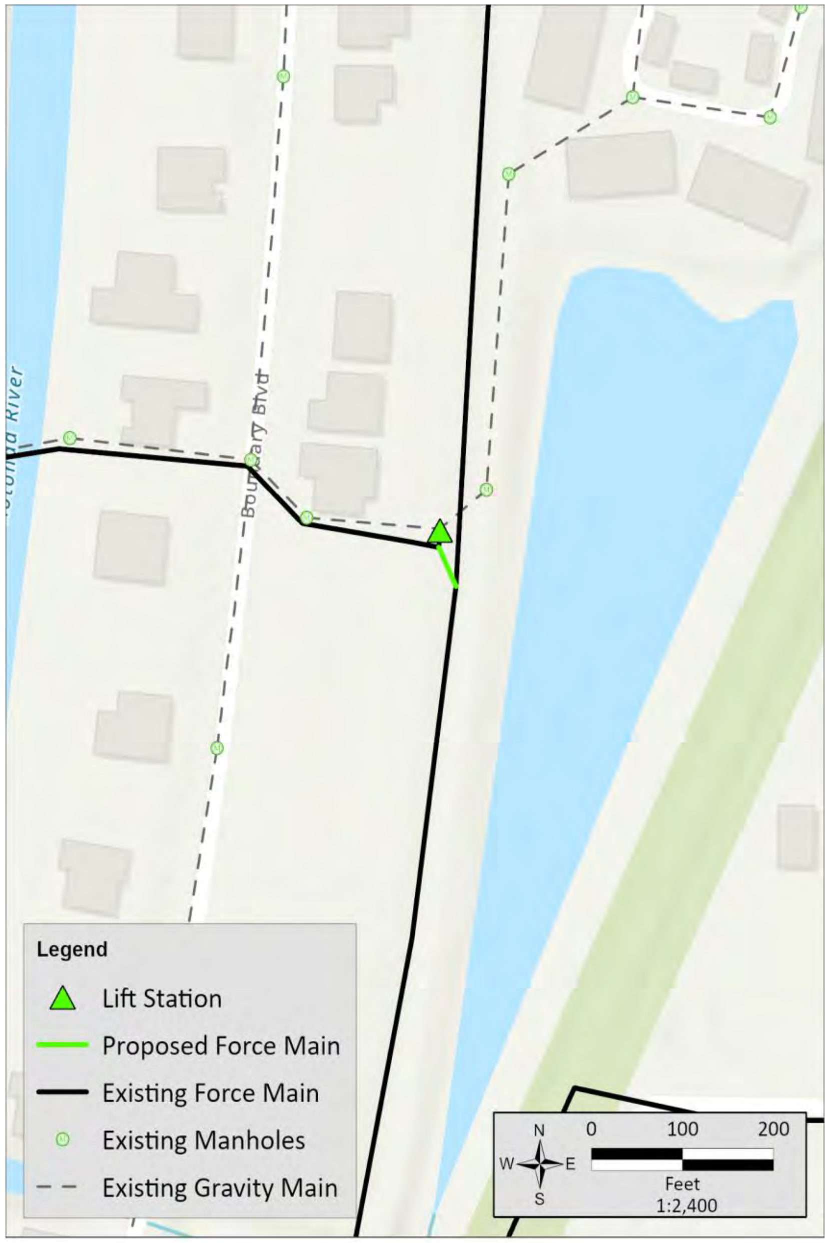
PVC

Force Main Size

8

PROJECT COMPONENTS

- ☐ Pump Station
- ☑ Force Mains
- ☐ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	0.5	0.5	0.5			1.4
Land (or ROW)						
Construction Cost			4	4	4	12
Total Project Cost	**0.5**	**0.5**	**4.5**	**4**	**4**	**13.5**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **7-W-FM - Landings (LS-868) to SR-775**

Priority Ranking: 7 | **Plant Service Area:** Rotonda WRF

Description: The project includes upsizing 200 linear feet (LF) of 4-inch force main to 6-inch force main downstream of Landings (LS-868) to SR-775.

HYDRAULIC DETAILS

FM Capacity Improved from

4-inch

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2031

To: 2035

PROJECT DETAILS

Project Location

Cape Haze

Force Main Length

200

Force Main Material

PVC

Force Main Size

6

PROJECT COMPONENTS

- ☐ Pump Station
- ☑ Force Mains
- ☐ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	1	1	1			4
Land (or ROW)						
Construction Cost			12	12	12	36
Total Project Cost	**1**	**1**	**13**	**12**	**12**	**40**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: 8-M-FM - Toledo Blade Blvd from Tamiami Trail to El Jobean Road

Priority Ranking: 8 | **Plant Service Area:** East Port WRF

Description: The project includes constructing 4,250 linear feet (LF) of 12-inch force main along Toledo Blade Boulevard from Tamiami Trail to El Jobean Road in Mid County.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: Present

To: 2030

PROJECT DETAILS

Project Location

Murdock Village

Force Main Length

4,250

Force Main Material

PVC

Force Main Size

12

PROJECT COMPONENTS

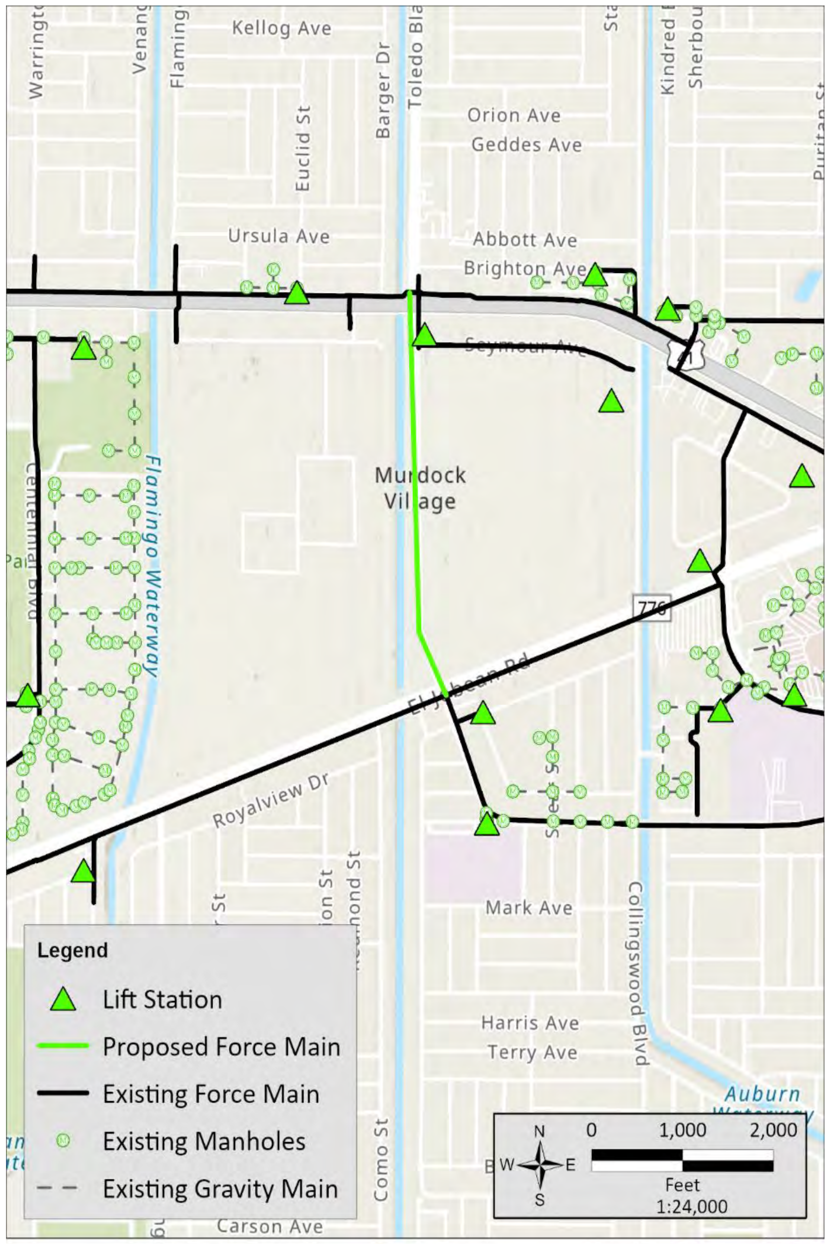
☐ Pump Station

☑ Force Mains

☐ Vacuum Mains

☐ Low Pressure Mains

☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	57	57	57			170
Land (or ROW)						
Construction Cost			510	510	510	1,530
Total Project Cost	**57**	**57**	**567**	**510**	**510**	**1,700**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **9-S-LS - Prada (LS-415) Pump Upgrade**

Priority Ranking: **9** | **Plant Service Area:** **Burnt Store WRF**

Description: The project includes pump upgrades at existing LS-415. A review of the 5-year model found that the lift station experiences a level of service failure during the Max Day Scenario. The lift station currently houses two 7.5 HP pumps. Updates to the lift station may include an increase in pump size, discharge piping, and electrical upgrades.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2031

To: 2035

PROJECT DETAILS

Project Location

North Burnt Store Marina

Force Main Length

N/A

Force Main Material

N/A

Force Main Size

N/A

PROJECT COMPONENTS

- ☑ Pump Station
- ☐ Force Mains
- ☐ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	21	21	21			63
Land (or ROW)						
Construction Cost			189	189	189	567
Total Project Cost	**21**	**21**	**210**	**189**	**189**	**630**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: 10-W-LS - Placida Bay (LS-810) Pump Upgrade

Priority Ranking: 10 | **Plant Service Area:** Rotonda WRF

Description: The project includes pump upgrades at existing LS-810. A review of the 5-year model found that the lift station experiences a level of service failure during the Max Day Scenario. The lift station currently houses one 2.7 HP and one 1.6 HP pump. Updates to the lift station may include an increase in pump size, discharge piping, and electrical upgrades.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2036

To: 2040

PROJECT DETAILS

Project Location

Cape Haze

Force Main Length

N/A

Force Main Material

N/A

Force Main Size

N/A

PROJECT COMPONENTS

- ☑ Pump Station
- ☐ Force Mains
- ☐ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	21	21	21			63
Land (or ROW)						
Construction Cost			189	189	189	567
Total Project Cost	**21**	**21**	**210**	**189**	**189**	**630**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **11-W-LS - Silage (LS-865) Pump Upgrade**

Priority Ranking: **11** | **Plant Service Area:** **West Port WRF**

Description: The project includes pump upgrades at existing LS-865. A review of the 5-year model found that the lift station experiences a level of service failure during the Max Day Scenario. The lift station currently houses two 5 HP pumps. Updates to the lift station may include an increase in pump size, discharge piping, and electrical upgrades.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2036

To: 2040

PROJECT DETAILS

Project Location

South Gardens of Gulf Cove

Force Main Length

N/A

Force Main Material

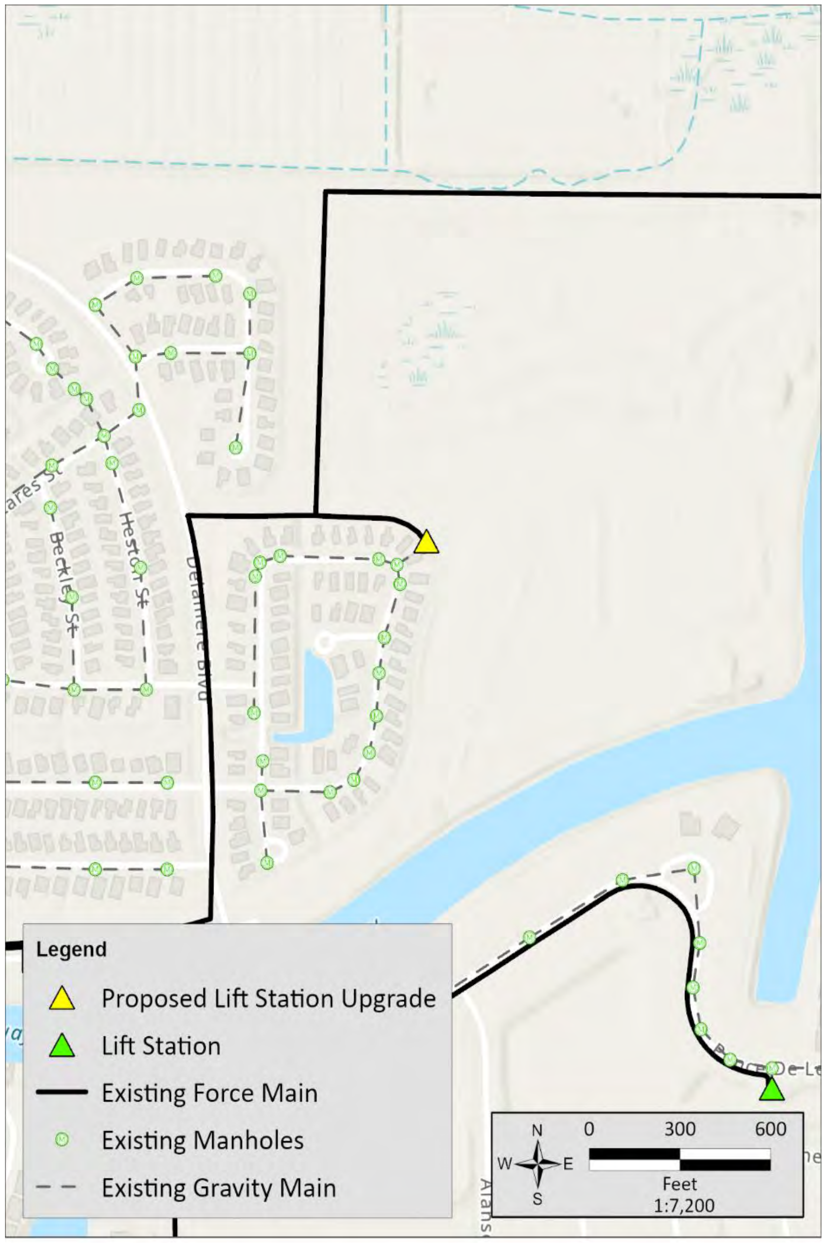
N/A

Force Main Size

N/A

PROJECT COMPONENTS

- ☑ Pump Station
- ☐ Force Mains
- ☐ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	15	15	15			45
Land (or ROW)						
Construction Cost			135	135	135	405
Total Project Cost	**15**	**15**	**150**	**135**	**135**	**450**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: 12a-W-FM - SR-776 from SR-771 to Oceanspray Boulevard

Priority Ranking: 12a | **Plant Service Area:** East Port WRF

Description: The project includes constructing 2,500 linear feet (LF) of 16-inch force main and 11,500 LF of 20-inch force main along SR-776 from SR-771 to Oceanspray Boulevard in West County.
Note: The project is not hydraulically driven based on CCU existing system. This improvement can be deferred based on the County's timing for accepting the Englewood Water District bulk meter flow or new development flows.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: Present

To: 2030

PROJECT DETAILS

Project Location
Englewood East

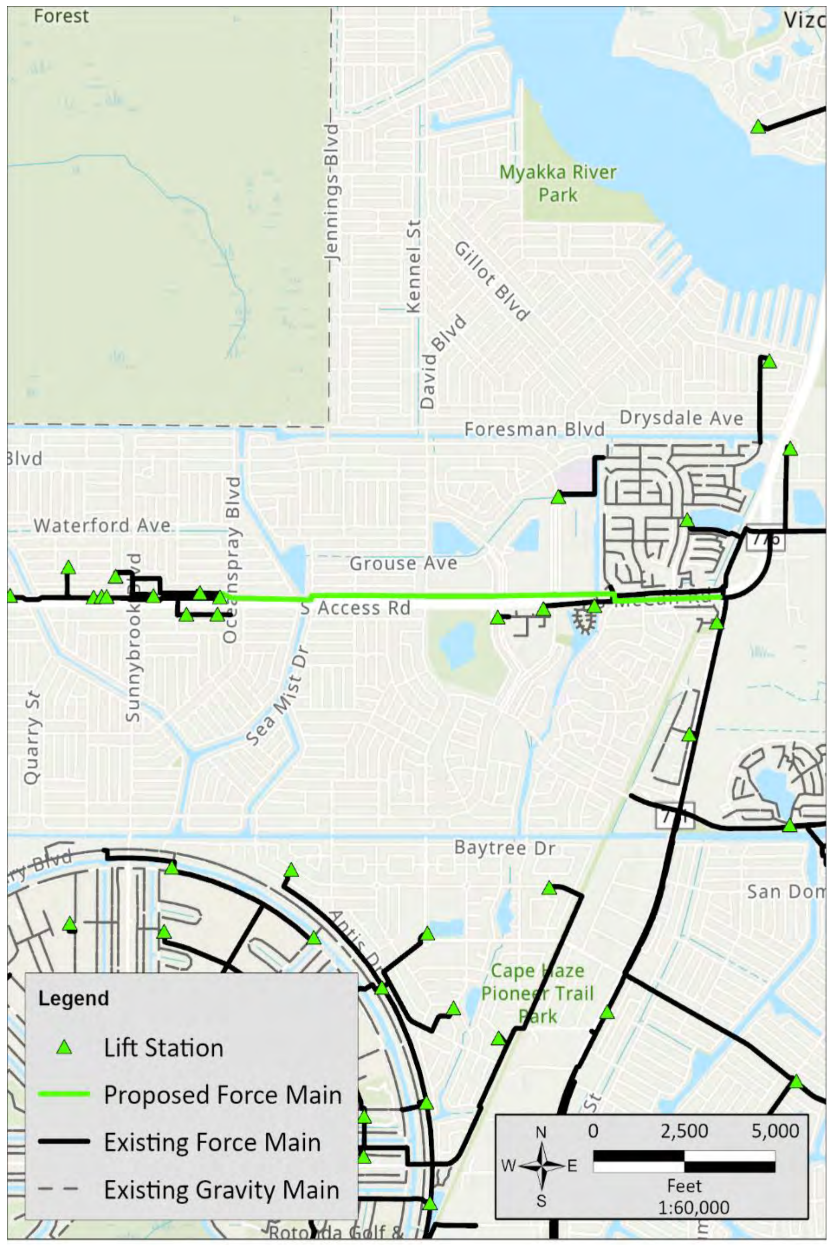
Force Main Length
14,000

Force Main Material
PVC

Force Main Size
16/20

PROJECT COMPONENTS

- ☐ Pump Station
- ☑ Force Mains
- ☐ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	272	272	272			815
Land (or ROW)						
Construction Cost			2,445	2,445	2,445	7,335
Total Project Cost	**272**	**272**	**2,717**	**2,445**	**2,445**	**8,150**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: 12b-W-FM - SR-776 from Sunnybrook Boulevard to Spinnaker Boulevard

Priority Ranking: 12b | **Plant Service Area:** West Port WRF

Description: The project includes constructing 5,390 linear feet (LF) of 8-inch force main along SR-776 from Sunnybrooke Boulevard to Spinnaker Boulevard in West County.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: Present

To: 2030

PROJECT DETAILS

Project Location
Englewood East

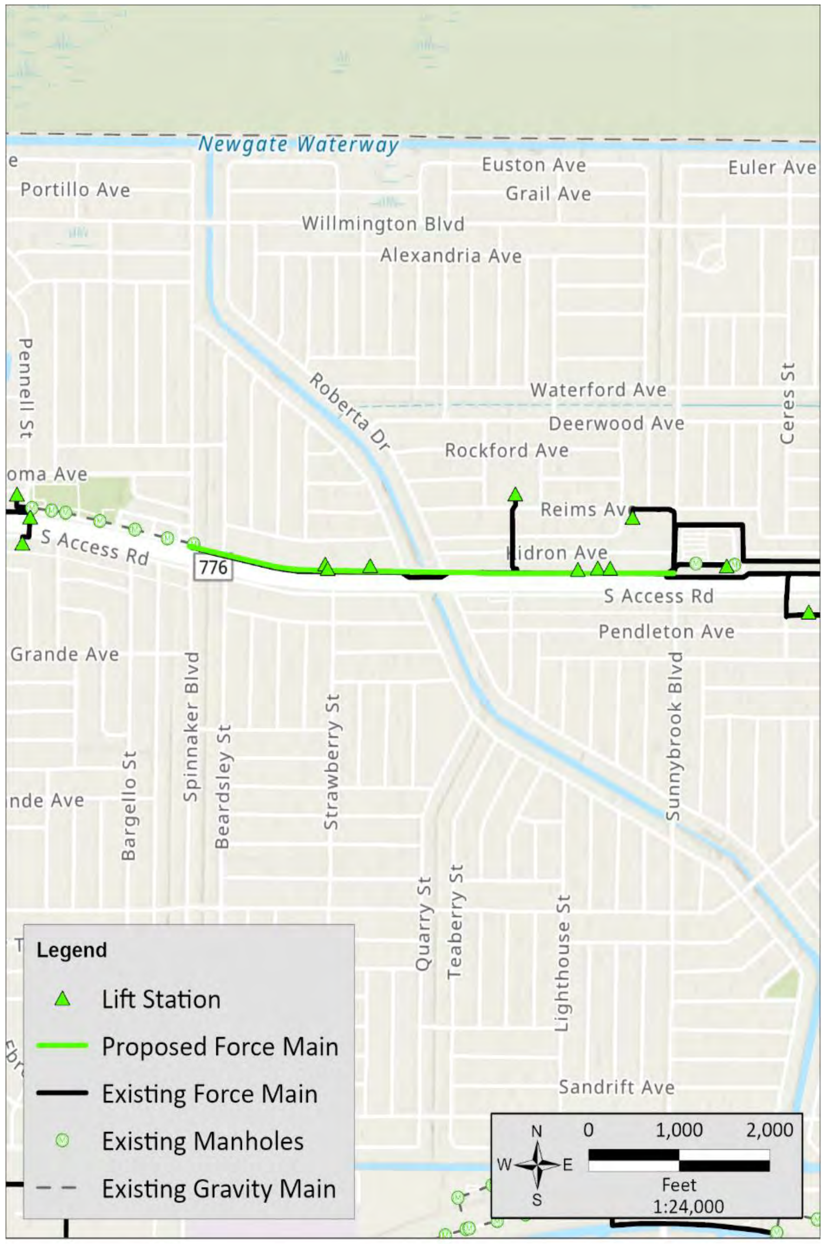
Force Main Length
5,390

Force Main Material
PVC

Force Main Size
8

PROJECT COMPONENTS

☐ Pump Station
☑ Force Mains
☐ Vacuum Mains
☐ Low Pressure Mains
☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	54	54	54			162
Land (or ROW)						
Construction Cost			485	485	485	1,455
Total Project Cost	**54**	**54**	**539**	**485**	**485**	**1,620**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **13-W-FM - Long Meadow Road to Parade Circle**

Priority Ranking: **13** | **Plant Service Area:** **Rotonda WRF**

Description: The project includes upsizing 1,160 linear feet (LF) of 4-inch force main to 8-inch force main along Long Meadow Road to where the force main discharges into gravity on Parade Circle in West County.

HYDRAULIC DETAILS

FM Capacity Improved from

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2041

To: 2045

PROJECT DETAILS

Project Location

Rotonda Community Park

Force Main Length

1,160

Force Main Material

PVC

Force Main Size

8

PROJECT COMPONENTS

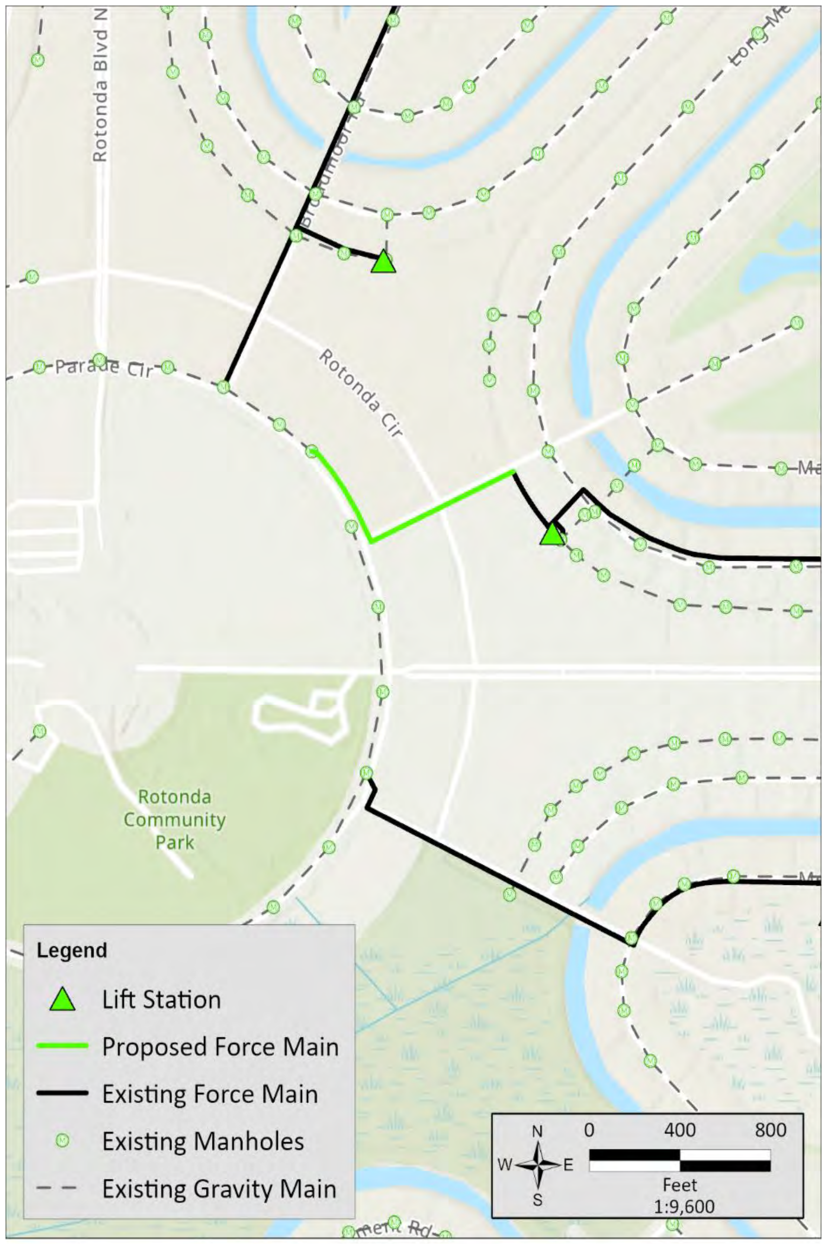
☐ Pump Station

☑ Force Mains

☐ Vacuum Mains

☐ Low Pressure Mains

☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	12	12	12			35
Land (or ROW)						
Construction Cost			104	104	104	313
Total Project Cost	**12**	**12**	**116**	**104**	**104**	**350**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **14-W-FM - Field (LS-801) to Rotonda WRF**

Priority Ranking: **14** | **Plant Service Area:** **Rotonda WRF**

Description: The project includes upsizing 2,030 linear feet (LF) of 12-inch force main to 16-inch force main from Field (LS-801) to Rotonda WRF in West County.

HYDRAULIC DETAILS

FM Capacity Improved from

12-inch

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2041

To: 2045

PROJECT DETAILS

Project Location

Rotonda West

Force Main Length

2,030

Force Main Material

PVC

Force Main Size

16

PROJECT COMPONENTS

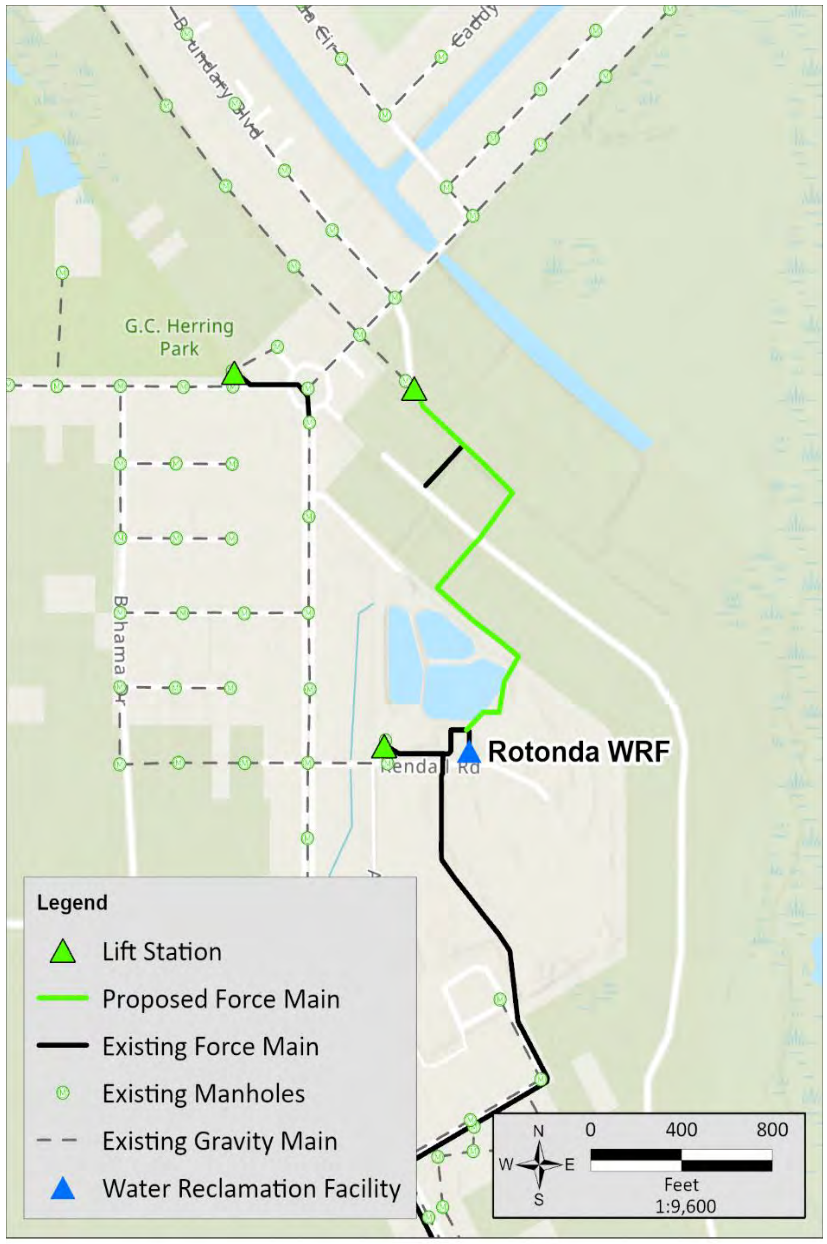
☐ Pump Station

☑ Force Mains

☐ Vacuum Mains

☐ Low Pressure Mains

☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	34	34	34			102
Land (or ROW)						
Construction Cost			305	305	305	914
Total Project Cost	**34**	**34**	**338**	**305**	**305**	**1,020**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **15-M-FM - East side of Franz Ross Park to Quesada (LS 37)**

Priority Ranking: **15** | **Plant Service Area:** **East Port WRF**

Description: The project includes upsizing 1,250 linear feet (LF) of 10-inch force main to 16-inch force main from the east side of Franz Ross Park to Quesada (LS-37) in Mid County.

HYDRAULIC DETAILS

FM Capacity Improved from

10-inch

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2041

To: 2045

PROJECT DETAILS

Project Location

Frans Ross Park

Force Main Length

1,250

Force Main Material

PVC

Force Main Size

16

PROJECT COMPONENTS

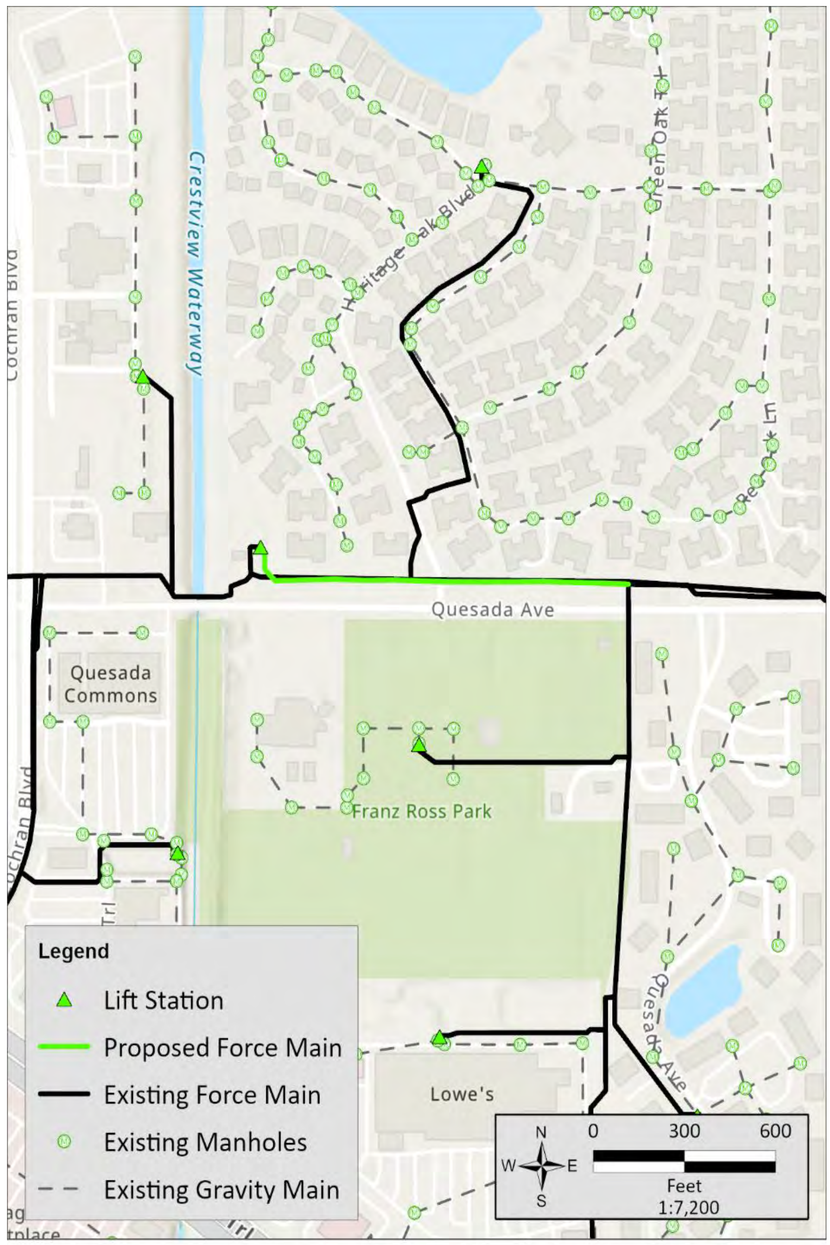
☐ Pump Station

☑ Force Mains

☐ Vacuum Mains

☐ Low Pressure Mains

☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	21	21	21			63
Land (or ROW)						
Construction Cost			188	188	188	563
Total Project Cost	**21**	**21**	**208**	**188**	**188**	**630**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **16-M-FM - Veterans Blvd from Centennial Boulevard to Toledo Blade Boulevard**

Priority Ranking: **16** | **Plant Service Area:** **East Port WRF**

Description: The project includes upsizing 4,770 linear feet (LF) of 12-inch force main to 16-inch force main along El Jobean Road from Centennial Boulevard to Toledo Blade Boulevard.

HYDRAULIC DETAILS

FM Capacity Improved from

12-inch

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2041

To: 2045

PROJECT DETAILS

Project Location
South Murdock Village

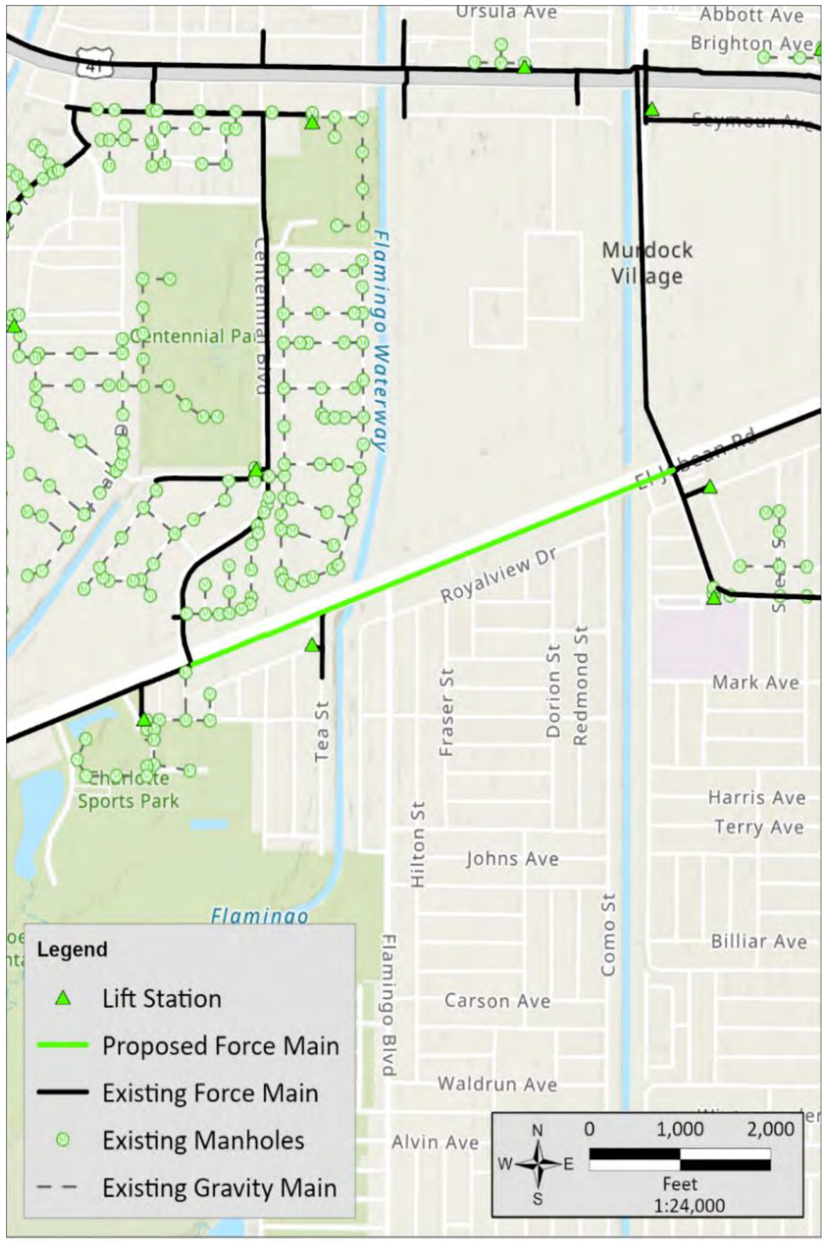
Force Main Length
4,770

Force Main Material
PVC

Force Main Size
16

PROJECT COMPONENTS

☐ Pump Station
☑ Force Mains
☐ Vacuum Mains
☐ Low Pressure Mains
☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	80	80	80			239
Land (or ROW)						
Construction Cost			716	716	716	2,147
Total Project Cost	**80**	**80**	**795**	**716**	**716**	**2,390**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **17-M-FM - Tamiami Trail to South Port (LS-65)**

Priority Ranking: 17 | **Plant Service Area:** East Port WRF

Description: The project includes upsizing 4,830 linear feet (LF) of 8-inch and 12-inch force main to 16-inch force main along Tamiami Trail to South Port (LS-65) in Mid County.

HYDRAULIC DETAILS

FM Capacity Improved from

8-inch/12-inch

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2041

To: 2045

PROJECT DETAILS

Project Location
Port Charlotte

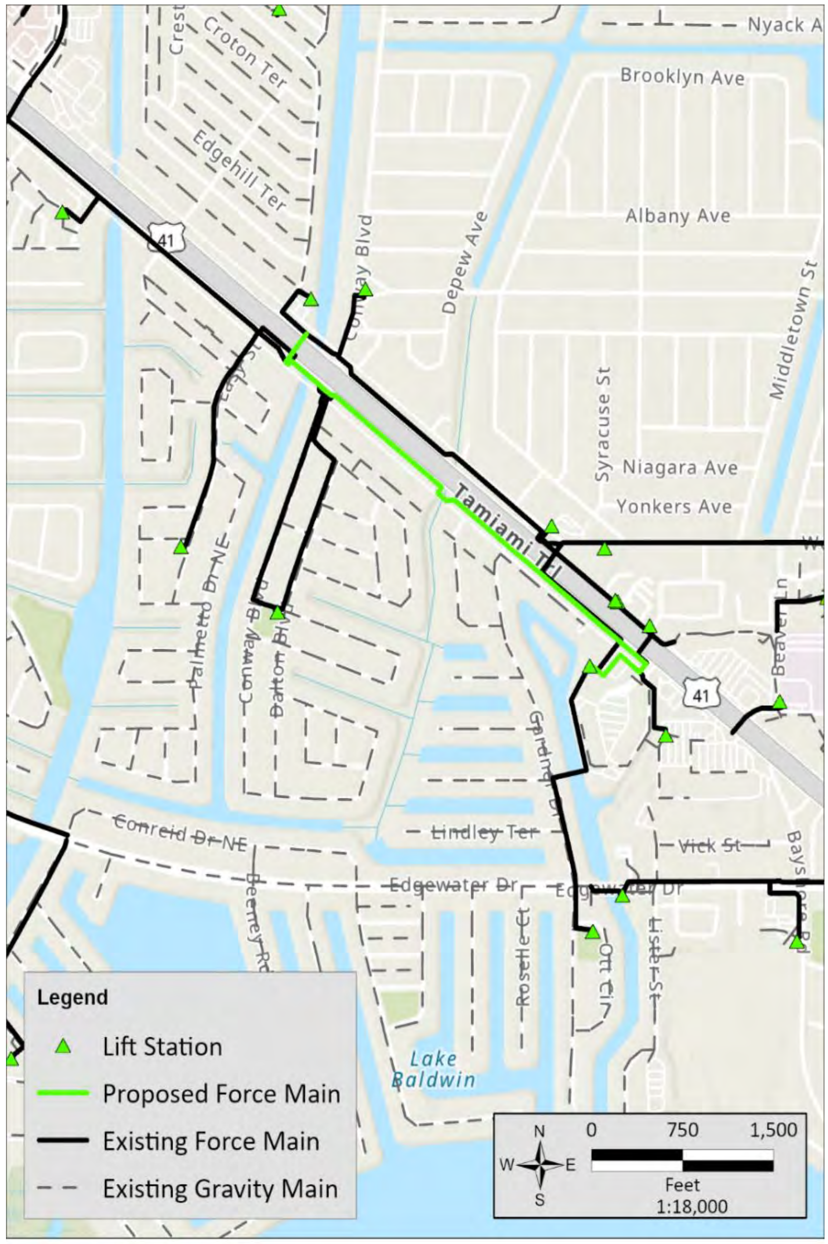
Force Main Length
4,830

Force Main Material
PVC

Force Main Size
16

PROJECT COMPONENTS

☐ Pump Station
☑ Force Mains
☐ Vacuum Mains
☐ Low Pressure Mains
☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	81	81	81			242
Land (or ROW)						
Construction Cost			725	725	725	2,174
Total Project Cost	**81**	**81**	**805**	**725**	**725**	**2,420**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **18-M-LS - Aswan Way (LS-306) Pump Upgrade**

Priority Ranking: **18**

Plant Service Area: **East Port WRF**

Description: The project includes pump upgrades at existing LS-306. A review of the 15-year model found that the lift station experiences a level of service failure during the Max Day Scenario. The lift station currently houses two 5 HP pumps. Updates to the lift station may include an increase in pump size, discharge piping, and electrical upgrades. This upgrade is contingent on S2S project M114 flows going through Asway Way.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2041

To: 2045

PROJECT DETAILS

Project Location

West Harbour Heights

Force Main Length

N/A

Force Main Material

N/A

Force Main Size

N/A

PROJECT COMPONENTS

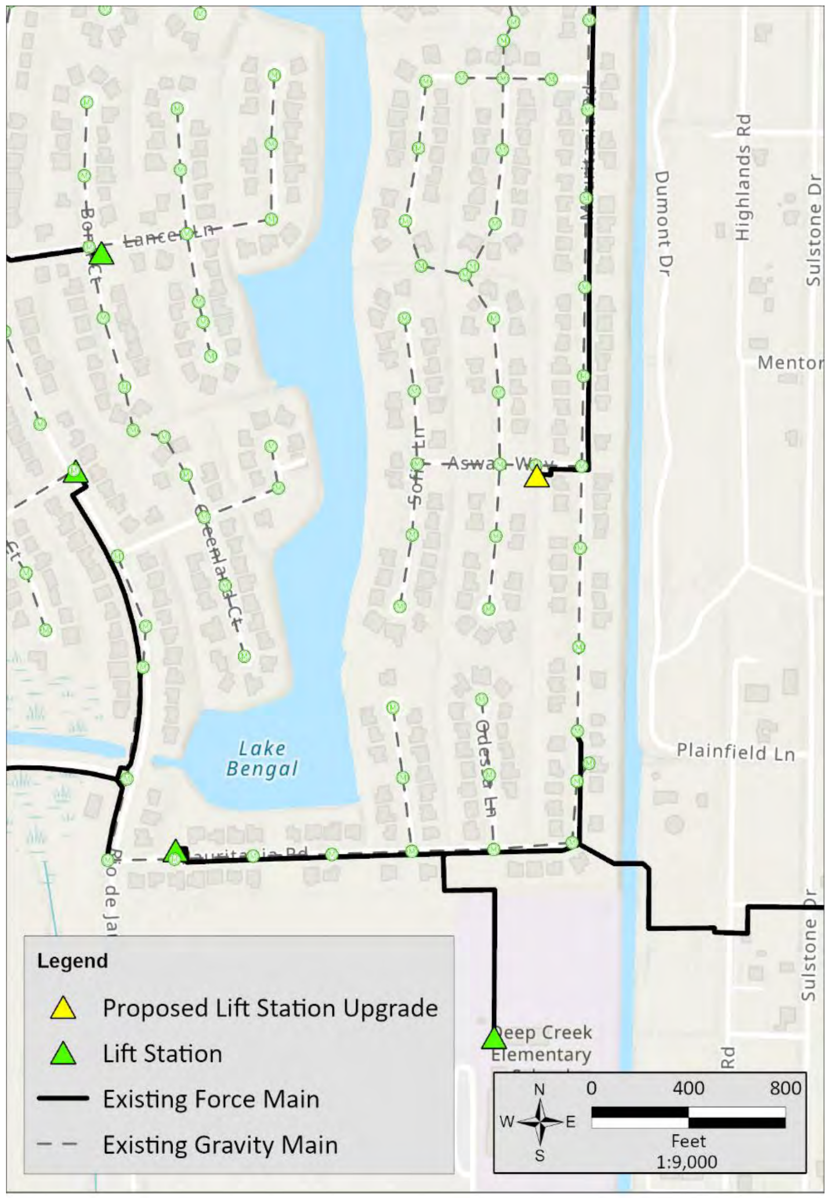
☑ Pump Station

☐ Force Mains

☐ Vacuum Mains

☐ Low Pressure Mains

☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	30	30	30			90
Land (or ROW)						
Construction Cost			270	270	270	810
Total Project Cost	**30**	**30**	**300**	**270**	**270**	**900**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **19-M-MLS - Peachland Boulevard Master Lift Station**

Priority Ranking: **19** | **Plant Service Area:** **East Port WRF**

Description: The project includes construction of a new master lift station near the intersection of Peachland Boulevard and Orlando Boulevard. A review of the 15-year model found that lift stations upstream experience a level of service failure during the Max Day Scenario and should consider installing a triplex. This project is contingent on the S2S areas coming online in the area.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2041

To: 2045

PROJECT DETAILS

Project Location

Audubon-Pennington Park

Force Main Length

240

Force Main Material

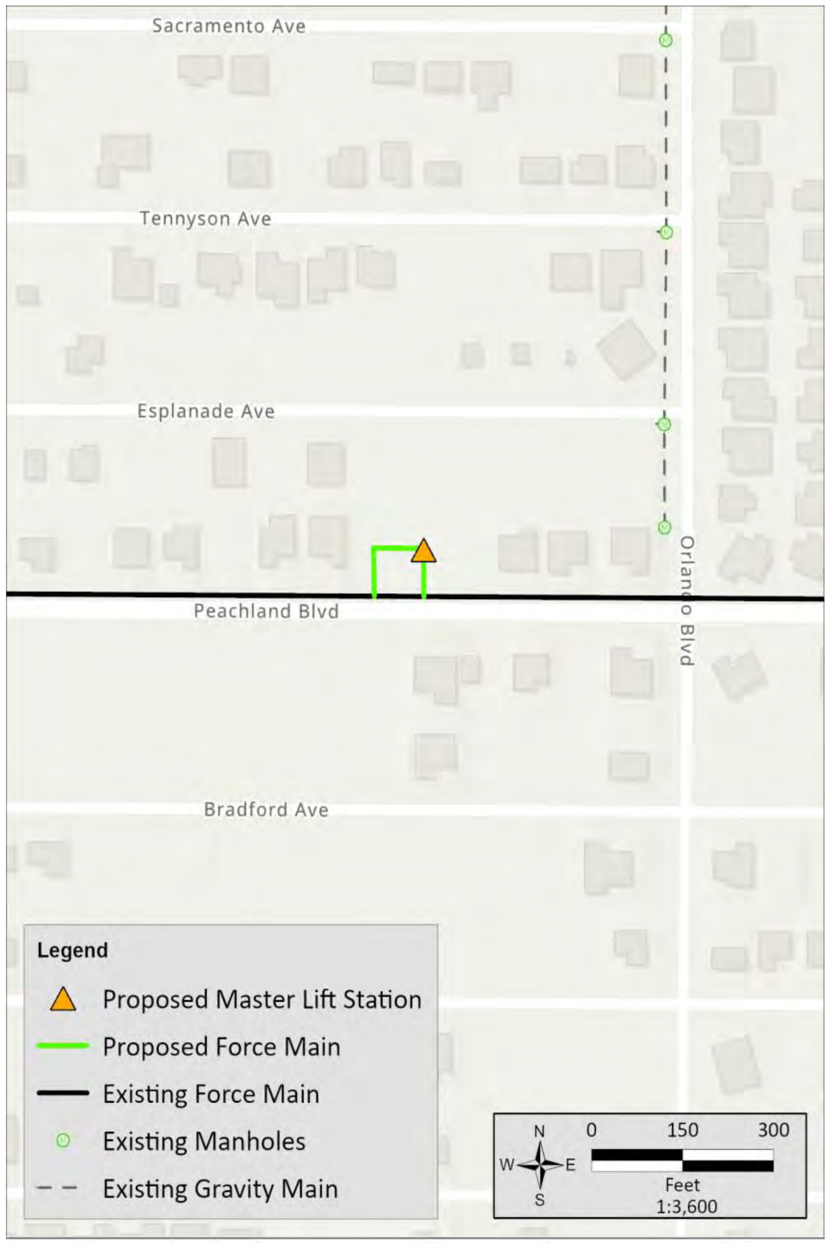
PVC

Force Main Size

20

PROJECT COMPONENTS

- ☑ Pump Station
- ☐ Force Mains
- ☐ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	667	667	667			2,000
Land (or ROW)						
Construction Cost			6,000	6,000	6,000	18,000
Total Project Cost	**667**	**667**	**6,667**	**6,000**	**6,000**	**20,000**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: Lake View Midway Water Quality Improvement

Priority Ranking: N/A | **Plant Service Area:** East Port WRF

DESCRIPTION: This project includes conversion of septic to centralized sewer system. New pump stations will be constructed for this project and will convey wastewater to the force main specified in the predecessor CIP.
Note: The Lake View Blvd, Midway Blvd, Toledo Blade and Cochran Blvd. FMs should be constructed prior to S2S conversion.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: Present

To: 2030

PROJECT DETAILS

Project Location

Lake View Midway

No. of Occupied Lots

2,260

No. of Vacant Lots

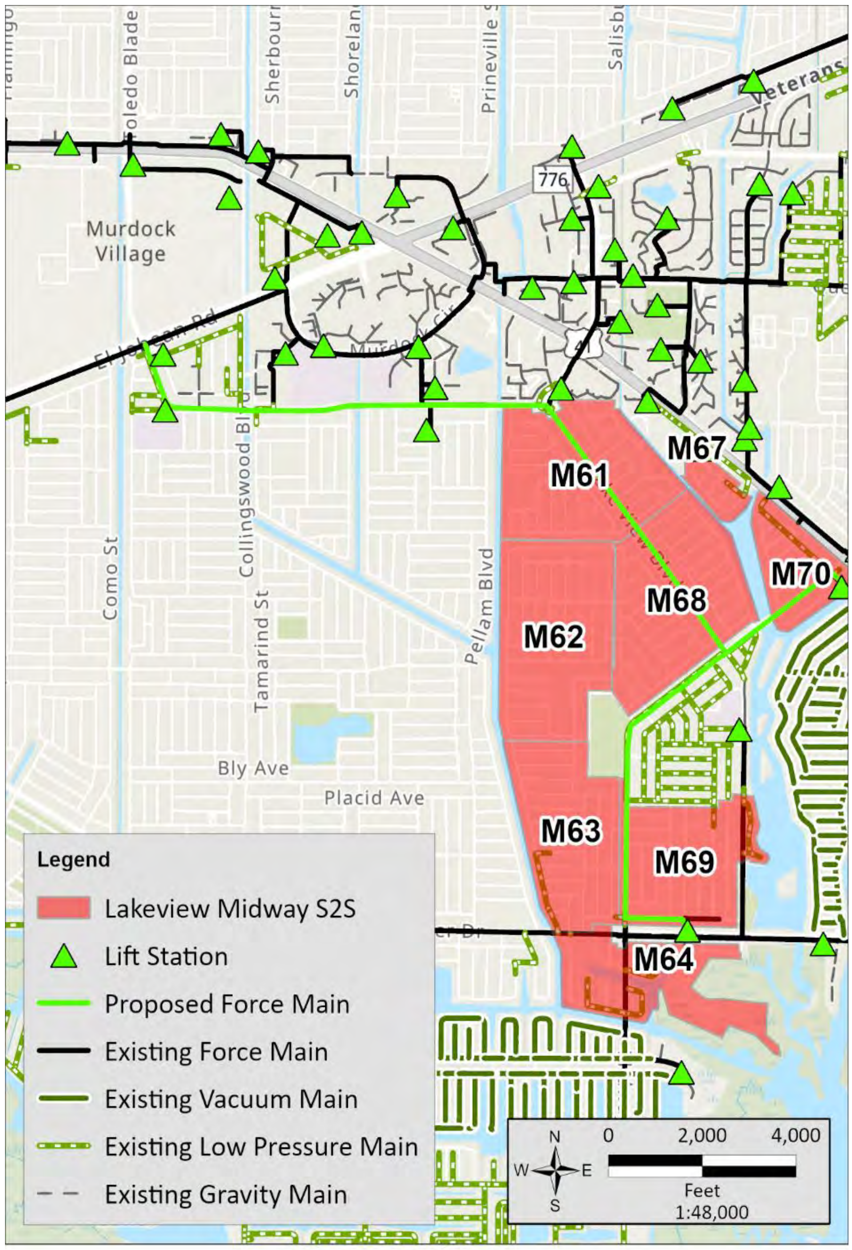
973

No. of Total Lots

3233

PROJECT COMPONENTS

- ☐ Pump Station
- ☐ Force Mains
- ☑ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	4,297	4,297	4,297			12,890
Land (or ROW)						
Construction Cost			38,669	38,669	38,669	116,008
Total Project Cost	**4,297**	**4,297**	**42,966**	**38,669**	**38,669**	**128,898**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **Little Alligator Basin Phase I Water Quality Improvement**

Priority Ranking: N/A | **Plant Service Area:** East Port WRF

DESCRIPTION: This project includes removal of septic systems from service and construction of a centralized sewer system. New pump stations will be constructed for this project and will convey wastewater to the force main specified in the predecessor CIP.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

☐ Diverts flows to another WWTP

☑ Increase capacity to accommodate future flows

☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2031

To: 2035

PROJECT DETAILS

Project Location

West Lake View Midway

No. of Occupied Lots

1,763

No. of Vacant Lots

1407

No. of Total Lots

3170

PROJECT COMPONENTS

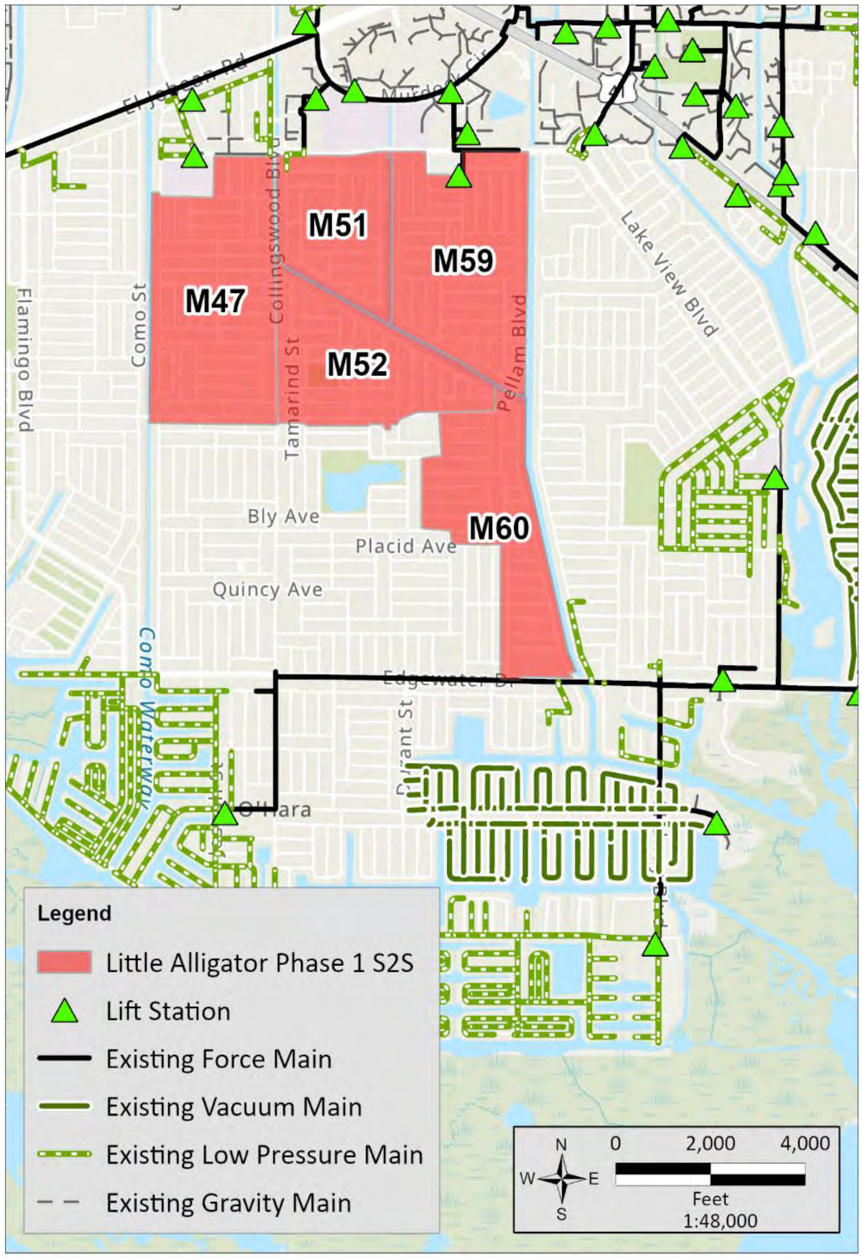
☐ Pump Station

☐ Force Mains

☑ Vacuum Mains

☐ Low Pressure Mains

☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	3,923	3,923	3,923			11,769
Land (or ROW)						
Construction Cost			35,306	35,306	35,306	105,918
Total Project Cost	**3,923**	**3,923**	**39,229**	**35,306**	**35,306**	**117,686**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **Little Alligator Basin Phase II Water Quality Improvement**

Priority Ranking: N/A | **Plant Service Area:** East Port WRF

DESCRIPTION: This project includes removal of septic systems from service and construction of a centralized sewer system. New pump stations will be constructed for this project and will convey wastewater to the force main specified in the predecessor CIP.

HYDRAULIC DETAILS

FM Capacity Improved from

N/A

PROJECT NEED

- ☐ Diverts flows to another WWTP
- ☑ Increase capacity to accommodate future flows
- ☐ Reduce O&M requirements

EST. CONSTRUCTION TIME

From: 2031

To: 2035

PROJECT DETAILS

Project Location

North East Lake View Midway

No. of Occupied Lots

1,307

No. of Vacant Lots

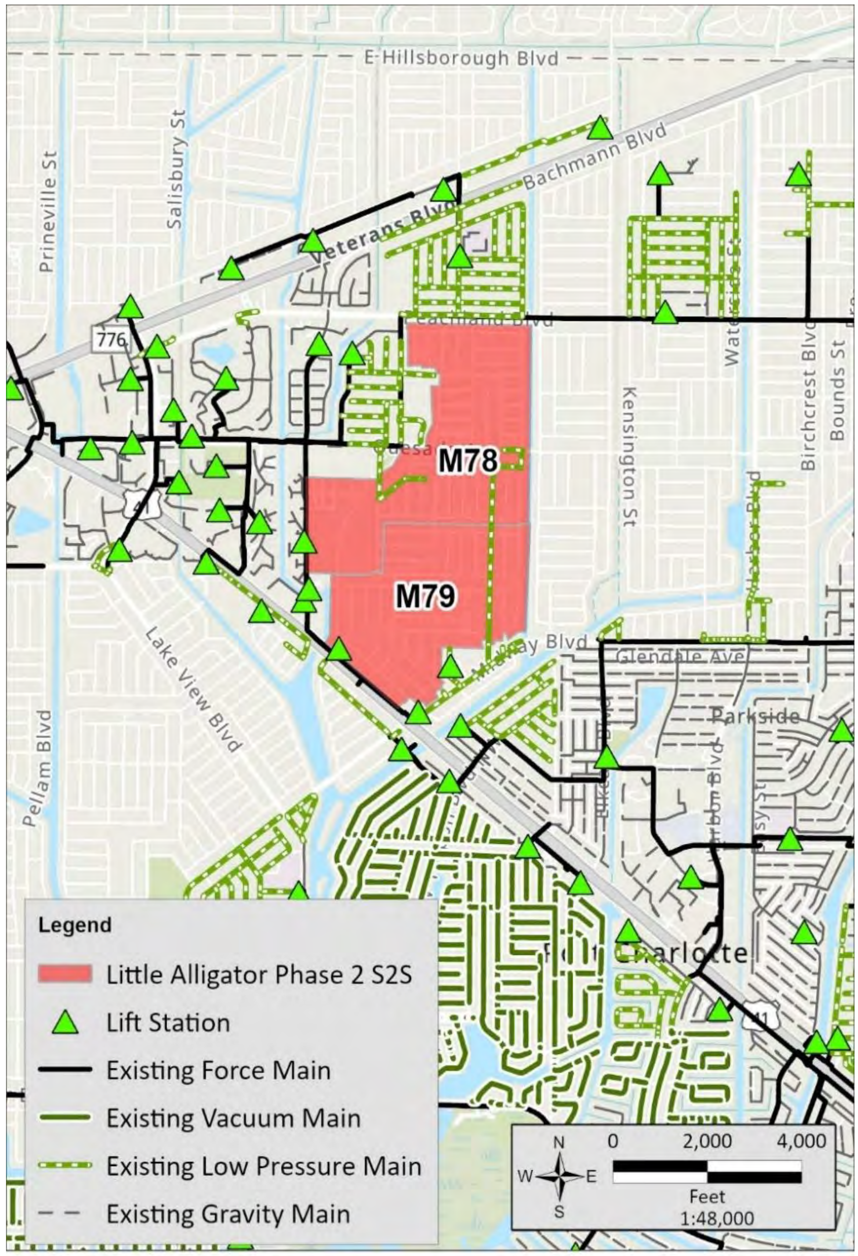
461

No. of Total Lots

1768

PROJECT COMPONENTS

- ☐ Pump Station
- ☐ Force Mains
- ☑ Vacuum Mains
- ☐ Low Pressure Mains
- ☐ Gravity Mains



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	1,892	1,892	1,892			5,676
Land (or ROW)						
Construction Cost			17,029	17,029	17,029	51,088
Total Project Cost	**1,892**	**1,892**	**18,921**	**17,029**	**17,029**	**56,764**

(Costs expressed in 2024 dollars)

Appendix J

Hydrograph Decomposition and Wastewater Flow Contributions per Equivalent Residential Connection (ERC)

APPENDIX J
HYDROGRAPH DECOMPOSITION & WASTEWATER FLOW CONTRIBUTIONS PER EQUIVALENT RESIDENTIAL CONNECTION (ERC)

Chapter 5 of the 2024 Sewer Master Plan includes Capacity Analysis Program and hydraulic modeling sections that reference hydrograph decomposition. This appendix summarizes the results of the *hydrograph decomposition* and *wastewater flow contributions per ERC* analyses completed for each of the Charlotte County service area wastewater reclamation facilities' (WRFs') sewer/wastewater collection systems:

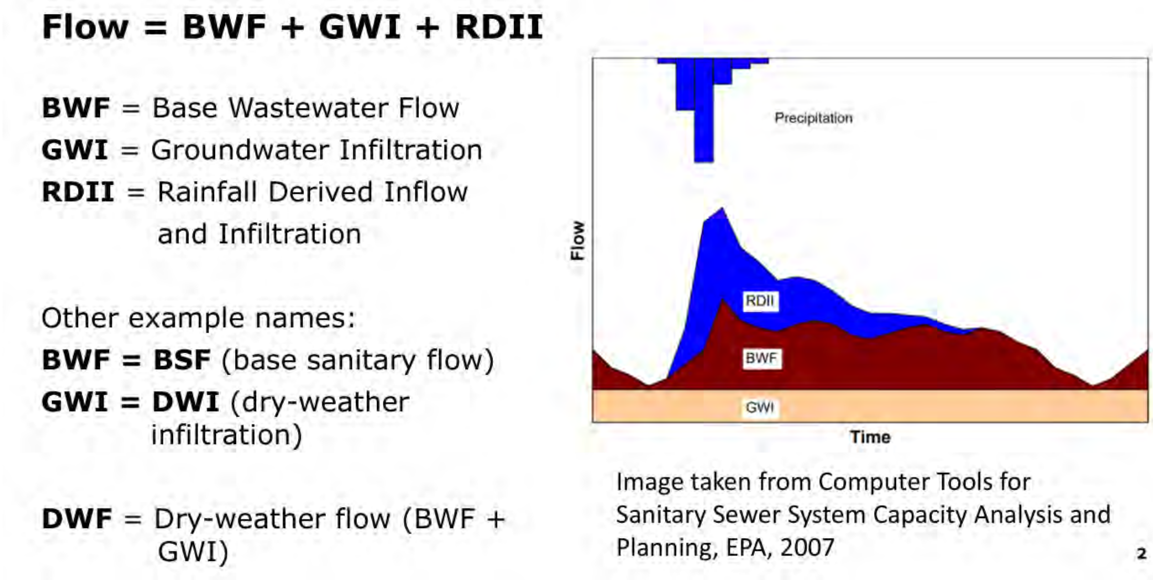
- East Port WRF
- West Port WRF
- Rotonda WRF
- Burnt Store WRF

Note ERC and dwelling unit (DU) may be interchangeable in some cases.

Hydrograph Decomposition – Reference Section 5.9 and Subsection 5.9.3

Hydrograph decomposition refers to the process of breaking down flow data (hydrograph) into individual components. For wastewater applications, available influent flowmeter data for each WRF was acquired by CCU from January 2018 to August 2023. The influent flow meter data (Flow) is graphed for the given time period (Time). The data was then broken down into the wastewater flow components. Figure J-1 shows these data.

Figure J-1 Wastewater Flow Components



Once the base wastewater flow (BWF) is estimated, the remaining flow can be assumed as infiltration and inflow (I&I). I&I naturally become higher during wet-weather periods induced by rainfall; these two conditions can be understood as average daily flow (ADF) and maximum daily flow (MDF). Results of a hydrograph decomposition may vary with different methods or time periods. Overall, the goal of a hydrograph decomposition study is typically to achieve a high-level estimate or approximation.

To quantify the severity of a given collection system's I&I, the collection system is summarized as a function of the length and diameter of all gravity pipe within it. This is referred to as "IDM," or inch-diameter-miles of gravity pipe.

The severity of I&I for each collection system is quantified by dividing the I&I from the hydrograph decomposition (in terms of gpd) by the system's IDM. Table J-1 generally summarizes the I&I severity based on typical industry standards.

Table J-1 I&I Severity Levels

I&I (gpd/IDM)	I&I Severity
<1,500	Low
1,500 to 4,000	Moderate
>4,000	High

Note: gpd/IDM = gallons per day per inch-diameter-mile.

Table J-2 summarizes the results of the WRF service-area-wide I&I estimates. As shown the County experiences low severity of I&I, generally less than 1,500 gpd/IDM.

Table J-2 Charlotte County WRF I&I Results

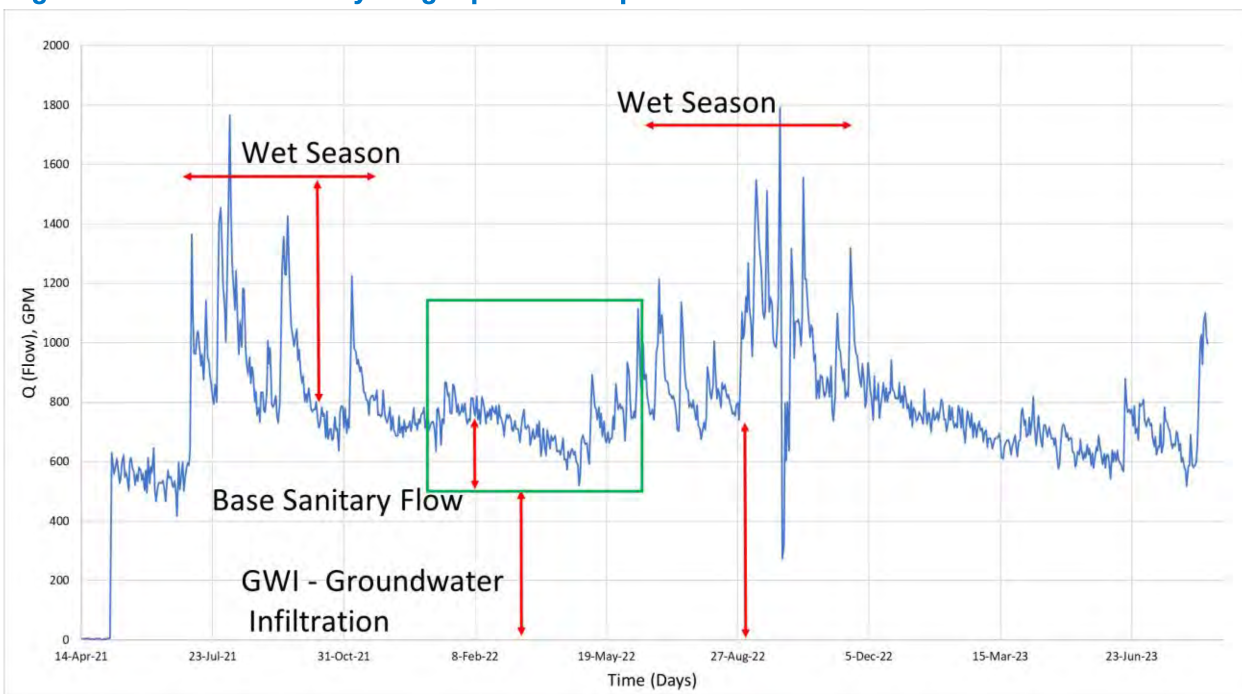
WRF	IDM	I&I (gpd/IDM)	I&I Severity Level
Rotonda	713	896	Low
West Port	216	887	Low
Burnt Store	435	176	Low
East Port	2,098	914	Low

Wastewater flow contributions per ERC – Reference Section 5.3 and Subsection 5.3.4.

Although the severity is low at each WRF, I&I can still have a significant impact on the capacity of each wastewater collection system. By evaluating and repairing the collection systems as needed, the WRF capacity can be increased, delaying or eliminating the need for infrastructure upgrades.

Figure J-2 shows an example of the hydrograph decomposition for the Rotonda WRF.

Figure J-2 Rotonda Hydrograph Decomposition



Wastewater flow contributions per ERC – Reference Section 5.3 and Subsection 5.3.4.

Wastewater flow contributions per ERC refers to the assumed gallons per day wastewater generation per connection that is used as an assumed planning value for hydraulic modeling and determining need for future CIP projects. Since 2017, Jones Edmunds has worked with CCU on several wastewater planning and modeling efforts and has continued to evaluate the appropriateness of the 160-gpd-per-connection assumption. The actual ADF generally ranges from approximately 80 to 140 gpd per residential connection based on County data, with newly constructed systems reporting as low as 80 to 100 gpd per connection. Table J-3 details the estimated gpd/ERC for ADF and MDF conditions and for each WRF according to 2022 DMR data and the hydrograph decomposition based on the influent flow mete provided by CCU.

Table J-3 CCU WRF Estimated ADF and MDF Wastewater Flow per ERC

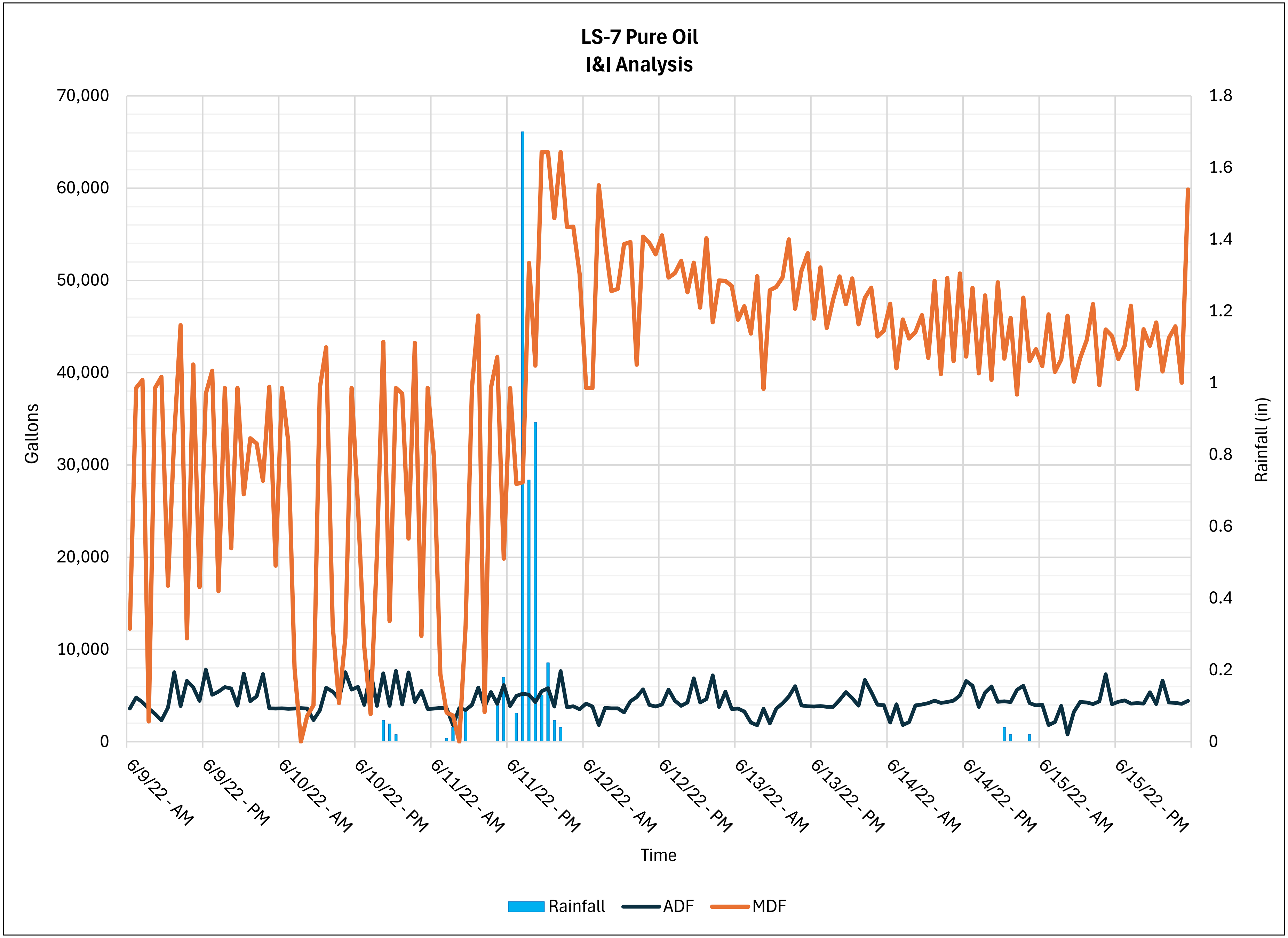
WRF	ERC's	ADF (2022 DMR)	ADF (Hydrograph)
Rotonda	8,530	142	143
West Port	6,019	133	124
Burnt Store	4,202	81	89
East Port	36,118	138	140

Note: ADF values are presented in gpd/ERC.

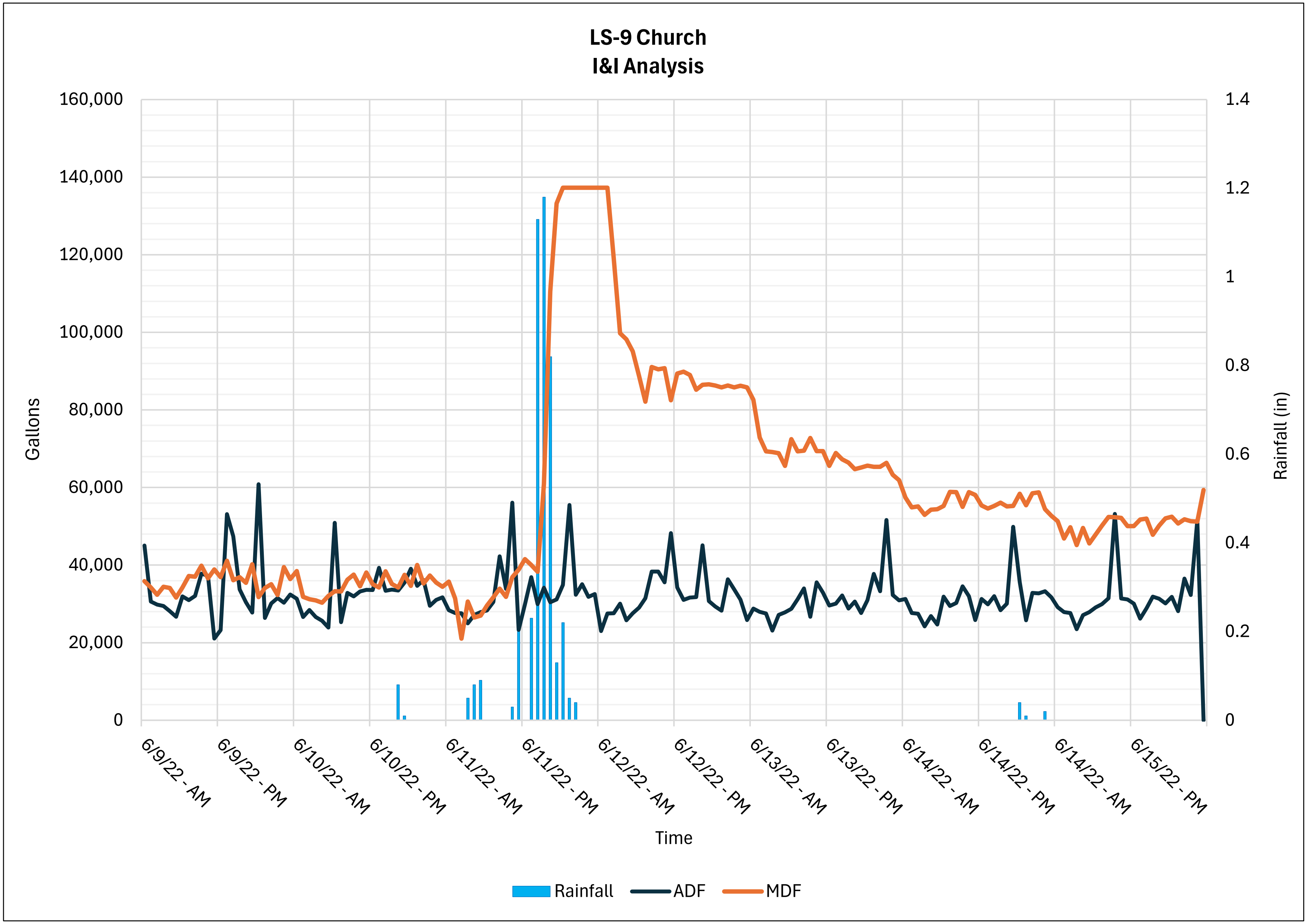
For modeling simulations, 160 gpd per ERC was used since it balanced the ADF planning value to provide adequate transmission capacity throughout the service areas but did not oversize future improvements and system upgrades.

Appendix K

Lift Station Combined I&I Analysis



LS-7 Pure Oil
I&I Analysis
Gallons
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Rainfall (in)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
6/9/22 - AM
6/9/22 - PM
6/10/22 - AM
6/10/22 - PM
6/11/22 - AM
6/11/22 - PM
6/12/22 - AM
6/12/22 - PM
6/13/22 - AM
6/13/22 - PM
6/14/22 - AM
6/14/22 - PM
6/15/22 - AM
6/15/22 - PM
Time
Rainfall
ADF
MDF


LS-9 Church
I&I Analysis
Gallons
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Rainfall (in)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
6/9/22 - AM
6/9/22 - PM
6/10/22 - AM
6/10/22 - PM
6/11/22 - AM
6/11/22 - PM
6/12/22 - AM
6/12/22 - PM
6/13/22 - AM
6/13/22 - PM
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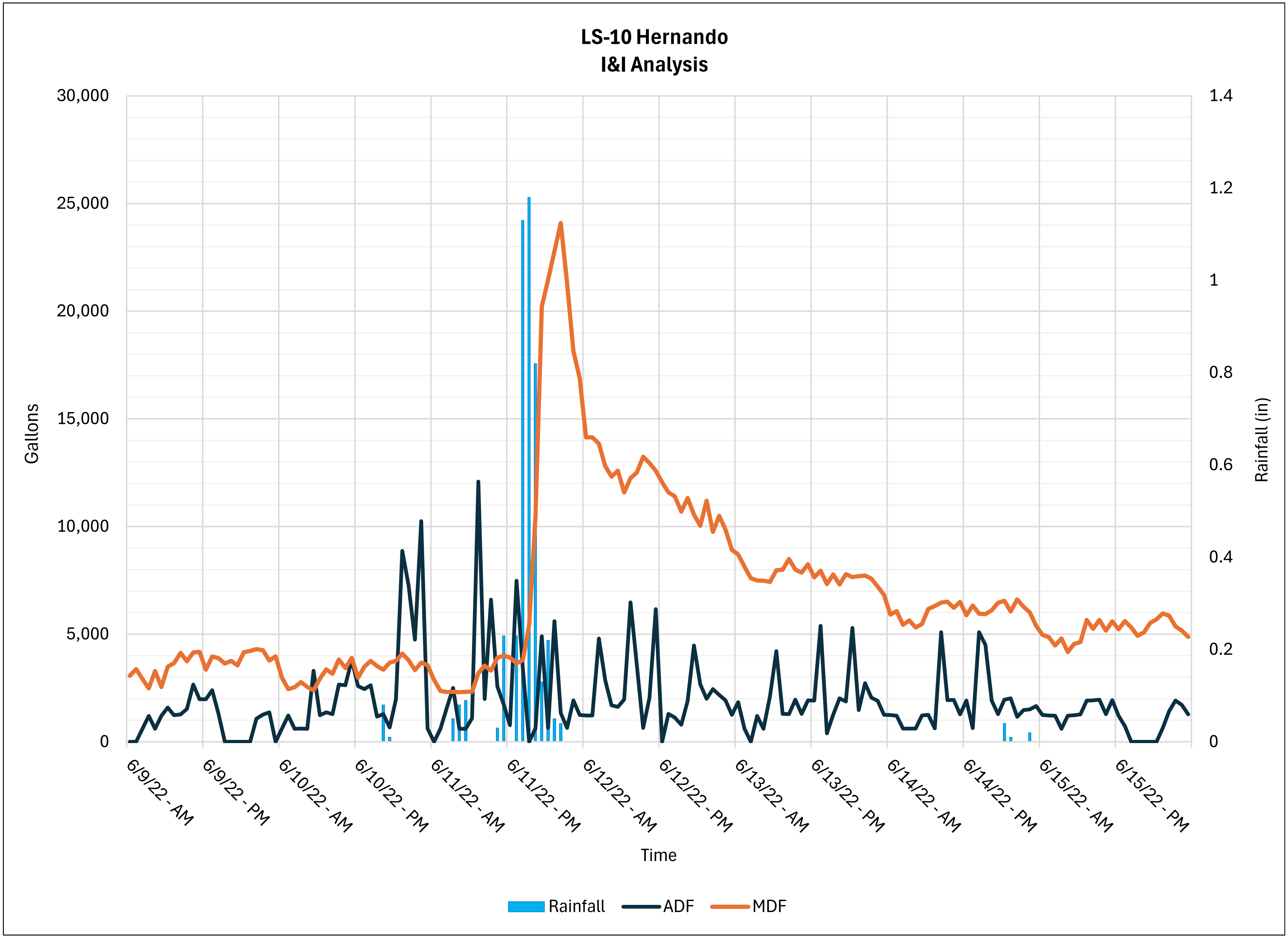
6/14/22 - AM
6/15/22 - PM
Time
Rainfall
ADF
MDF



LS-10 Hernando
I&I Analysis
Gallons
30,000
25,000
20,000
15,000
10,000
5,000
0
Rainfall (in)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
6/9/22 - AM
6/9/22 - PM
6/10/22 - AM
6/10/22 - PM
6/11/22 - AM
6/11/22 - PM
6/12/22 - AM
6/12/22 - PM
6/13/22 - AM
6/13/22 - PM
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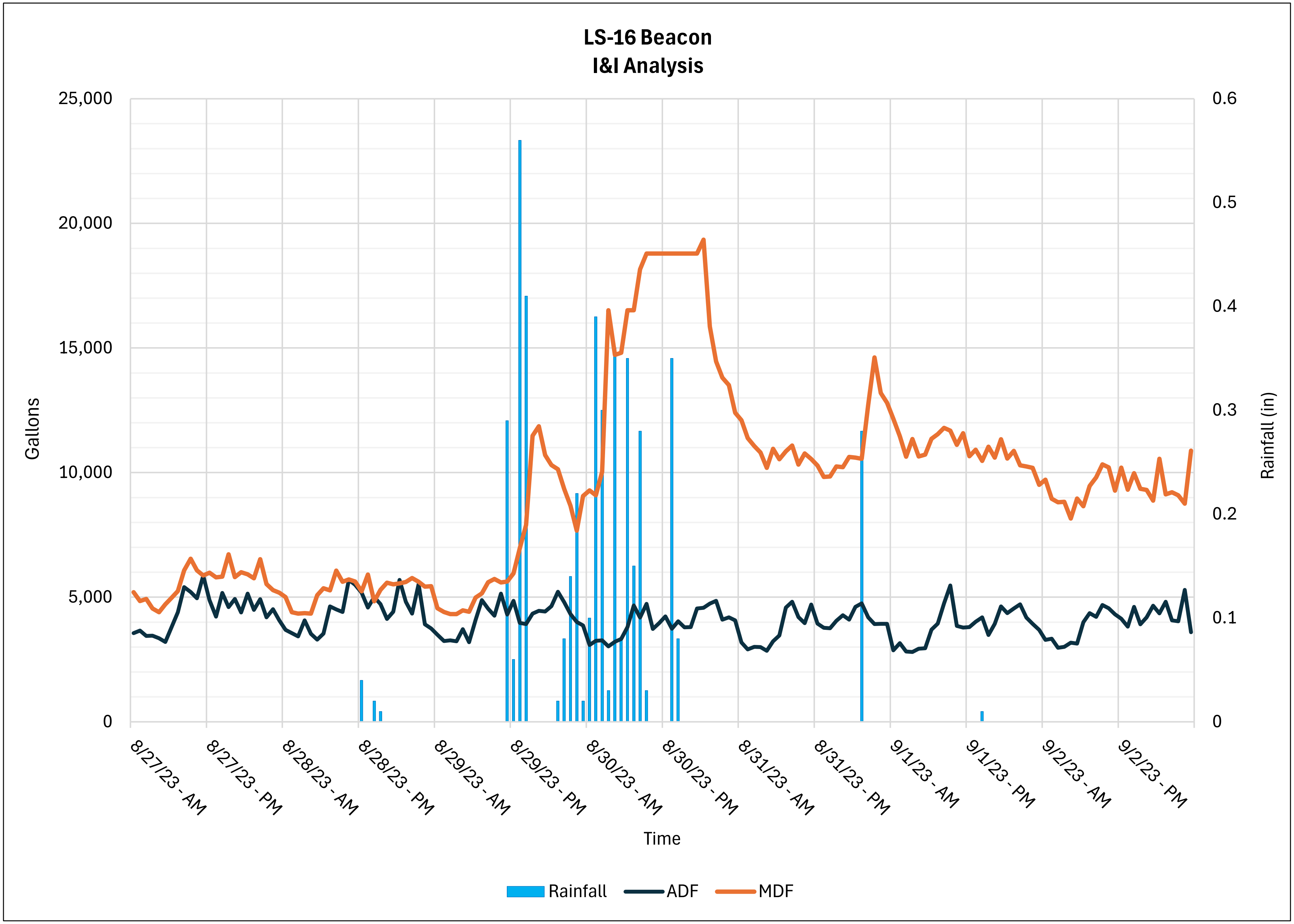
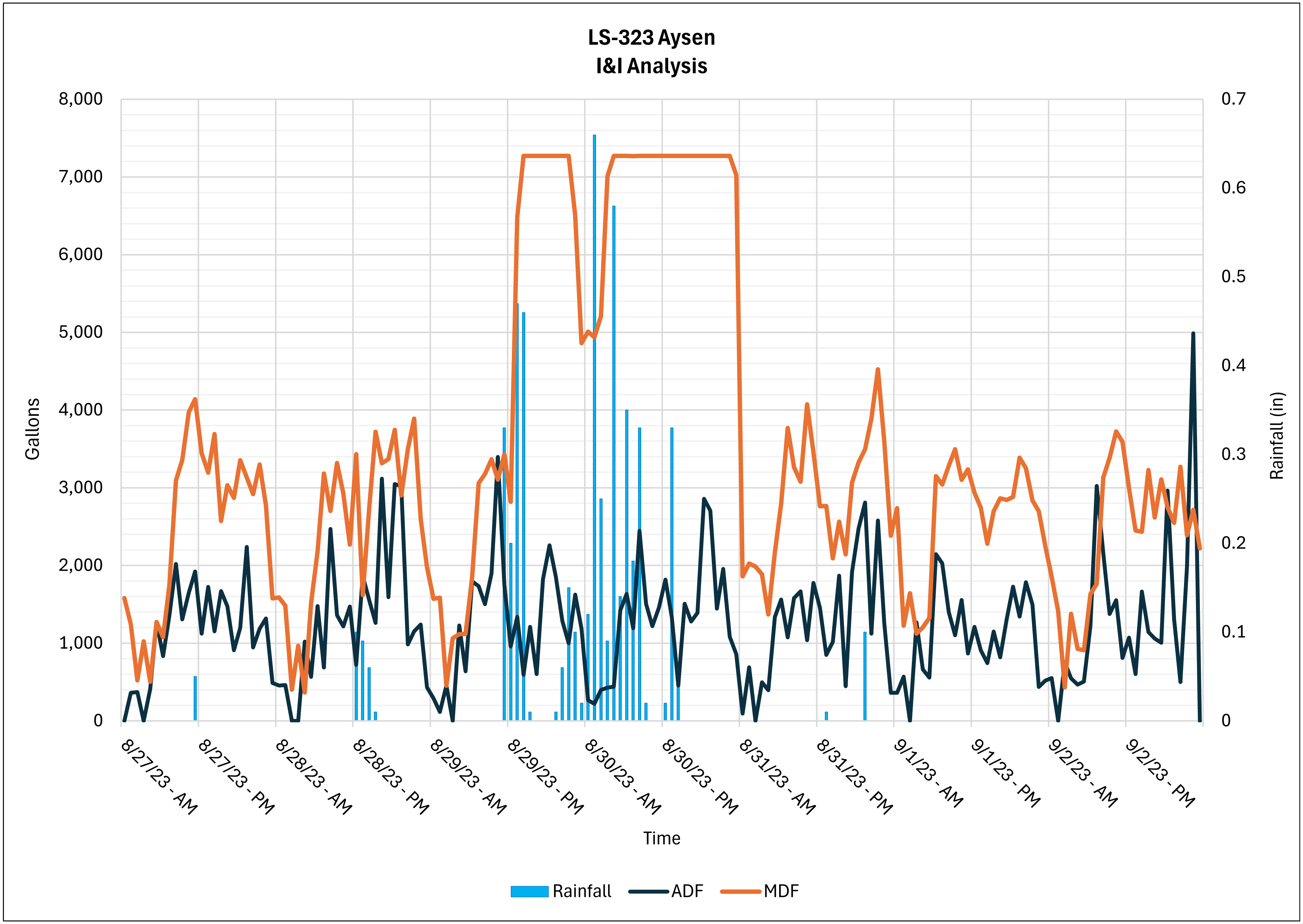
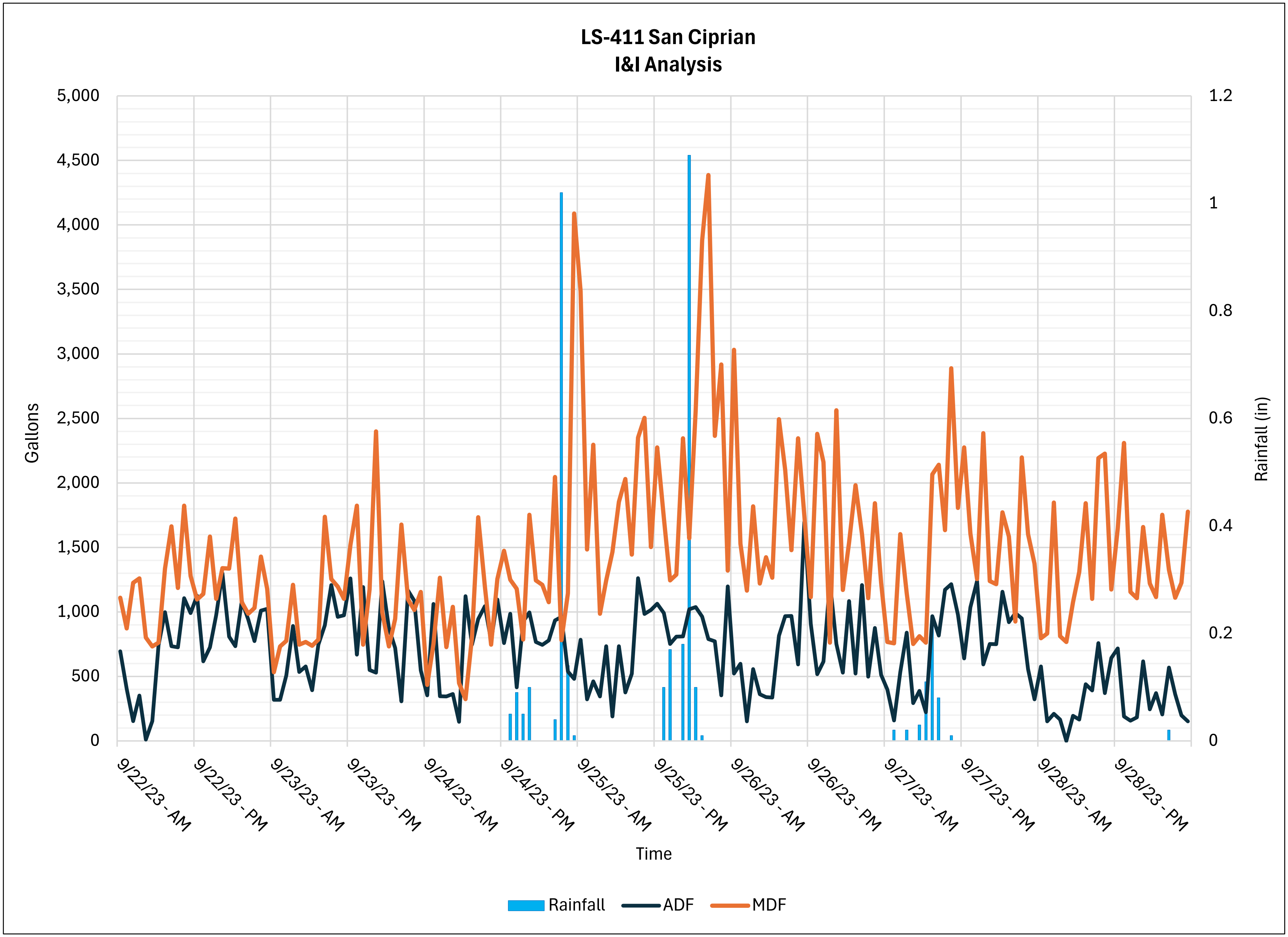
6/14/22 - PM
6/15/22 - AM
6/15/22 - PM
Time
Rainfall
ADF
MDF


LS-16 Beacon
I&I Analysis
25,000
20,000
15,000
10,000
5,000
0
Gallons
0.6
0.5
0.4
0.3
0.2
0.1
0
Rainfall (in)
8/27/23 - AM
8/27/23 - PM
8/28/23 - AM
8/28/23 - PM
8/29/23 - AM
8/29/23 - PM
8/30/23 - AM
8/30/23 - PM
8/31/23 - AM
8/31/23 - PM
9/1/23 - AM
9/1/23 - PM
9/2/23 - AM
9/2/23 - PM
Time
Rainfall
ADF
MDF



LS-323 Aysen
I&I Analysis
Gallons
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Rainfall (in)
8/27/23 - AM
8/27/23 - PM
8/28/23 - AM
8/28/23 - PM
8/29/23 - AM
8/29/23 - PM
8/30/23 - AM
8/30/23 - PM
8/31/23 - AM
8/31/23 - PM
9/1/23 - AM
9/1/23 - PM
9/2/23 - AM
9/2/23 - PM
Time
Rainfall
ADF
MDF



LS-411 San Ciprian
I&I Analysis
Gallons
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Rainfall (in)
1.2
1
0.8
0.6
0.4
0.2
0
9/22/23 - AM
9/22/23 - PM
9/23/23 - AM
9/23/23 - PM
9/24/23 - AM
9/24/23 - PM
9/25/23 - AM
9/25/23 - PM
9/26/23 - AM
9/26/23 - PM
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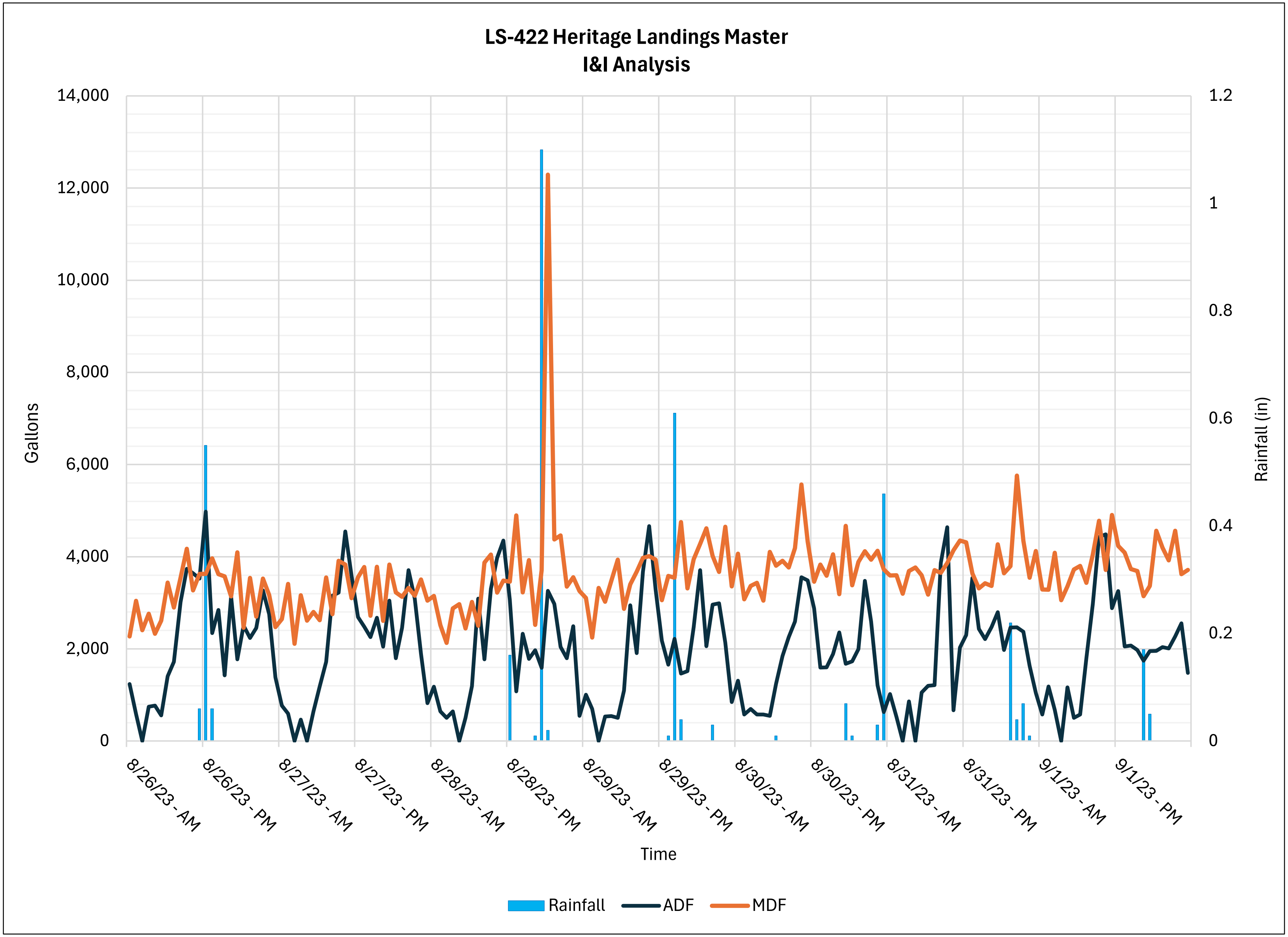
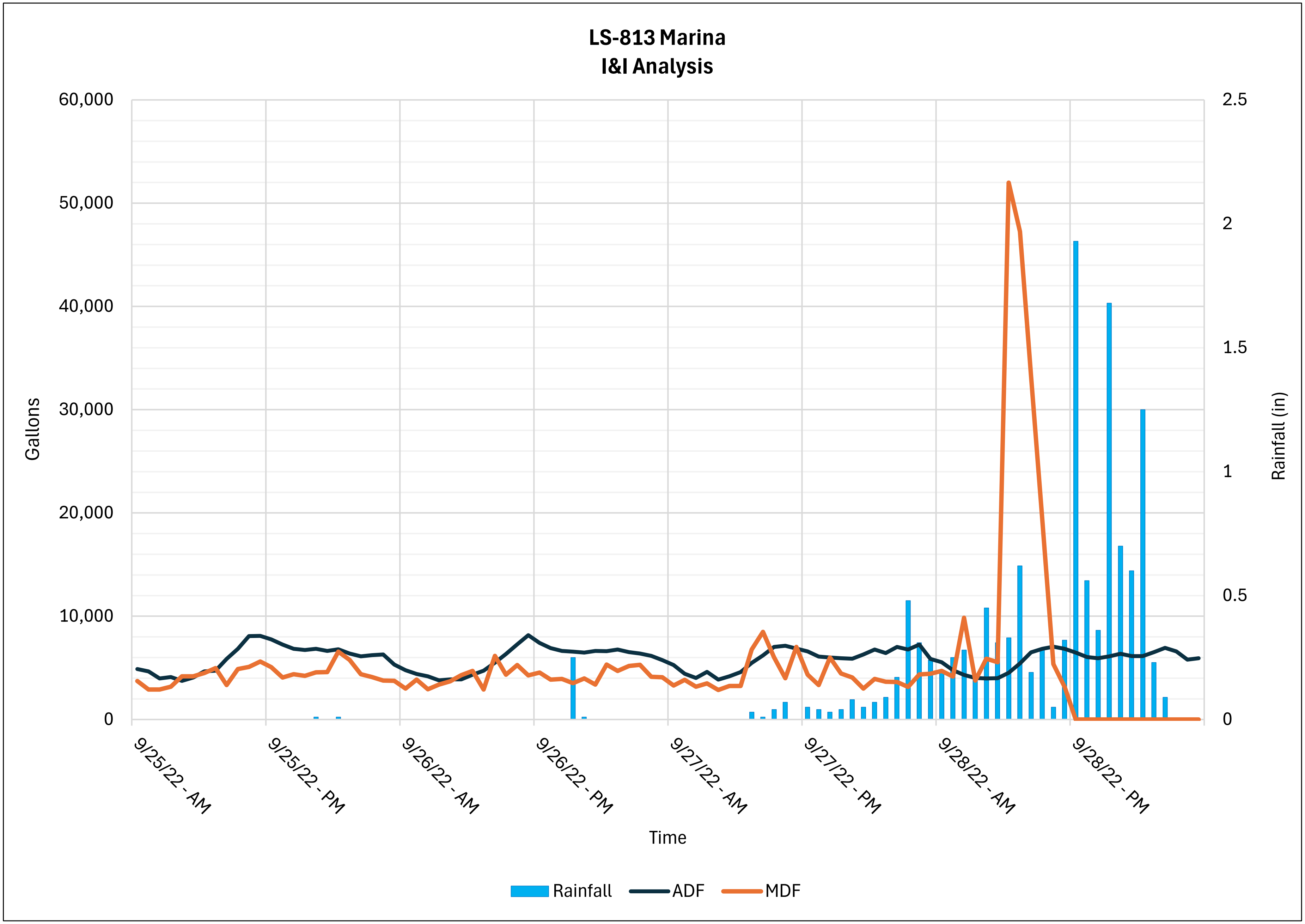
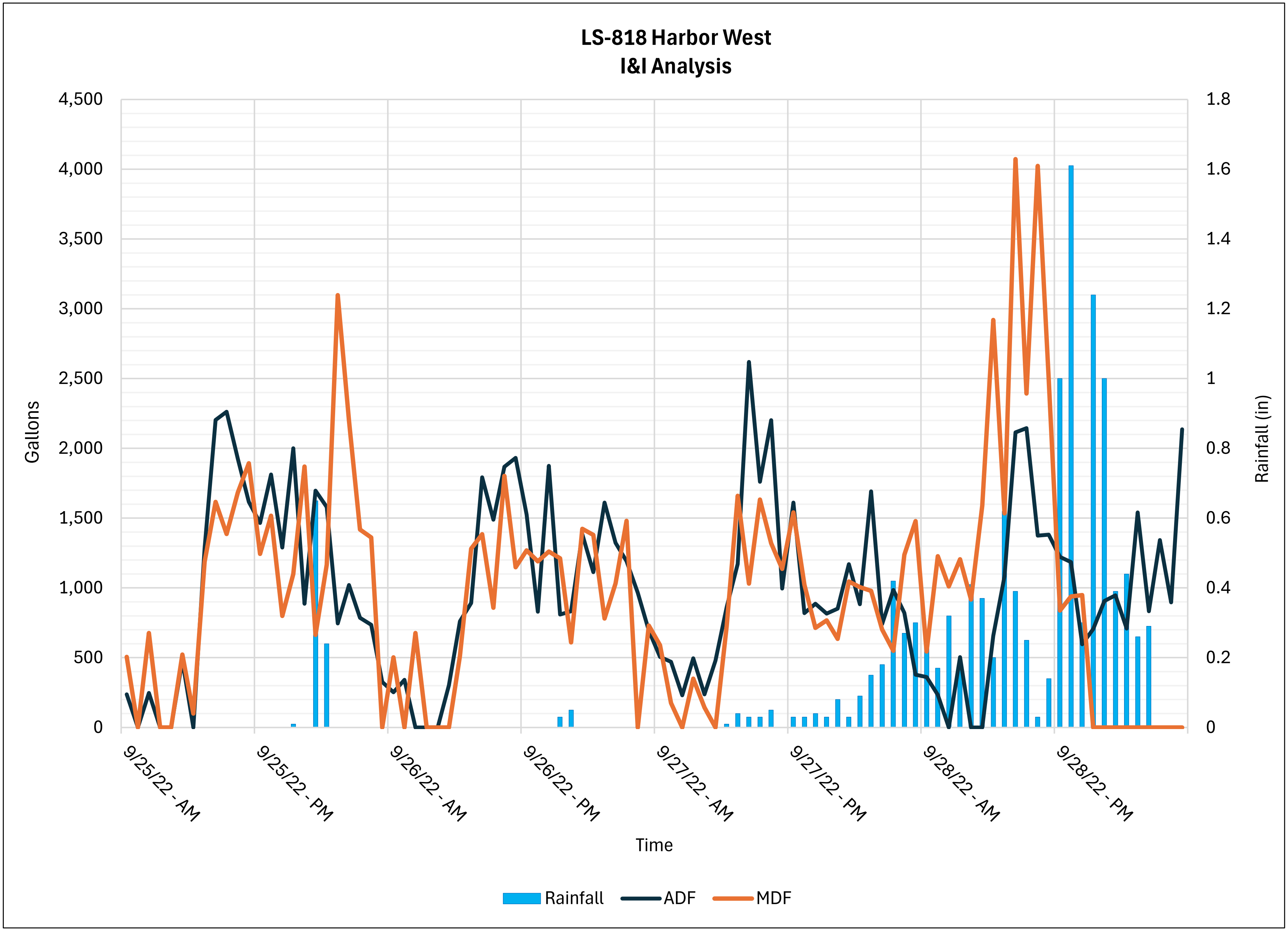
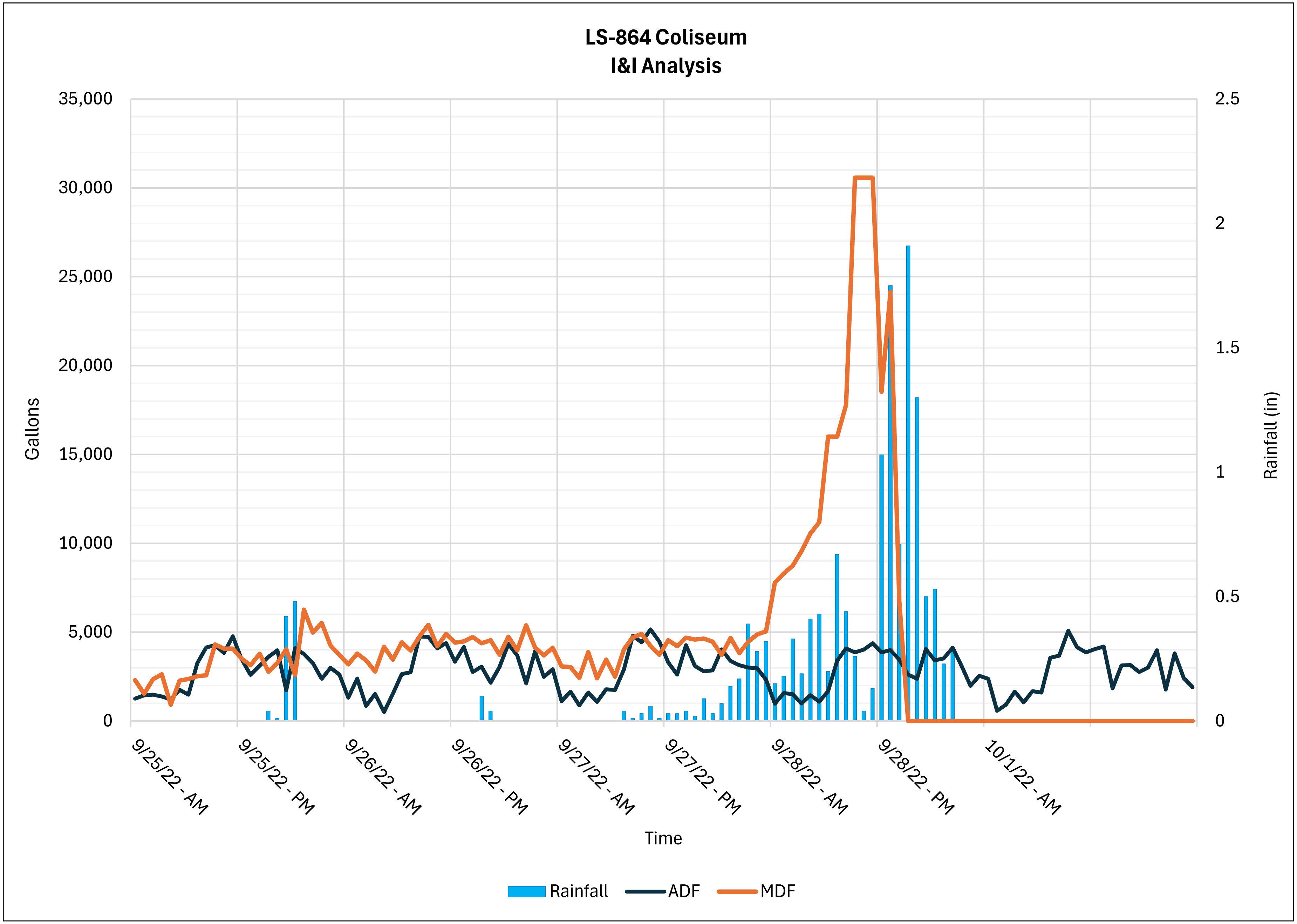
9/27/23 - PM
9/28/23 - AM
9/28/23 - PM
Time
Rainfall
ADF
MDF


LS-422 Heritage Landings Master
I&I Analysis
Gallons
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Rainfall (in)
1.2
1
0.8
0.6
0.4
0.2
0
8/26/23 - AM
8/26/23 - PM
8/27/23 - AM
8/27/23 - PM
8/28/23 - AM
8/28/23 - PM
8/29/23 - AM
8/29/23 - PM
8/30/23 - AM
8/30/23 - PM
8/31/23 - AM
8/31/23 - PM
9/1/23 - AM
9/1/23 - PM
Time
Rainfall
ADF
MDF


LS-813 Marina
I&I Analysis
Gallons
60,000
50,000
40,000
30,000
20,000
10,000
0
Rainfall (in)
2.5
2
1.5
1
0.5
0
9/25/22 - AM
9/25/22 - PM
9/26/22 - AM
9/26/22 - PM
9/27/22 - AM
9/27/22 - PM
9/28/22 - AM
9/28/22 - PM
Time
Rainfall
ADF
MDF



LS-818 Harbor West
I&I Analysis
Gallons
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Rainfall (in)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
9/25/22 - AM
9/25/22 - PM
9/26/22 - AM
9/26/22 - PM
9/27/22 - AM
9/27/22 - PM
9/28/22 - AM
9/28/22 - PM
Time
Rainfall
ADF
MDF


LS-864 Coliseum
I&I Analysis
Gallons
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Rainfall (in)
2.5
2
1.5
1
0.5
0
9/25/22 - AM
9/25/22 - PM
9/26/22 - AM
9/26/22 - PM
9/27/22 - AM
9/27/22 - PM
9/28/22 - AM
9/28/22 - PM
10/1/22 - AM
Time
Rainfall
ADF
MDF

Appendix L

CCU Surface Water Discharge Elimination Plan

Senate Bill 64 Annual Progress Report

Facility Name: ____
Facility ID: ____
Contact Person Name and Title: ____
Contact Person Phone Number: ____
Contact Person Email: ____

Information on Discharges Eliminated

Discharge Type (effluent, reclaimed water, or reuse water)	Average Gallons Per Day	Date the discharge was eliminated
Select One		
Select One		
Select One		
Select One		
Select One		

Information on Continuing Discharges

Discharge Allowance Category	Discharge Type (effluent, reclaimed water, or reuse water)	Average Gallons Per Day	Treatment Level Provided (BOD, TSS, TN, TP, and disinfection level)
Meets section 403.086(10), F.S.	Select One		
Associated with an indirect potable reuse project	Select One		
Wet weather discharge in accordance with an applicable department permit	Select One		
Discharge into a stormwater management system that is subsequently withdrawn by a user for irrigation purposes	Select One		
Reuse system reuses a minimum of 90% of a facility's annual average flow	Select One		
Discharge provides a direct ecological or public water supply benefits	Select One		

Were there any modifications to the facility's plan to eliminate nonbeneficial surface water discharges since November 1, 2021?

Yes: ☐
No: ☐

If so, please explain:

Cover Sheet for Plan Submittal

Facility Name East Port Water Reclamation Facility

Facility ID FL0040291

Contact Person Name, Title, Phone, Email Craig W. Rudy, Utilities Director, 941-764-4502, Craig.Rudy@charlottecountyfl.gov

If the requirement for a plan does not apply to the facility, please mark which exemption applies (attach documentation demonstrating that the facility meets the exemption)

Check One	Exemption
	Facility is in a fiscally constrained county as described in section 218.67(1), F.S.
	Facility is in a municipality that is entirely with a rural area of opportunity as designated pursuant to section 288.0656, F.S.
	Facility is in a municipality that has less than $10 million in total revenue, as determined by the municipality's most recent annual financial report submitted to the Department of Financial Services in accordance with section 218.32, F.S.
	Facility is operated by an operator of a mobile home park as defined in section 723.003, F.S., and has a permitted capacity of less than 300,000 gallons per day.

Indicate which plan(s) category under which the facility will comply

Check One	Plan Category
	The plan eliminates the discharge.
	The plan meets section 403.086(10), F.S.
	The plan does not eliminate the discharge – The discharge is associated with an indirect potable reuse project;
	The plan does not eliminate the discharge – The discharge is a wet weather discharge that occurs in accordance with an applicable department permit;
X	The plan does not eliminate the discharge – The discharge is into a stormwater management system and is subsequently withdrawn by a user for irrigation purposes;
	The plan does not eliminate the discharge – The utility operates the domestic wastewater treatment facilities with reuse systems that reuse a minimum of 90 percent of a facility's annual average flow, as determined by the department using monitoring data for the prior 5 consecutive years, for reuse purposes authorized by the department; or
	The plan does not eliminate the discharge – The discharge provides direct ecological or public water supply benefits, such as rehydrating wetlands or implementing the requirements of minimum flows and minimum water levels or recovery or prevention strategies for a waterbody.

Please enter the information on discharges eliminated

Discharge Type (effluent, reclaimed water, or reuse water)	Average Gallons Per Day	Date the discharge will be eliminated

Please enter information on any continuing discharges to surface waters after January 1, 2032.

Discharge Allowance Category	Discharge Type (effluent, reclaimed water, or reuse water)	Average Gallons Per Day	Treatment Level Provided (e.g. BOD limit = 5mg/L, TSS = 5 mg/L, TN = 3mg/L, TP = 1mg/L and high-level disinfection)
Meets section 403.086(10), F.S.			
Associated with an indirect potable reuse project.			
Wet weather discharge in accordance with an applicable department permit.			
Discharge into a stormwater management system that is subsequently withdrawn by a user for irrigation purposes.	Reclaimed Water	1.119 MG	BOD limit = 5mg/L, TSS = 5 mg/L, TN = 3mg/L, TP = 1mg/L and high-level disinfection
Reuse system reuses a minimum of 90 percent of a facility's annual average flow.			
Discharge provides direct ecological or public water supply benefits.			

Certification Statement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	
Authorized Signatory Representative Name *and Official Title* (type or print) [Rule 62-620.305, F.A.C.]	
[signature]	1/11/21
Authorized Signatory Representative Signature	*Date Signed*

TECHNICAL MEMORANDUM JonesEdmunds

Charlotte County East Port WRF Domestic Wastewater Nonbeneficial Surface-Water Discharge Elimination Plan

TO: Kenneth Stecher, PE; Dave Watson, PE; Bruce Bullert, PE

FROM: David Yonge, PhD, PE; Jeff Crowley, PE, Christopher Makransky, EI

DATE: November 1, 2021

SUBJECT: Plan for Elimination of Nonbeneficial Surface-Water Discharge by 2032
Jones Edmunds Project No. 03405-042-01

1 BACKGROUND

This Technical Memorandum has been prepared on behalf of Charlotte County Utilities Department (CCU) in accordance with Section 403.064(17), Florida Statutes (FS), which requires all domestic wastewater facilities with a permitted discharge to surface water to submit a plan by November 1, 2021, to eliminate nonbeneficial surface-water discharge by January 1, 2032. This plan was generated for the County-owned East Port Water Reclamation Facility (WRF) (FL0040291) in response to the Florida Department of Environmental Protection (FDEP) letter dated July 8th, 2021 (Attachment 1).

2 INTRODUCTION

CCU owns and operates the East Port WRF, which serves the Port Charlotte service area, referred to as Mid County. The East Port WRF is permitted to treat 6.0 million gallons per day (MGD) annual average daily flow (AADF) and has three permitted reuse and disposal options including:

- Underground Injection (U-001) – A total 9.60-MGD AADF permitted capacity underground injection well system consisting of two Class I underground injection wells permitted under FDEP permit numbers 44274-253-UO, IW-1, and 330486-002-UO, IW-2; discharging to Class G-IV groundwater. Underground Injection Well System U-001 is approximately at
latitude 26° 58' 28" N, longitude 82° 02' 12" W.

- Land Application (R-001) – An 8.792-MGD AADF permitted capacity slow-rate public-access system that receives flow from East Port WRF, Rotonda WRF, and West Port WRF. Treated effluent is used to irrigate a slow-rate public-access system, R-001.

- Land Application (R-002) – A 1.70-MGD AADF slow-rate restricted public-access system consisting of on-site sprayfields approximately at latitude 26° 58' 58" N, longitude 82° 1' 59" W.

The unrestricted public-access reuse system (R-001) is used to provide reclaimed water for irrigation to golf courses, residential areas, parks, athletic complexes, schools, and roadway medians. From an operational, economic, and environmental perspective, providing reclaimed water to major users (i.e., using 0.1 MGD or more) is beneficial. Three major reclaimed water users are specified in the East Port WRF permit (Attachment 2) that require additional monitoring and reporting practices. These users and their permitted flow allocations are:

- Kingsway Country Club (D-001); Permitted Amount 0.388 MGD.
- Maple Leaf Golf Course (D-002); Permitted Amount 0.388 MGD.
- Deep Creek Golf Course (D-003); Permitted Amount 0.343 MGD.

Additional monitoring and reporting are required for these users because CCU sells and delivers reclaimed water directly into the users' golf course stormwater ponds. Delivery of the reclaimed water to the pond system allows the major users to subsequently withdraw water for irrigation and maintain pond levels for aesthetic purposes. These ponds are not used as reclaimed water-storage facilities for CCU's benefit since the water cannot be recovered; rather, the water is sold to the major users who primarily control the use of the reclaimed water downstream of the meter based on irrigation needs. The stormwater ponds are part of the sites' stormwater management system, which includes existing outfalls to tidal creeks and stormwater ditches that eventually drain to the Peace River. The ponds were permitted under Rule 62-610.820, Florida Administrative Code (FAC), which allows reclaimed water to be discharged to stormwater ponds that have a control structure and the ability to discontinue flows based on specified elevations.

Maintaining an adequate level in these ponds to avoid overflowing is a high priority for CCU staff. Since CCU does not control the water that is withdrawn from the pond for irrigation or the volume that can accumulate in the ponds during storm events, CCU installed pond-level indicators and monitors the pond levels via a supervisory control and data acquisition (SCADA) system. CCU limits reclaimed water sales to the customers based on the pond levels and only provides reclaimed water when pond levels are below the permitted control elevations in accordance with the permit conditions.

3 HISTORICAL PERFORMANCE DATA

As part of the East Port WRF permit conditions, CCU is required to monitor, record, and report the total number of days in which overflow events from the emergency discharge facilities on storage ponds occurred as well as the approximate number of hours of discharge for each calendar month. This information is reported in the WRF's monthly Discharge Monitoring Reports (DMRs). Figures 1 through 3 depict the rainfall for each pond, reclaimed water sold, and pond overflow occurrences.

Figures 1 through 3 show a trend that significantly more rainfall occurs from June to December, and reclaimed water is generally sold from January to May. Furthermore, the figures also show that overflows generally do not occur on months when reclaimed water is sold. This data suggests that CCU successfully operates the pond control valves at each site to minimize or cease reclaimed water sales (discharges) when the pond elevations are at or above their permitted control elevations.

Figure 1 D-001 Total Monthly Overflows, Reclaimed Water and Rainfall

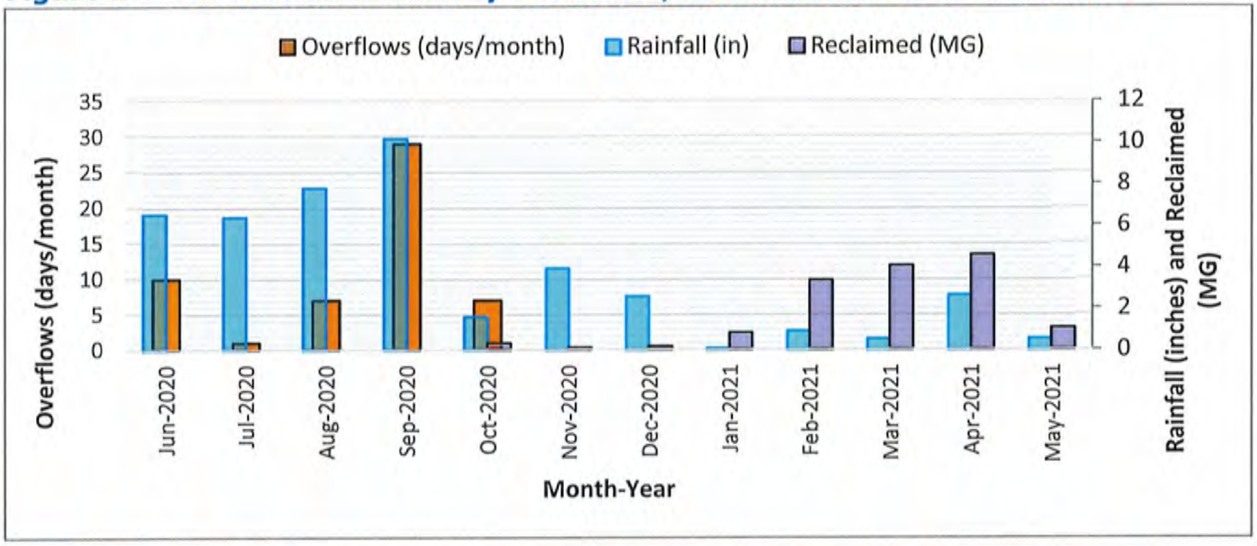


Figure 2 D-002 Total Monthly Overflows, Reclaimed Water and Rainfall

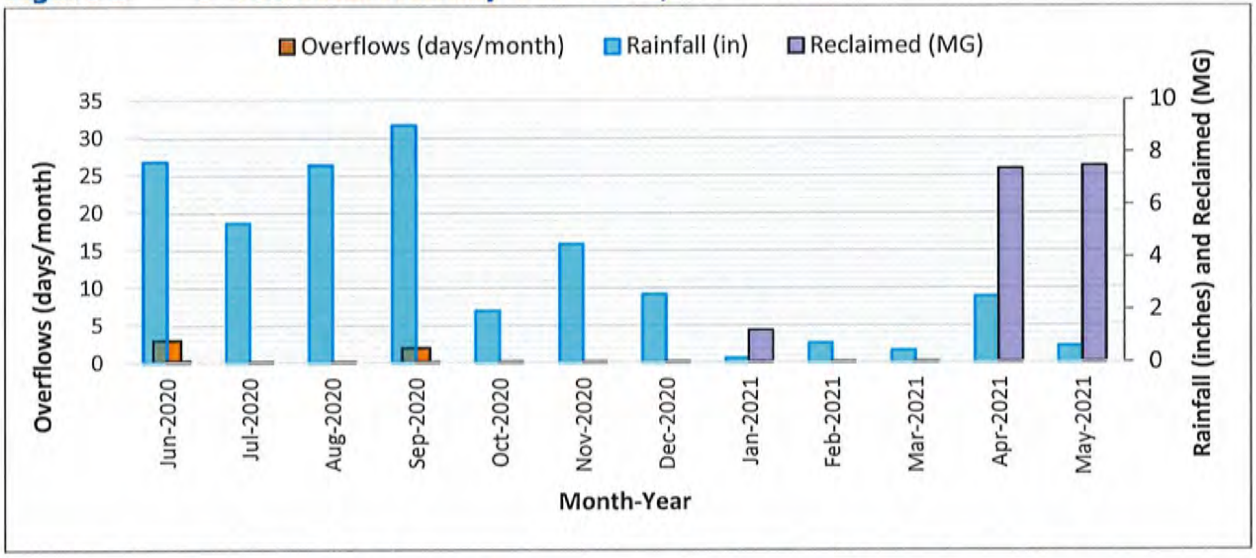
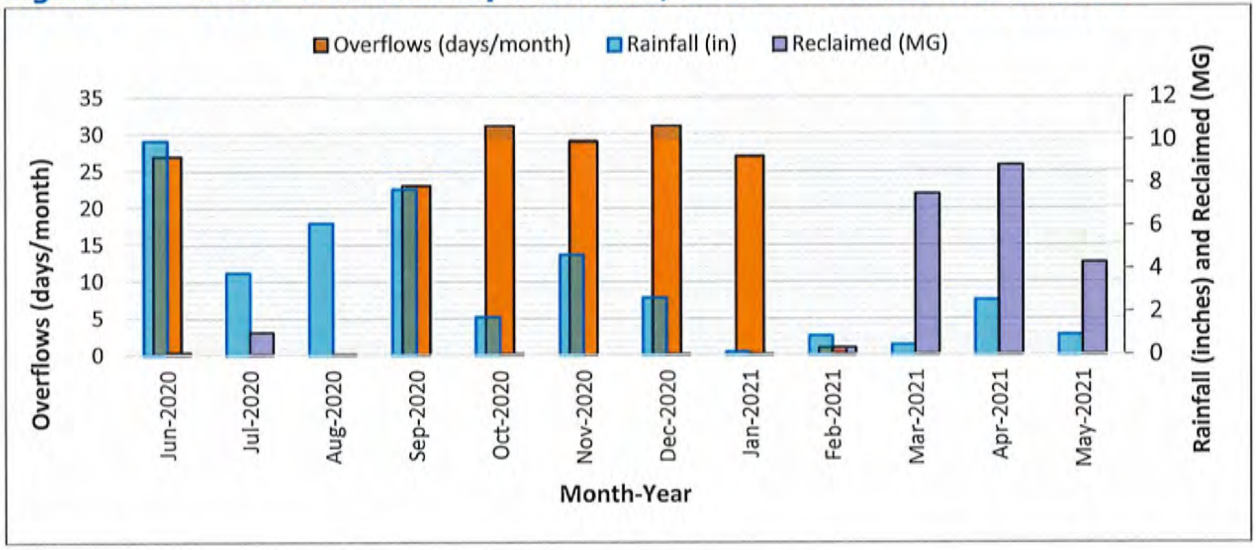


Figure 3 D-003 Total Monthly Overflows, Reclaimed Water and Rainfall



The total reclaimed water flow from June 2020 to May 2021 to the Kingsway Country Club, Maple Creek Golf Course, and Deep Creek Golf Course was 14.25 million gallons (MG), 16.1 MG, and 21.98 MG, respectively. This equates to only 12 percent of the combined theoretical permitted flow (408 MG) for the three major users.

As demonstrated by data herein, selling reclaimed water faces notable seasonal challenges. CCU is aware that selling reclaimed water through the public access reuse system is not a reliable reuse/disposal application as demand is contingent on the time of year (e.g., six consecutive months may occur where reclaimed water cannot be sold and reused). This creates a recurring seasonal need for alternative methods for reuse/disposal of reclaimed water. Therefore, CCU also has alternative methods for reuse/disposal to improve system resiliency.

4 TREATMENT PROCESS AND EFFLUENT QUALITY

The East Port WRF operates a modified Ludzack-Ettinger (MLE) activated-sludge process for biological nutrient removal (BNR). The facility has two mechanical bar screens, grit removal, two aeration basins, two anoxic basins, two clarifiers, two traveling bridge sand filters, two chlorine contact chambers using sodium hypochlorite for disinfection, sludge holding/ digestion tanks, and two belt filter presses. The East Port WRF has two septage-receiving stations which is combined with raw sewage at the headworks for further treatment. The East Port WRF has two lined storage ponds sized for 45 MG and 95 MG. As mentioned in Part 2 of this Technical Memorandum, the East Port WRF has three disposal methods for effluent water. Each disposal method has varying requirements for effluent standards including high-level disinfection for public-access reuse (R-001) and basic-level disinfection for the on-site sprayfields (R-002). Table 1 lists the flows and primary water-quality requirements for each effluent reuse and disposal method for the East Port WRF.

Table 1 Current East Port WRF Effluent Requirements

Reuse/Disposal Method	R-001	R-002	U-001
Max Flow (MGD)	8.792[a]	1.70[a]	9.6[a]
Max BOD (mg/L)	20[a]/30[b]/ 45[c]/60[d]	20[a]/30[b]/ 40[c]/60[d]	20[a]/30[b]/ 45[c]/60[d]
Max TSS (mg/L)	5[d]	20[a]/30[b]/ 45[c]/60[d]	20[a]/30[b]/ 45[c]/60[d]
Total Fecal (#/mL)	25[d]	200[a]/200[e]/800[d]	Not applicable

Notes: Statistical Bases = [a]annual average; [b]monthly average; [c]weekly average; [d]single sample; [e]monthly geometric mean.

CCU is currently designing an expansion of the WRF to treat 9 MGD. The design includes an upgrade to the BNR process to a four-stage Bardenpho system, which will achieve water-quality effluents consistent with advanced wastewater treatment facilities and support the County's goal of improving water quality (e.g., biochemical oxygen demand (BOD) limit = 5 milligrams per liter (mg/L), total suspended solids (TSS) = 5 mg/L, total nitrogen (TN) = 3 mg/L, total phosphorus (TP) = 1 mg/L, and high-level disinfection).

5 SUMMARY AND RECOMMENDATION

As described above, a portion of the reclaimed water flow entering the master reuse system is conveyed to the stormwater ponds of three major reuse customers. The outfalls associated with these stormwater ponds are not direct surface-water outfalls from the WRF but are indirect discharges associated with the users' stormwater lakes/ponds that are augmented with reclaimed water from East Port WRF. The stormwater ponds are part of a stormwater management system, which contains outfalls to tidal creeks that eventually flow to the Peace River.

The permitted amount for each reuse customer totals 1.119 MGD or 408 million gallons per year (MGY), which is based on the irrigation capacity of approximately 0.0039 MG per acre and reclaimed water use agreements. However, historical data show that CCU can only convey a portion (less than 15 percent) of this flow on a yearly basis to prevent overflowing the stormwater pond outfalls. The existing East Port WRF BNR treatment system produces high-quality reclaimed water but is being upgraded to advance treatment to support the County's goal of improving water quality.

Although overflows occur, the occurrences are due to rainfall events rather than reclaimed water. Historical data shows that CCU can control and prevent surface water discharges from occurring due to the contribution of reclaimed water to the ponds while providing the major users access to high-quality reclaimed water. Providing water to the major users reduces potable and groundwater use for irrigation, which benefits the Southwest Florida Water Management District (SWFWMD) Southern Water Use Caution Area by preventing additional groundwater withdrawals. Since these pond systems are operated in a manner that prevents discharges due to reclaimed water and provides a benefit to CCU, the users, and the environment, CCU plans to continue to operate the pond systems as designed.

Appendix M

EPA Memorandum PFAS Enforcement Discretion and Settlement Policy Under CERCLA

ASSISTANT ADMINISTRATOR FOR ENFORCEMENT AND COMPLIANCE ASSURANCE
WASHINGTON, D.C. 20460

April 19, 2024

MEMORANDUM

SUBJECT: PFAS Enforcement Discretion and Settlement Policy Under CERCLA

FROM: David M. Uhlmann

TO: Regional Administrators and Deputy Regional Administrators
Regional Counsels and Deputy Regional Counsels

Communities across the United States face public health and environmental challenges because of toxic PFAS contamination.[1] PFAS have been manufactured in the United States and around the world since the 1940s for use in a wide range of industrial and consumer products from fire-fighting foam to non-stick cookware and water-resistant fabrics. PFAS are referred to as "forever chemicals" because of their persistence in the environment. Exposure to PFAS has been linked to deadly cancers, impacts to the liver and heart, and immune and developmental damage to infants and children.

On August 17, 2023, EPA announced a new National Enforcement and Compliance Initiative (NECI) to address exposure to PFAS.[2] NECIs are intended to focus on the most serious and widespread environmental problems facing the United States. PFAS is no exception. Due to the toxicity and persistence of PFAS chemicals, and the breadth and scope of PFAS contamination throughout the country, addressing PFAS contamination is a significant priority for EPA.

EPA now has designated two types of PFAS, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).[3] The rule designating PFOA and PFOS as hazardous substances will allow EPA to use the full strength of CERCLA to address PFAS contamination. At the same time, the rule does not change the statute's liability framework, which provides liability protections in certain circumstances for parties that are not primarily responsible.

[1] PFAS, or per- and polyfluoroalkyl substances, are a large group of manufactured chemicals. For the majority of this document, EPA will use PFAS as a shorthand to refer to perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), including their salts and structural isomers, consistent with the definition in the Final Designation of PFOA and PFOS as Hazardous Substances. *See infra* note 3.
[2] *See* FY 2024 – 2027 National Enforcement and Compliance Initiatives.
[3] *See* Final Designation of PFOA and PFOS as Hazardous Substances. *See also* Proposed Designation of PFOA and PFOS as Hazardous Substances.

With this memorandum, I am providing direction to all EPA enforcement and compliance staff about how EPA will exercise its enforcement discretion under CERCLA in matters involving PFAS, just as EPA exercises enforcement discretion regarding other hazardous substances. EPA will focus on holding responsible entities who significantly contributed to the release of PFAS into the environment, including parties that manufactured PFAS or used PFAS in the manufacturing process, federal facilities, and other industrial parties.

EPA does not intend to pursue entities where equitable factors do not support seeking response actions or costs under CERCLA, including, but not limited to, community water systems and publicly owned treatment works, municipal separate storm sewer systems, publicly owned/operated municipal solid waste landfills, publicly owned airports and local fire departments, and farms where biosolids are applied to the land. For these same parties, EPA can use CERCLA statutory authorities when appropriate to enter into settlements that provide contribution protection from third party claims for matters addressed in the settlement.

I. Executive Summary

EPA is issuing this PFAS Enforcement Discretion and Settlement Policy Under CERCLA regarding enforcement considerations that will inform EPA's decisions to pursue or not pursue potentially responsible parties (PRPs) for response actions or costs under CERCLA to address the release or threatened release of PFAS. This Policy is intended to clarify when EPA intends to use its CERCLA enforcement authorities or decide not to pursue a particular party. This Policy applies only to the exercise of EPA's enforcement discretion when requiring action to address releases of PFAS under CERCLA; it does not apply to enforcement under other EPA programs or statutes, including other EPA programs that may address PFAS.

The designation of PFOA and PFOS as hazardous substances should not disrupt CERCLA's liability framework; CERCLA will continue to operate as it has for decades. In enforcement matters, the facts, circumstances, and equities of each case inform which parties the Agency pursues. CERCLA's liability limitations and protections safeguard against liability in certain circumstances for parties that are not primarily responsible. EPA's enforcement discretion policies historically have given EPA much-needed flexibility to provide additional protections when circumstances warrant.[4]

Although CERCLA's liability framework is broad, the statutory affirmative defenses and EPA's enforcement discretion provide mechanisms to narrow the scope of liability and focus on the significant contributors to contamination. Some stakeholders have expressed concern that the designation of PFOA and PFOS as hazardous substances will result in parties being pursued for PFAS liability under CERCLA, even if the equities do not support seeking CERCLA response actions or costs. EPA intends to rely upon CERCLA statutory protections and EPA's existing enforcement discretion policies to alleviate those concerns, as well as the factors set forth here.

Consistent with CERCLA's objectives, EPA will focus on holding accountable those parties that have played a significant role in releasing or exacerbating the spread of PFAS into the environment, such as those who have manufactured PFAS or used PFAS in the manufacturing process, and other industrial

[4] *See* Unique Parties and Superfund Liability.

parties. For purposes of this Policy only, these parties are referred to as major PRPs. EPA also intends to pursue federal agencies or federal facilities when they are responsible for PFAS contamination.[5]

EPA remains committed to environmental justice and identifying and protecting overburdened communities that may be disproportionally impacted by adverse health and environmental effects.[6] EPA intends to pursue major PRPs and federal agencies to conduct investigations and cleanup to protect communities from high-risk, high-concentration PFOA and PFOS exposures.

As more fully described in Section IV of this memorandum, and subject to the limitations set forth in Section V, EPA does not intend to pursue otherwise potentially responsible parties where equitable factors do not support seeking response actions or costs under CERCLA, including, but not limited to, the following entities:

(1) Community water systems[7] and publicly owned treatment works (POTWs);[8]
(2) Municipal separate storm sewer systems (MS4s);[9]
(3) Publicly owned/operated municipal solid waste landfills;
(4) Publicly owned airports and local fire departments; and
(5) Farms where biosolids are applied to the land.

EPA may extend enforcement discretion under this Policy to additional parties even if they do not fall within the categories listed above, based on the equitable factors set forth in Section IV.B.

In addition to potential EPA action, EPA understands that entities are concerned about being sued by other PRPs for PFAS cleanup costs under CERCLA. In CERCLA settlements with major PRPs, EPA will seek to require those settling parties to waive their rights to sue parties that satisfy the equitable factors. The major PRPs would then not be able to sue those non-settling parties for matters addressed under the settlement. These settlement protections are consistent with settlement protections regularly applied by EPA in other CERCLA contexts.

Further, consistent with current CERCLA enforcement practice to mitigate these litigation risk concerns, EPA can enter settlements with concerned parties under our statutory authorities when appropriate. Such settlements would help to mitigate litigation risk concerns and associated costs by providing protection from CERCLA contribution claims by other PRPs seeking a portion of PFAS response costs.[10] This exercise of enforcement discretion is discussed in Section IV.C.

To provide context for this policy, Section II provides below a short overview of CERCLA, including a description of the statutory liability framework. Section III includes a summary of the Agency's integrated approach to addressing PFAS. Section IV discusses how EPA intends to exercise its CERCLA

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[5] *See* Executive Order 12580, 52 Fed. Reg. 2923 (Jan. 23, 1987).
[6] *See* Strengthening Environmental Justice Through Cleanup Enforcement Actions (July 1, 2021).
[7] A community water system is a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. *See* 40 C.F.R. § 141.2.
[8] POTW means a treatment works (as defined by CWA section 212) that is owned by a state or municipality (as defined by Clean Water Act (CWA) section 502(4)).
[9] An MS4 is a conveyance or system of conveyances that is: owned by a state, city, town, village, or other public entity that discharges to waters of the U.S.; designed or used to collect or convey stormwater (e.g., storm drains, pipes, ditches); not a combined sewer; and not part of a sewage treatment plant, or publicly owned treatment works (POTW). *See* 40 C.F.R. § 122.26(b)(8).
[10] *See* CERCLA section 113(f)(2), 42 U.S.C. § 9613(f)(2).

enforcement discretion for PFAS. Section V identifies limitations and contingencies that apply to the use of enforcement discretion in this policy.

II. Overview of CERCLA

CERCLA was enacted in 1980 in response to public concern about abandoned hazardous waste sites. CERCLA authorizes the federal government to assess sites, clean up contaminated sites, and respond to releases or threatened releases of hazardous substances, pollutants, and contaminants.

There are over 800 hazardous substances designated under CERCLA. Hazardous substance designation gives rise to a requirement to report releases at or above a certain quantity[11] and enables EPA to order actions by and recover response costs from PRPs. CERCLA's liability framework aims to ensure that, wherever possible, PRPs perform or pay for cleanups instead of relying on the Hazardous Substance Trust Fund (Superfund), consistent with EPA's "polluter pays" principle.

As described in CERCLA section 107(a), the following categories of persons may be liable for the costs or performance of a cleanup of a hazardous substance under CERCLA:

(1) Current owners and operators of a facility where hazardous substances come to be located;
(2) Owners and operators of a facility at the time that hazardous substances were disposed of at the facility;
(3) Generators and parties that arranged for the disposal or transport of the hazardous substances; and
(4) Transporters of hazardous waste that selected the site where the hazardous substances were brought.

To conserve Superfund money for cleanups at sites where there are no financially viable PRPs, EPA has adopted an "enforcement first" policy[12] to compel those responsible for contaminated sites to take the lead in cleanup (the "polluter pays" principle). In keeping with this policy, EPA routinely reaches settlements with PRPs to clean up sites. In addition, EPA can compel PRPs to clean up sites where there may be an imminent and substantial endangerment to public health or welfare or the environment from an actual or threatened release of hazardous substances. When EPA spends Superfund money to finance a response action, EPA may then seek reimbursement from PRPs. Private parties may also conduct cleanups and seek reimbursement of eligible response costs from PRPs.

CERCLA liability is not unlimited. CERCLA includes several statutory protections that may limit liability and discourage litigation (e.g., the provision for settlements with "de minimis" or minor parties, CERCLA section 122(g)). Moreover, EPA has well-established enforcement discretion policies that provide EPA flexibility to offer liability protections to parties when circumstances warrant (e.g., innocent landowners, de micromis parties, owners of residential property at or near Superfund sites,

[11] The designation of PFOA and PFOS, including their salts and structural isomers, as hazardous substances, can trigger the applicability of release reporting requirements under CERCLA sections 103 and 111(g), and accompanying regulations, and section 304 of the Emergency Planning and Community Right-to-Know Act. Facilities must report releases of hazardous substances at or above the reportable quantity (RQ) within a 24-hour period. For PFOA and PFOS, a default RQ of one pound is assigned to these substances pursuant to CERCLA section 102(b). This Policy does not apply to these requirements, and parties that may be eligible for enforcement discretion must comply with this requirement if a reportable release occurs at their facility.

[12] *See* Enforcement First for Remedial Action at Superfund Sites (Sept. 20, 2002).

and contiguous property owners).[13] Existing CERCLA limitations and enforcement policies are sufficient to mitigate concerns about liability that may arise after designation. No additional action should be necessary to ensure that those limitations and policies continue to operate as they have for decades. Nonetheless, EPA is issuing this CERCLA PFAS enforcement discretion policy consistent with existing statutory protections and policies.[14]

EPA's CERCLA enforcement discretion policies help the Agency focus on sites that pose the most risk and PRPs who have contributed significantly to contamination. EPA will continue to implement its "enforcement first" policy, which compels PRPs to conduct and pay for cleanup before resorting to the Superfund, in furtherance of CERCLA's "polluter pays" principle.

III. EPA's Approach to PFAS

On October 18, 2021, EPA released its PFAS Strategic Roadmap,[15] which highlighted the integrated approach the Agency is taking across a range of environmental media and EPA program offices to protect the public and the environment from PFAS contamination. EPA's approach to PFAS is focused on three central directives to address PFAS contamination:

(1) *research* – to invest in research, development, and innovation to increase understanding of PFAS exposures and toxicity, human health, and ecological effects and effective interventions that incorporate the best available science;
(2) *restrict* – to pursue a comprehensive approach to proactively prevent PFAS from entering air, land, and water at levels that can adversely impact human health and the environment; and
(3) *remediate* – to broaden and accelerate the cleanup of PFAS contamination to protect human health and ecological systems.[16]

Historically, PFAS have been found in, or used in making, a wide range of consumer products including carpets, clothing, fabrics for furniture, packaging for food, and cookware. PFAS also have been components of firefighting foams used to extinguish liquid fuel fires at airfields, refineries, military bases and other locations, and in several industrial processes. As a result of their widespread use, environmental releases of PFAS have occurred for decades, leaving many communities and ecosystems exposed to PFAS in soil, sediment, surface water, groundwater, and air. A growing body of scientific evidence shows that exposure at certain levels to specific PFAS is linked to adverse impacts to human health.[17] EPA uses its various enforcement authorities, including under the Safe Drinking Water Act, the Resource Conservation and Recovery Act, the Toxic Substances Control Act, the Clean Air Act, and the Clean Water Act, to identify and address PFAS releases at private and federal facilities and in communities.

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[13] For example, for parties who have contributed a miniscule amount of waste to the site (De Micromis Parties), EPA policy is that they should not participate in financing the cleanup. *See* Superfund Cleanup: De Minimis/De Micromis Policies and Models.
[14] *See supra* note 4.
[15] *See* PFAS Strategic Roadmap: EPA's Commitments to Action 2021-2024.
[16] *Id.* at 5.
[17] *Id.* at 7.

In September 2022, based on significant evidence that PFOA and PFOS may present a substantial danger to human health or welfare or the environment,[18] the Agency proposed to designate PFOA and PFOS as hazardous substances under section 102(a) of CERCLA. Findings from laboratory animal toxicological studies and human epidemiology studies suggest that exposure to PFOA and/or PFOS may lead to cancer and reproductive, developmental, cardiovascular, liver, and immunological effects.[19]

On April 17, 2024, EPA signed the final rule[20] to designate PFOA and PFOS as hazardous substances under section 102(a) of CERCLA. This designation allows EPA to use its CERCLA enforcement authorities, as appropriate and where relevant statutory elements are met, which could shift the cost burden of CERCLA response costs from the Superfund to PRPs. As with any other hazardous substance, EPA will determine what, if any, response and enforcement actions may be necessary to protect human health and the environment. Further, EPA and its state, local, and Tribal partners, may carry out a response action to address PFAS contamination, wholly distinct from CERCLA enforcement-driven actions.

IV. CERCLA Enforcement Discretion and Settlement Policy

Although EPA has the authority under CERCLA to require parties to perform response actions and to seek response costs incurred by the United States, the Agency has discretion on how to exercise its authority, which the Agency has utilized since CERCLA was enacted in 1980.

Consistent with EPA's past practice, this Section describes how EPA intends to exercise its CERCLA enforcement discretion for matters involving PFAS. As noted above, EPA intends to focus its enforcement efforts on entities who significantly contributed to the release of PFAS contamination into the environment, including parties that manufactured PFAS or used PFAS in the manufacturing process, federal facilities, and other industrial parties.

Section IV.A identifies entities where equitable factors do not support seeking response actions or costs under CERCLA. Section IV.B sets forth the equitable factors that EPA will consider in deciding whether to exercise enforcement discretion under CERCLA for other PRPs. Section IV.C. sets forth EPA's approach to settling with parties described in this Section.

A. Parties Covered by the PFAS Enforcement Discretion Policy

EPA does not intend to pursue, based on equitable factors, PFAS response actions or costs under CERCLA against the following parties:

1. Community Water Systems and POTWs

Community water systems and POTWs conduct public services by providing safe drinking water and managing and processing public waste. These entities are required to treat PFAS-contaminated sources of drinking water and receive PFAS-contaminated wastewater. They do not manufacture PFAS nor use PFAS as part of an industrial process. Through their operation processes, these parties may discharge

[18] *See* Proposed Designation of PFOA and PFOS as Hazardous Substances.
[19] *See id.* or related news release to proposed designation.
[20] *See supra* note 3.

effluents;[21] dispose or manage sewage sludge, biosolids,[22] and drinking water treatment residuals; and arrange for the disposal of spent treatment media (i.e., activated carbon filters, anion exchange media, or membranes) and/or the discharge of leachate, permeate, or regeneration brines.

2. Municipal Separate Storm Sewer Systems (MS4s)

MS4s do not manufacture PFAS nor use PFAS as part of an industrial process. Owners/operators of regulated MS4s perform a public service and are required to develop, implement, and enforce a stormwater management program (SWMP) to describe how the MS4 will reduce the discharge of pollutants from its sewer system.[23] While the SWMP should detect and eliminate illicit discharges, illegal dumping and connections may result in illicit discharges of non-stormwater wastes into the MS4. MS4s implement programs to prevent or reduce pollutant runoff from municipal operations into the storm sewer system, which helps to control pollutant discharges by minimizing the potential pathways for contaminants carried in runoff.

3. Publicly Owned or Operated Municipal Solid Waste Landfills

Publicly owned or operated municipal solid waste landfills perform a public service by handling municipal solid waste. They do not manufacture PFAS nor use PFAS as part of an industrial process. In addition to receiving waste from communities and other residential entities, these landfills may accept solid waste from POTWs that may be contaminated with PFAS, particularly sewage sludge and solid residues that result from treatment processes and filtration media such as granular activated carbon filters.

4. Publicly Owned Airports and Local Fire Departments

State or municipal airports and local fire departments provide a public service by preparing for and suppressing fire emergencies and protecting public safety. They do not manufacture PFAS nor use PFAS as part of an industrial process. Many airports and fire departments, however, store and use aqueous film forming foam (AFFF),[24] fire-fighting foam that may contain PFAS. Many airports have been required by Federal Aviation Administration regulations to maintain adequate amounts of AFFF to address fire emergencies.[25] State or municipal airports and local fire departments have also used AFFF during fire emergencies and training exercises.

To the extent publicly owned airports and local fire departments are legally required to continue to use AFFF, these parties must follow all applicable regulations governing the use, storage, handling, and disposal of AFFF that contains PFAS.[26] EPA also expects these parties to exercise a high standard of care

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[21] CERCLA enumerates 11 categories of federally permitted releases, including releases regulated by CWA section 402 which established a National Pollutant Discharge Elimination System permit program. In this Policy, EPA does not take a position on the applicability of a "federally permitted release" as defined in CERCLA section 101(10).

[22] Sewage sludge is a product of the wastewater treatment process. During wastewater treatment, the liquids are separated from the solids and then may be treated physically and chemically to produce a semisolid, nutrient-rich product. The terms "biosolids" and "treated sewage sludge" are often used interchangeably; however, biosolids typically means sewage sludge treated to meet the requirements in 40 C.F.R. part 503 and intended to be applied to land as a soil amendment. Disposal (incineration and landfilling) requirements in Part 503 refer to sewage sludge.

[23] *See* Stormwater Discharges from Municipal Sources-Developing an MS4 Program.

[24] A Class B fire is a fire in flammable liquids or flammable gases, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, or alcohols. States, Tribes, or municipalities may have regulations for the use and handling of AFFF.

[25] 14 C.F.R. part 139.

[26] Protocols for handling, storage, and accidental release can be found in the Material Safety Data Sheet for AFFF.

to limit the release of PFAS, minimize and contain releases, and forgo, when possible, the use of AFFF in the process of cleaning equipment and training exercises.

5. Farms that Apply Biosolids to Land

POTWs also produce sewage sludge that may be treated to become biosolids. Farms then routinely apply these biosolids to the land, and by doing so, provide for a beneficial application of a product from the wastewater treatment process.[27] Under the Clean Water Act, EPA and the states have regulated standards for the application of sludge as an agricultural fertilizer that ensures strict guidelines and agronomic application rates are followed that support crop growth and protect soil and water quality.[28] EPA recognizes that such land application can result in both economic and resource management benefits, including conservation of landfill space, reduction in methane gas from landfills, reduction of releases from incinerators, and a reduced demand for synthetic fertilizers.[29] Further, these farms do not manufacture PFAS nor use PFAS as part of an industrial process.

B. Factors Considered for Enforcement Discretion for Other Parties

Consistent with EPA's practice of considering fairness and equitable factors, EPA will exercise its enforcement discretion to not pursue additional entities for PFAS response actions or costs under CERCLA, informed by the totality of the following factors:

(1) Whether the entity is a state, local, or Tribal government, or works on behalf of or conducts a service that otherwise would be performed by a state, local, or Tribal government.
(2) Whether the entity performs a public service role in:
    - Providing safe drinking water;
    - Handling of municipal solid waste;
    - Treating or managing stormwater or wastewater;
    - Disposing of, arranging for the disposal of, or reactivating pollution control residuals (e.g., municipal biosolids and activated carbon filters);
    - Ensuring beneficial application of products from the wastewater treatment process as a fertilizer substitute or soil conditioner;[30] or
    - Performing emergency fire suppression services.
(3) Whether the entity manufactured PFAS or used PFAS as part of an industrial process.
(4) Whether, and to what degree, the entity is actively involved in the use, storage, treatment, transport, or disposal of PFAS.

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[27] Under CERCLA section 101(22)(D), the definition of "release" explicitly excludes "the normal application of fertilizer." EPA believes this language is best read as requiring a site-specific analysis.
[28] *See* 40 C.F.R. part 503.
[29] EPA acknowledges that biosolids used as soil amendment are subject to an evolving regulatory scheme. CWA sections 405(d) and (e) authorize EPA to promulgate regulations containing guidelines for the use and disposal of sewage sludge, including by establishing numerical limitations where feasible. Under CWA section 405(d)(2)(D), these regulations must be "adequate to protect human health and the environment from any reasonably anticipated adverse effect of each pollutant." *See also* Policy on Municipal Sludge Management, 49 Fed. Reg. 24358 (June 2, 1984).
[30] *See, e.g.*, Standards for the Use or Disposal of Sewage Sludge, 58 Fed. Reg. 9248, 9262 (Feb. 19, 1993).

In helping to ensure equitable outcomes in addressing PFAS contamination, the above factors are instructive in determining whether an entity's CERCLA responsibility should be limited.

C. Settlement Agreements and Contribution Protection

EPA has broad discretion to decide whether to respond to a release or threat of release under CERCLA. Response decisions are made on a case-by-case basis after considering the specific circumstances related to the release at issue. CERCLA section 104(a) provides that whenever there is a release or threat of release of a hazardous substance, or a release of a pollutant or contaminant which may present an imminent and substantial danger to public health or welfare, "the President is authorized to act" and take any response action the President "deems necessary to protect the public health or welfare or the environment." EPA is further directed to employ settlement procedures "[w]henever practicable and in the public interest…to expedite effective remedial actions and minimize litigation."[31]

To further the goals of this policy, EPA can provide some measure of litigation and liability protection through settlement agreements in two primary ways when circumstances warrant.[32]

First, EPA may protect certain non-settling parties when the Agency enters settlement agreements with major PRPs. For example, if EPA settles with a PFAS manufacturer, EPA may secure a waiver of rights providing that the PFAS manufacturer cannot pursue contribution against certain non-settling parties to that settlement. The waiver of rights helps provide some protection to parties that EPA does not intend to pursue from both the costs of litigation and the costs of cleanup. Without such a waiver, settling major PRPs could pursue contribution under CERCLA from those other parties for a portion of the CERCLA cleanup.

Second, EPA may enter into settlement agreements with parties where factors do not support enforcement against them for PFAS response actions under CERCLA, as discussed in Section IV.A and B of this Policy. A party that resolves its liability through a CERCLA settlement with the United States will not be liable for third-party contribution claims related to the matters addressed in the settlement.[33] Non-settling PRPs will not be able to pursue these settling parties for contribution costs under CERCLA related to the settlement, thus minimizing litigation costs and discouraging third-party litigation.

EPA intends to discuss possible settlement approaches with interested parties that are identified by this Policy. In certain situations, parties may qualify for *de minimis* or *de micromis* settlements under the terms of the Agency's 2002 enforcement discretion/settlement policy.[34] On a case-by-case basis,

[31] CERCLA section 122(a), 42 U.S.C. § 9622(a).

[32] *See*, *e.g.*, Interim Revisions to CERCLA Judicial and Administrative Settlement Models to Clarify Contribution Rights and Protection from Claims Following the *Aviall* and *Atlantic Research Corporation* Decisions (Mar. 16, 2009); Defining "Matters Addressed" in CERCLA Settlements (Mar. 14, 1997).

[33] "A person who has resolved its liability to the United States or a state in an administrative or judicially approved settlement shall not be liable for claims for contribution regarding matters addressed in the settlement. Such settlement does not discharge any of the other potentially liable persons unless its terms so provide, but it reduces the potential liability of the others by the amount of the settlement." CERCLA section 113, 42 U.S.C. § 9613.

[34] *See* Revised Settlement Policy and Contribution Waiver Language Regarding Exempt De Micromis and Non-Exempt De Micromis Parties (Nov. 6, 2002); *see also* Model De Minimis Contributor Consent Decree, Model De Minimis Contributor ASAOC, Model De Minimis Landowner Consent Decree and Model De Minimis ASAOC; Superfund Cleanup Subject Listing De Minimis/De Micromis Policies and Models.

EPA may enter into limited "ability to pay" settlements with parties to resolve CERCLA response costs, where payment could result in undue financial hardship for the PRP.[35]

Parties may also be asked to perform actions such as in-kind services, including PFAS monitoring activities and implementing institutional controls. Further, parties identified by this Policy may seek settlement with EPA in order to take actions to address contamination, which would provide protection from potential contribution claims.

V. Limitations and Contingencies and Responsibilities of Other Federal Agencies and Facilities

A. Limitations and Contingencies

Any exercise of CERCLA enforcement discretion pursuant to this Policy is contingent upon a party's full cooperation with EPA, including providing access and information when requested and not interfering with activities that EPA is taking or directing others to undertake to implement a CERCLA response action. This Policy does not exempt parties from reporting PFAS releases under CERCLA.

This Policy in no way affects EPA's ability to pursue any responsible party, including those entities set forth in Section IV, whose actions or inactions significantly contribute to, or exacerbate the spread of significant quantities of PFAS contamination, thereby requiring a CERCLA response action. Where conditions may present an imminent and substantial endangerment to public health, EPA retains its authority to take any necessary action under CERCLA section 106.

This Policy does not apply to enforcement actions taken under any EPA programs or statutes other than CERCLA. As with any other hazardous substance, this Policy also does not affect EPA's ability to determine and address what, if any, response and enforcement action may be necessary to protect human health and the environment.

Further, the Agency, working with state, local, and Tribal partners, may carry out a response action to address PFAS contamination, wholly distinct from CERCLA enforcement-driven actions. In the event the exercise of CERCLA enforcement discretion results in some or all responsible parties at a Superfund site not being pursued to fund or perform PFAS cleanup, characterization, or other response actions, EPA may use all available resources and work with state, local, and Tribal partners to address the contamination.

EPA also recognizes that the science and legal requirements associated with PFAS continue to evolve.[36] As a result, the scope of this policy may change to reflect newly emerging science or regulatory requirements, or other relevant considerations. Entities must continue to follow all applicable laws and regulations.

This Policy is intended to assist EPA personnel in its exercise of CERCLA enforcement discretion in the normal course of business. It is intended solely for the guidance of employees of the Agency. This policy is not a regulation and does not create new legal obligations or limit or expand obligations under any federal, state, Tribal, or local law. It is not intended to and does not create any substantive or

[35] *See* General Policy on Ability to Pay Determinations (Sept. 30, 1997).

[36] *See, e.g.*, Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances and Materials Containing Perfluoroalkyl and Polyfluoroalkyl Substances (2024).

procedural rights for any persons. In addition, this guidance does not alter EPA's policy of not providing no action assurances outside the framework of a legal settlement, and EPA will evaluate each request for relief under this policy based on all available information.

B. Federal Agencies

Nothing in this policy affects the scope of CERCLA liability or responsibility of federal agencies, such as the Department of Defense (DoD) and the Department of Energy (DoE), to address PFAS contamination. DoD, DoE, and other federal agencies are responsible for cleaning up releases of hazardous substances, pollutants, and contaminants (including PFAS) from their facilities, and are delegated the President's CERCLA section 104 response authorities for releases on or from facilities under their own jurisdiction, custody, or control.[37] CERCLA section 111(e)(3) prohibits the use of Superfund money for remedial action at a federal facility on the National Priorities List.

VI. Next Steps and Contacts

EPA has established a team to support the implementation of this policy. This team will respond to issues pertaining to this policy and, where appropriate, assist EPA regional staff in formulating and expediting settlement agreements as needed. For questions, please contact Tina Skaar at skaar.christina@epa.gov.

cc: Superfund Emergency Management Division Directors
Superfund Regional Counsel Branch Chiefs
Kenneth Patterson, Director, Office of Site Remediation Enforcement, Office of Enforcement and Compliance Assurance (OECA)
Kathryn Caballero, Director, Federal Facilities Enforcement Office, OECA
Rosemarie Kelley, Director, Office of Civil Enforcement, OECA
Barry Breen, Principal Deputy Assistant Administrator, OLEM
Larry Douchand, Director, Office of Superfund Remediation and Technology Innovation, Office of Land and Emergency Management (OLEM)
Brendan Roache, Acting Director, Office of Emergency Managment, OLEM
Jeffrey Prieto, General Counsel, Office of General Counsel
Charlotte Youngblood, Associate General Counsel, Solid Waste and Emergency Response Law Office, Office of General Counsel
Bruno Piggot, Acting Assistant Administrator, Office of Water
Todd Kim, Assistant Attorney General, Environment and Natural Resources Division (ENRD), Department of Justice
Thomas A. Mariani, Jr., Chief, Environmental Enforcement Section, ENRD, Department of Justice

[37] *See* Executive Order 12580, 52 Fed. Reg. 2923 (Jan. 23, 1987).