Charlotte County
Reclaimed Water Master Plan

Charlotte County Utilities Department | 2024

JonesEdmunds 50 YEARS 1974-2024

CHARLOTTE COUNTY FLORIDA

CHARLOTTE COUNTY UTILITIES DEPARTMENT
RECLAIMED WATER MASTER PLAN

Charlotte County | May 2024

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RECLAIMED WATER MASTER PLAN

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May 2024

This item has been digitally signed and sealed by Christopher R. Makransky, PE, on the date indicated here.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAD	Annual Average Daily
AADD	Annual Average Daily Demand
AADF	Annual Average Daily Flow
ARPA	American Rescue Plan Act of 2021
AR	Aquifer Recharge
AWT	Advanced Wastewater Treatment
AWWA	American Water Works Association
BAT	Biologically Active Filtration
BCC	Board of County Commissioners
BMAP	Basin Management Action Plan
BOD	Biological Oxygen Demand
CCC	Chlorine Contact Chamber
CCCP	Cross-Connection Control and Backflow Prevention (Program)
CCU	Charlotte County Utilities Department
CDD	Community Development Department
CIP	Capital Improvement Project
CMP	Capital Maintenance Program
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
DIP	Ductile Iron Pipe
DMR	Discharge Monitoring Report
DPR	Direct Potable Reuse
EPA	US Environmental Protection Agency
EPS	Extended-Period Simulation
FAC	Florida Administrative Code
EQ	Equalization Tank
FDEP	Florida Department of Environmental Protection
FS	Florida Statutes
GDU	General Development Utilities
gpd	Gallons per Day
gpm	Gallons per Minute
GST	Ground Storage Tank
HP	Horsepower
HSP	High-Service Pump
HSPS	High-Service Pump Station
HWL	High-Water Level

I&I	Inflow and Infiltration
IPR	Indirect Potable Reuse
IR	Internal Recycle
LF	Linear Foot
LOS	Level of Service
MADF	Monthly Average Daily Flow
MBR	Membrane Bioreactor
MDF	Maximum Daily Flow
MFL	Minimum Flow Level
MG	Million Gallons
MGD	Million gallons per day
MMADF	Maximum Monthly Average Daily Flow
MSBU	Municipal Service Benefit Unit
MTMADF	Maximum Three-Month Annual Daily Flow
NPDES	National Pollution Discharge Elimination System
O&M	Operation and Maintenance
PDF	Peak Daily Flow
PFAS	Per- and Polyfluoroalkyl Substances
PLM	Public Listing Meeting
PRC	Potable Reuse Commission
psi	Pounds per Square Inch
RFI	Request for Inclusion
RIB	Rapid Infiltration Basin
RO WTP	Reverse Osmosis Water Treatment Plant
RWBS	Reclaimed Water Booster Station
RWMP	Reclaimed Water Master Plan
SAT	Soil Aquifer Treatment
SCADA	Supervisory Control and Data Acquisition
SFWMD	South Florida Water Management District
SWAG	Water-Quality Assistance Grant
SWD	Surface Water Discharge
SWFWMD	Southwest Florida Water Management District
SWUCA	Southern Water Use Caution Area
TDS	Total Dissolved Solids
TMADF	Three-Month Annual Daily Flow
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
UIC	Underground Injection Control
USDA	US Department of Agriculture

USDW	Underground Source of Drinking Water
UV	Ultraviolet
UV-AOP	Ultraviolet-Advanced Oxidation Process
VFD	Variable-Frequency Drive
WIFIA	Water Infrastructure Finance and Innovation Act
WRF	Water Reclamation Facility
WSW	Water & Sewer (Policy)
WWTP	Wastewater Treatment Plant
WWTF	Wastewater Treatment Facility

1. INTRODUCTION

OVERVIEW

Chapter 1 defines the purpose, background, report structure, and objectives of Charlotte County's Reclaimed Water Master Plan. Creating affordable, reliable, and efficient reclaimed water storage and distribution systems are key to our water supply sustainability, economic prosperity, and the health of the County's natural resources and landscape.

1.1 PURPOSE

To support Florida State water conservation efforts, the Charlotte County Board of County Commissioners (BCC) is taking steps to ensure adequate quantities of water supplies and to sustain the quality of natural water resources in Charlotte County as part of its *One Charlotte One Water* initiative. Charlotte County Utilities (CCU) plays an important role in this mission since it manages the County's wastewater, reclaimed water, and drinking water infrastructure. In accordance with the BCC's strategic objectives, CCU contracted Jones Edmunds to prepare a reclaimed water master plan for the County's utility service areas (Mid County, West County, and South County) and combine them into the County-wide Charlotte County Reclaimed Water Master Plan (RWMP).

1.2 BACKGROUND

For years, Florida has recognized that fresh groundwater and surface water supplies are not an unlimited resource, and reuse of reclaimed water as an alternative water supply for irrigation or other purposes can significantly reduce overall water withdrawals. Excessive groundwater pumping on freshwater aquifers can lead to several negative impacts including worsened water quality from saltwater intrusion and depleted groundwater supplies. Conversely, overdrawing from surface water supplies can impact rivers and downstream natural ecosystems. Since 1997, the Florida State Legislature has recognized reuse of reclaimed water as a critical resource for sustaining Florida's natural water supplies and meeting existing and future water supply needs. Thus, the water management districts have promoted water conservation and the use of reclaimed water for many years. The encouragement and promotion of water conservation and reuse of reclaimed water are State objectives and are described in Florida Statutes (FS) Sections 373.250 and 403.064.

Reclaimed water originates at homes and businesses and is largely impacted by the water use habits of the residents in a community. In centralized sewer systems, wastewater is collected from residential homes, businesses, and industry and is conveyed to wastewater treatment plants or facilities (WWTPs or WWTFs). The water exiting a WWTP is referred to as effluent water and, based on the treatment level and how the water is used after being treated, may be classified as reclaimed water. Facilities that produce reclaimed water are typically referred to as water reclamation facilities (WRFs) or advanced wastewater treatment (AWT) plants. These facilities are regulated by the Florida Department of Environmental Protection (FDEP). FDEP is responsible for permitting and enforcing effluent standards that utilities must constantly monitor to ensure compliance with the Florida Administrative Code (FAC). Today, many rules dictate the handling, use, and application of treated effluent water based on the treatment processes of the facility, effluent water quality, and reuse application.

Utilities have little control over the quantity of wastewater that they receive at WWTPs. As such, engineers often design WWTPs to accommodate large variations in flow by applying safety factors when sizing tanks, increasing tank storage, and providing backup effluent disposal options to avoid overflows in the collection system or at the facility. In addition, the utility has little control over the quality and composition of the wastewater, which can contain chemicals that harm the treatment process and impact effluent water quality.

WWTPs were originally designed to accomplish four primary processes:

- Reduce oxygen demand.
- Reduce nutrients in the wastewater.
- Remove suspended solids.
- Disinfect the treated effluent.

The biological constituents in wastewater require oxygen to survive and if left untreated would deplete oxygen supplies in water bodies and cause eutrophic conditions leading to fish kills. Similarly, if excess nutrients, namely Nitrogen and Phosphorus, are not removed from the wastewater, their presence in natural water bodies can lead to algae blooms and red tide events.

Historically, WWTPs have also been designed to remove suspended solids in the wastewater since they reduce water clarity and can serve as host sites for pathogens and viruses. As a last step, the treated effluent is disinfected to reduce coliform and other bacteria that can cause illness if ingested. These processes served as the primary means for wastewater treatment at a time when effluent was considered a waste product and the primary method for disposing of it was a surface water discharge (SWD) or deep injection well. Over time, technology improved, and the industry began to implement more advanced treatment processes capable of producing high-quality effluent known as reclaimed water. According to Chapter 62-600, FAC, effluent water that has received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic WWTF is classified as reclaimed water. The improvements in effluent water quality have given utilities the ability to use the effluent water for various applications. Reclaimed water applications are defined by the FDEP as either *reuse* or *effluent disposal* in Chapter 62-610.810, FAC.

Today, all Florida wastewater treatment facilities are required to meet effluent standards. WRFs typically have more stringent standards for biological oxygen demand (BOD), total suspended solid (TSS), and total nitrogen (TN) and have at least basic or high-level disinfection. WRFs typically conduct a higher frequency of sampling and monitoring and are required to take samples for compliance with primary and secondary drinking water standards annually. WRFs may also have additional monitoring requirements depending on the method of effluent reuse and disposal. AWT plants are required to meet even more stringent effluent standards than WRFs for BOD, TSS, TN, and total phosphorus (TP). Today, legislation is being developed to define the treatment and water quality standards required for direct potable reuse (DPR) applications.

As technology advances and humans continue to learn about the interface between humanity and the environment, new challenges will continue to surface. Today's emerging water-quality issues include the presence of per- and polyfluoroalkyl substances (PFAS), nanoparticles, pharmaceuticals, and endocrine disruptors in our water supplies. Researchers, scientists, and engineers continue to investigate the analytical methods for measuring and treating these contaminants, which will drive innovation and inform legislation. This in turn will impact how engineers continue to design WRF processes.

As our state continues to grow, Floridians must consider reclaimed water not as a waste product but as a resource and an integral component of the water cycle. The impacts of sea-level rise, groundwater withdrawals, rainfall patterns, water use, and overall water resource management should be considered for long-term sustainability and reliable drinking water supplies, which are directly impacted by reclaimed water use. Ultimately, each utility must determine the best use of this resource as it considers current and future regulations and the impacts each option has on its local and regional environment, society, and economy.

1.3 Report Structure

This report was prepared in accordance with the guidelines set forth in the American Water Works Association (AWWA) Manual M24: *Planning for the Distribution of Reclaimed Water*, Fourth Edition, 2018, which identifies the following as fundamental considerations in reclaimed water planning documents:

- Identify goals of the reclaimed water reuse program.
- Establish reuse volumes with respect to supply and demand.
- Estimate potential reclaimed water demands from new or re-developments.
- Consider long-term effects/changes to wastewater generated and impacts to availability.
- Assess the impact of developing reclaimed facilities on current/future capacities and operation and maintenance (O&M) for existing/future potable water treatment.
- Assess possible sources, quantities, and treatment requirements.
- Determine storage requirements.
- Determine potential pipeline routes and adequacy to accommodate expansion.
- Consider construction based on buildout scenarios.
- Consider jurisdictional issues (review contractual agreements).
- Identify the Capital Improvement Projects (CIPs) and develop near- and long-term improvement plans.

In addition, this document also contains components required for the approval of planning documents for the Clean Water State Revolving Fund (CWSRF) assistance as identified in the CWSRF planning document requirements and specified under Rule 62-503.700(2) and Rule 62-505.350, FAC.

1.4 Objectives

A primary goal of the BCC is to ensure adequate quantity of water supplies and sustain the quality of natural water resources in Charlotte County. This RWMP effort provides CCU with the information needed to support this goal by meeting the following objectives:

- Summarize historical reclaimed water demands.
- Model and estimate growth and reuse flows.
- Identify water-conservation methods by maximizing the beneficial use of reclaimed water to reduce the impact on other water resources.
- Encourage the use of reclaimed water for irrigation and other non-potable water needs to reduce the demand for potable water, surface water, and groundwater.
- Review and determine the current best use of reclaimed water considering secondary effects.
- Identify methods of expanding the reclaimed water distribution network to maximize reuse and minimize effluent disposal.
- Develop CIPs based on existing and future infrastructure needs and guiding principles through 2040.
- Identify funding programs and options for the County to implement the recommended CIPs.

1.5 Guiding Principals

The RWMP is being developed as a collaborative effort to meet the common goal of the local and regional community to incorporate the following guiding principles:

- *Affordability* – Each project identified in the RWMP focuses on developing affordable solutions for residents and business owners.
- *Sustainability* – The RWMP incorporates water conservation initiatives to provide a balanced approach to water use and environmental stewardship to manage Charlotte County's natural resources.
- *Efficiency* – The RWMP projects consider efficient utilization of existing utility infrastructure and incorporation of efficient construction methods such as working with developers and other County departments for cost-sharing opportunities.
- *Reliability* – The RWMP considers existing conveyance infrastructure and identifies which components will require updating to provide a reliable product for the County's residents and businesses.

1.6 Partners and Related Plans

Preparation of the RWMP fulfills the reclaimed water component of the BCC's *One Charlotte One Water* strategy and is aligned with local, regional, and non-profit cooperating partner goals and objectives. Specifically, the RWMP addresses goals and objectives outlined in:

- The County's *Smart Charlotte 2050 Comprehensive Plan* (Charlotte County BCC, 2010).
- *Water Master Plan* (Jones Edmunds, 2023).
- *The Charlotte County Utilities Department Strategic Plan* (Revised 2016).
- *Reuse Water Supply Master Plan* (Stantec, 2008).
- *Water Conservation Plan* (Malcolm Pirnie, 2008).

- *Central and West County Reuse Master Plan and Engineering Report* (Dufresne-Henry, Inc.; 2005).
- *South County Reuse Master Plan and Engineering Report* (Dufresne-Henry, Inc.; 2005).

Appendix A provides additional references cited throughout this report.

2. PRESENT-DAY RECLAIMED SYSTEM

OVERVIEW

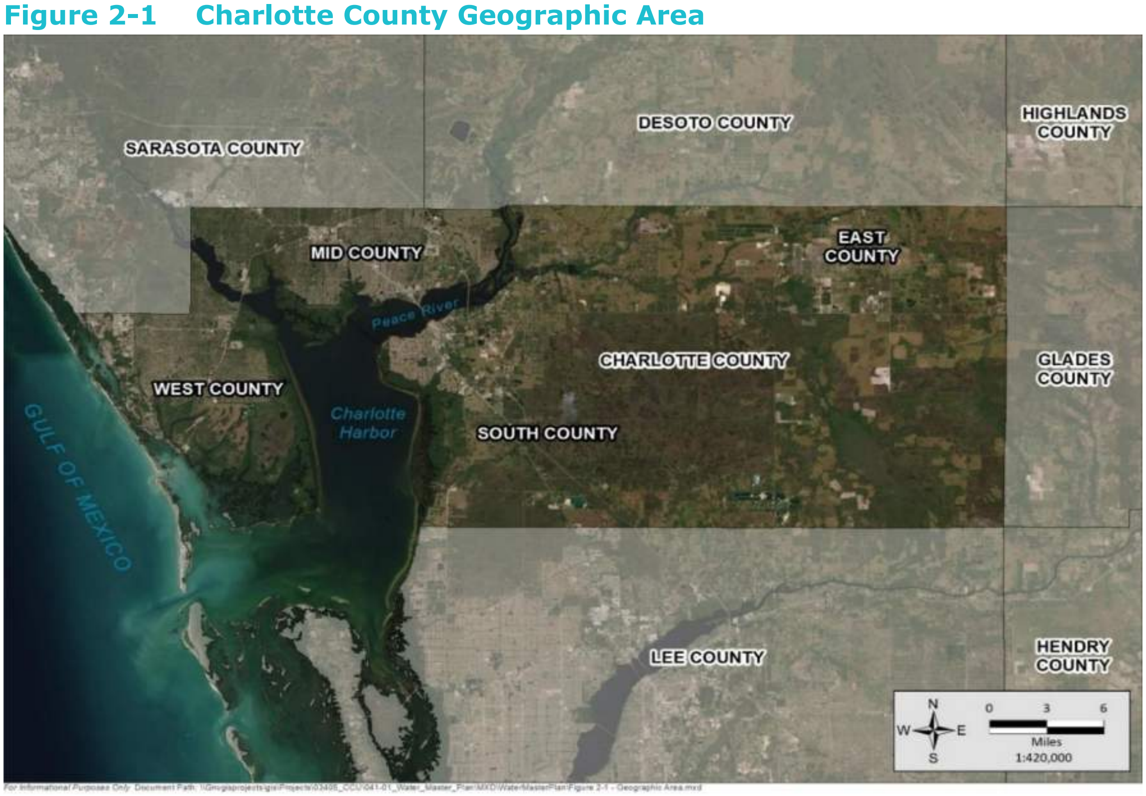
This chapter provides a brief historical perspective of the development of the Charlotte County reclaimed water system including the establishment of CCU in 1991, major facility upgrades, the establishment of the reuse distribution systems, and a summary of the present-day reclaimed water system.

This chapter also reviews the County's ongoing reclaimed water projects and O&M programs.

2.1 Reclaimed Water System Development

Charlotte County is delineated by the Peace River and the Myakka River into three primary land masses as depicted in Figure 2-1. 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 called *West County*, and the Peace River forms the barrier between Mid County and the landmass to the southeast known as *East County* and *South County*. East County is currently largely undeveloped and is not provided water, wastewater, or reclaimed water utility services by CCU.

Figure 2-1 Charlotte County Geographic Area



CCU was formed with the goal of providing and maintaining utilities for Charlotte County. At that time, treated wastewater was not recognized as the valuable alternative water supply that we know today as reclaimed water. Most treated wastewater was disposed of by deep injection wells, percolation ponds, or surface-water discharge, offering no recovery and little to no benefits to the environment or water supply sustainability. Over time, as coastal areas of Florida such as Charlotte County began to experience high population growth, pressure to obtain additional water supplies increased and State and local water conservation objectives became critical components to future sustainability. CCU recognized the importance of reclaimed water and thus created a goal to maximize reclaimed water distribution for irrigation and other purposes to reduce natural water source withdrawals to the extent technically and economically feasible.

In 1991, Charlotte County purchased their first wastewater utility assets from General Development Utilities (GDU) and created CCU. The original system served nearly 11,000 sewer connections, and wastewater collection system components included gravity, low-pressure, and force mains as well as the South Port WWTF (1.0 million gallons per day [MGD]), East Port WWTF (3.0 MGD), and West Port WWTF (0.32 MGD). The effluent produced at the WWTFs was originally disposed of via surface-water discharge or percolation ponds.

After initially acquiring wastewater utilities in 1991, Charlotte County decommissioned the South Port WWTF and upgraded the treatment processes at the East Port and West Port WWTFs. The upgrades allowed the facilities to treat effluent to reclaimed water standards and in turn be classified as WRFs. By 1994, Charlotte County contracted its first reclaimed water customer. The immediate benefit for CCU was that the sale of reclaimed water would offset effluent disposal costs. In subsequent years, Charlotte County continued to expand their service area through purchases of other utility franchises, including Rampart Utilities, AquaSource Utilities, and Florida Water Services. As additional sewer customers were added to the collection system, increased wastewater flows occurred and, subsequently, reclaimed production increased.

Abundant reclaimed water at the East Port WRF and customer demands for irrigation water throughout the central and west parts of the County were the driving forces behind CCU's desire to regionally expand its reclaimed water distribution system. The spatial supply and demand variations in Charlotte County led CCU to investigate the feasibility of an interconnected Master Reuse System to serve the Mid and West County areas. In 2005, CCU developed a computerized hydraulic model to identify the infrastructure needed to connect the three WRFs in Mid and West County areas into one reclaimed water transmission system and to serve as many customers as economically possible.

The modeling results showed that a customer-based approach would reliably supply reclaimed water to interested public users. The concept was supported by the Southwest Florida Water Management District (SWFWMD) since it promoted water conservation by offering a significantly cheaper water supply than potable water, reduced potable water demands and the regional resources used for potable water production, and reduced groundwater and surface-water withdrawals for irrigation, which assisted in preventing saltwater intrusion. In 2008, SWFWMD cooperatively funded a project to further the development of a master reclaimed water distribution system for the Mid and West County areas.

CCU began construction on the Master Reuse System through multiple phased expansions. Phase 1 was completed in 2009 and included two strategically placed 0.5-million-gallon (MG) storage tanks, the Eagle Street and Walenda reclaimed water booster stations (RWBSs), and 14 miles of 12- and 16-inch-diameter reclaimed water transmission mains in Mid County. The expansion allowed a large golf course community and a Major League Baseball training complex to connect as well as numerous municipal and commercial properties along the transmission route.

The second phase included system improvements that used hydraulic modeling to evaluate expansions into West County. The completed system model identified the need for increased storage at the West Port WRF, and therefore the existing reclaimed water pond storage was expanded to 20 MG. CCU also undertook developing a third booster pump station in West County to maximize delivery of reclaimed water to West County. The West County RWBS, also known as the Rotonda East Booster Station, was funded by the County and SWFWMD. By early 2014, the transmission systems for all three WRFs were linked, allowing the West Port WRF to store reclaimed water received from the East Port, West Port, and the Rotonda WRFs. To maximize reuse and share this resource, CCU worked with FDEP in 2014 to establish and permit the Master Reuse System for the East Port, West Port, and Rotonda WRFs once the Mid and West County systems had been interconnected earlier that year. Before the interconnection, each WRF supplied water to separate reclaimed water distribution systems and the existing or potential customers were assigned to the individual WRF FDEP operating permits.

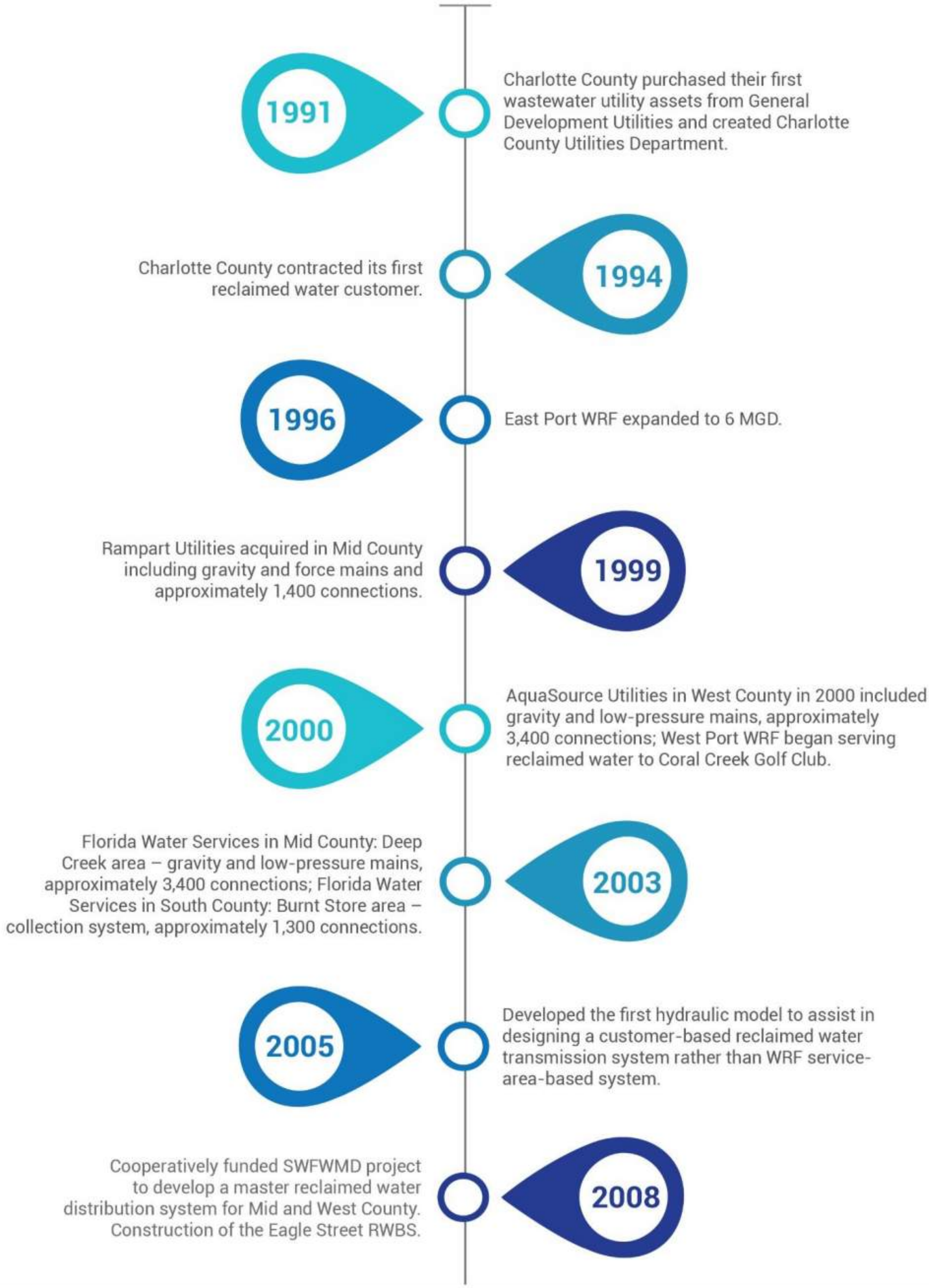
The final phase of the expansion plan began in 2016 and included installing a 16-inch transmission main on CR 771 and a transmission main for Spring Lakes on Port Charlotte Boulevard and US Highway 41 between Hillsborough Boulevard and Enterprise Boulevard. CCU has also completed other improvements to account for wet-weather storage and provide additional operational flexibility in the Master Reuse System, such as adding a 95-MG reclaimed water storage pond at the East Port WRF and installing a 9.0-MGD pump station as part of the East Port WRF Stage 5 project. The work was completed in 2020.

The South County reclaimed water system is provided with water from the Burnt Store WRF, which was acquired by CCU in 2003. High resident and commercial developer interest in South County (Burnt Store) in the 2000s led to the Burnt Store WRF expansion to 0.5 MGD in 2005. A developer constructed a 3-mile reclaimed water transmission main from the Burnt Store WRF to Tern Bay (now Heritage Landing Golf Course) along Burnt Store Road, which served as the original reclaimed water system. During that time, the reclaimed water distribution system was primarily sized at 12- to 16-inch diameter mains along Burnt Store Road to support development. Over time development growth slowed, until 2020. In 2020, construction began expanding the system further north to the intersection of Notre Dame Boulevard and Burnt Store Road and south to Cape Coral Fire Station #7.

CCU continues to prioritize the use of reclaimed water to the Master Reuse System and South County reclaimed water system by adding reclaimed water customers along the existing transmission system routes.

Figure 2-2 highlights the timeline for reclaimed water system development in Charlotte County.

Figure 2-2 Reclaimed Water System Timeline



2009

Phase 1 expansion was completed and included two strategically placed 0.5-MG storage tanks and pumping stations along with approximately 10 miles of 16-inch diameter reclaimed water transmission main and 4 miles of 12-inch diameter reclaimed water transmission main.

2014

Phase 2 complete – Master Reuse System permitted through FDEP. Included approximately 2 miles of 16-inch transmission pipe, reclaimed water storage at West Port WRF expanded to 20 MG, Rotonda East RWBS (funded through SWFWMD).

2016

Phase 3 reclaimed water expansion begins. It included Stage 5 Improvements at East Port WRF for a 95-MG reclaimed water storage pond and a 9 MGD HSPS and installation of three reclaimed water transmission mains: approximately 5.5 miles of 16-inch diameter main along Placida Road, approximately 1.5 miles of 16-inch diameter main along Cape Haze Drive, and approximately 1 mile of 12-inch diameter main along Rotonda Boulevard West.

2018

Reclaimed water modeling was conducted to determine operational and structural improvements required to improve the delivery of reclaimed water to customers in Mid and West County.

2019

The 9 MGD reclaimed water HSPS was completed as part of the East Port WRF Stage 5 Improvements project.

2020

The Phase 3 expansion was completed and the CCU Master Reuse System hydraulic model was updated to current conditions.

2021

South County hydraulic reclaimed water model was developed.

2.2 Present-Day Reclaimed Water System

CCU currently owns, operates, and maintains two separate reclaimed water distribution systems including the Master Reuse System serving Mid and West County areas and the system serving the Burnt Store area in South County. Both distribution systems are supplied reclaimed water from pump stations at the WRFs. Each WRF has either ground storage tanks (GSTs) or on-site storage ponds to account for variations in reclaimed water production and demand. CCU also owns and operates RWBSs and reclaimed water storage facilities throughout the Master Reuse System. The RWBSs are used to maintain the flow and pressure throughout the system and work in conjunction with the reclaimed water pumping stations at the WRFs. CCU uses the remote storage facilities to assist with maintaining system pressure, reducing pump strain, and providing local storage to maintain flows during peak demand.

Currently, Mid County reclaimed water operations are driven by reclaimed water production at the East Port WRF. East Port WRF is CCU's largest WRF, and it currently satisfies all Mid County's existing reclaimed water users' demands. Excess flows are also conveyed to West County through the Master Reuse System to satisfy the West County reclaimed water demand, which is significant due to the large number of bulk reclaimed water users (customers using greater than 100,000 gallons per day [gpd]). The Master Reuse System provides CCU operational flexibility in storing and transferring reclaimed water to a large geographic area and allows CCU to manage the effluent disposal allocations between the WRFs.

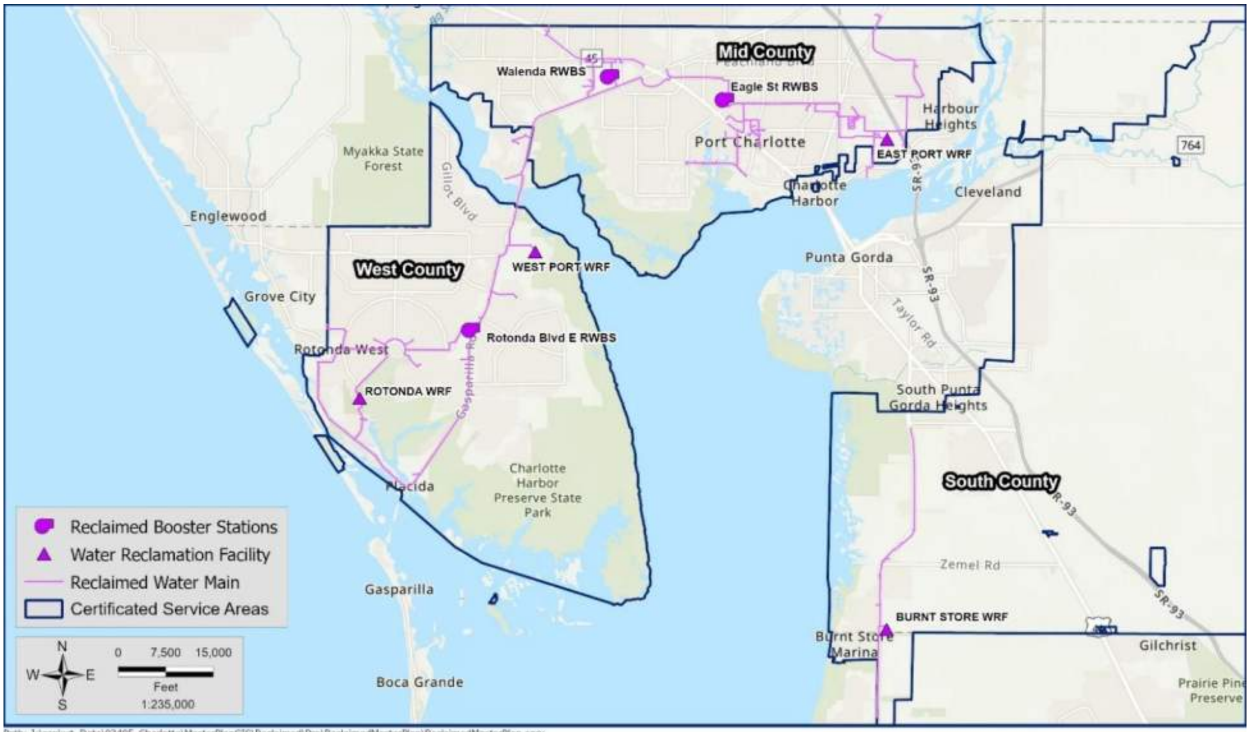
Reclaimed water operations are regulated and permitted through FDEP for each system. The Master Reuse System is permitted for operations under the East Port WRF FDEP Permit No. FL0040291 and has a permitted capacity of 8.79 MGD average annual daily flow (AADF) based on the total flows from East Port WRF, West Port WRF, and Rotonda WRF. The South County Reuse System is permitted under the Burnt Store WRF FDEP Permit No. FLA014083 for 0.5 MGD based on the flows and infrastructure present at the Burnt Store WRF.

The primary reclaimed water infrastructure components consist of the following:

- Five in-plant reclaimed water pumping stations (two at Rotonda WRF).
- Reclaimed water storage facilities (GSTs and ponds).
- Three active distribution system RWBSs (Eagle Street, Walenda, and Rotonda Boulevard East) and one inactive RWBS (Gertrude).
- 88 miles of reclaimed water main.
- 533 distribution system valves.
- Pond discharge valve stations.
- Reclaimed customer connections and meters.

Figure 2-3 shows the locations of CCU's main reclaimed water infrastructure components relative to each service area. Further details regarding the present-day status of facilities and operations for CCU's Master Reuse System and South County Reuse System are provided in Chapter 3.

Figure 2-3 Charlotte County Utilities Reclaimed Water System



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2.3 EXISTING RECLAIMED WATER CUSTOMERS AND AGREEMENTS

Currently, most reclaimed water customers purchase water for irrigation. The County also supplies reclaimed water to concrete plants in West County. In 2022, CCU provided irrigation water to eight golf courses, one professional sports park, and numerous residential and commercial customers. CCU's reclaimed water customers are a combination of bulk users who receive water in their stormwater irrigation ponds and pressurized customers whose irrigation systems are directly connected to CCU's reclaimed water distribution systems.

Before any connection to the reclaimed water distribution system occurs, CCU cooperates with potential customers to determine feasibility, customer needs, and requirements for delivery of reclaimed water. Considerations typically include volume and delivery schedule based on supply and demand, determination of additional infrastructure (if required), execution of legal agreement, cross-connection control site survey, and installation of appropriate backflow prevention device.

Existing reclaimed water customer information, as of February 1, 2022, is provided in Table 2-1,

Table 2-2, and Table 2-3, for Mid County, West County, and South County, respectively, based on reclaimed water customer information provided by CCU. Reclaimed water distribution is a dynamic operation, typically experiencing change in supply or demand from month to month. Customers are organized by service area and are typically served by the nearest WRF, but it is possible for CCU to convey flows between Mid and West County through the master reuse system. Figure 2-4 shows a map of existing reclaimed water customers in Charlotte County that were being served by CCU, as of February 1, 2022.

Table 2-1 Existing Mid County Reclaimed Water Customers

Reclaimed Water User/Sites	Connection Type	Agreement Amount (MGD)	Agreement Date
CCCS – Sheriff's Office	Direct	0.011	11/25/2019
CCCS Parks – 1120 O'Donnell	Direct	0.002	9/8/2020
CCCS Parks – 1185 O'Donnell	Direct	0.050	5/26/2016
CCCS Parks – Franz Ross	Direct	0.048	12/11/2019
CCCS Parks – Sports Park	Pond	0.250	12/29/2008
Charlotte Convenience (7-11)	Direct	0.002	2/28/2020
Charlotte Crossing	Direct	0.005	5/10/2011
Deep Creek Golf Club	Pond	0.180	2/4/2016
Kingsway Country Club (GC)	Pond	0.230	1/31/1995
Maple Leaf Estates	Pond	0.230	8/16/1994
Marylou Homeowners Assoc.	Direct	0.038	10/29/1996
Midwestern Construction Inc.	Direct	0.007	12/2/2014
MRT Landscaping	Direct	0.025	11/3/2020
Murphy Oil USA # 7360 – Cochran	Direct	0.001	10/19/2010
Myakka RV Park	Direct	0.040	12/17/2012
Pt Char G. C. - Golf Links	Pond	0.613	5/16/2018
Redding Lawncare & Landscaping, Inc.	Direct	0.002	3/9/2019
Riverwood (GC)	Pond	1.200	6/27/2017
Suncoast Lakes Home Owners	Direct	0.067	5/9/2005
Sunnydell Commons II	Direct	0.004	1/18/2016
Waste Management	Direct	0.008	12/24/2008
	Total Mid County Demands	**3.013**	

Table 2-2 Existing West County Reclaimed Water Customers

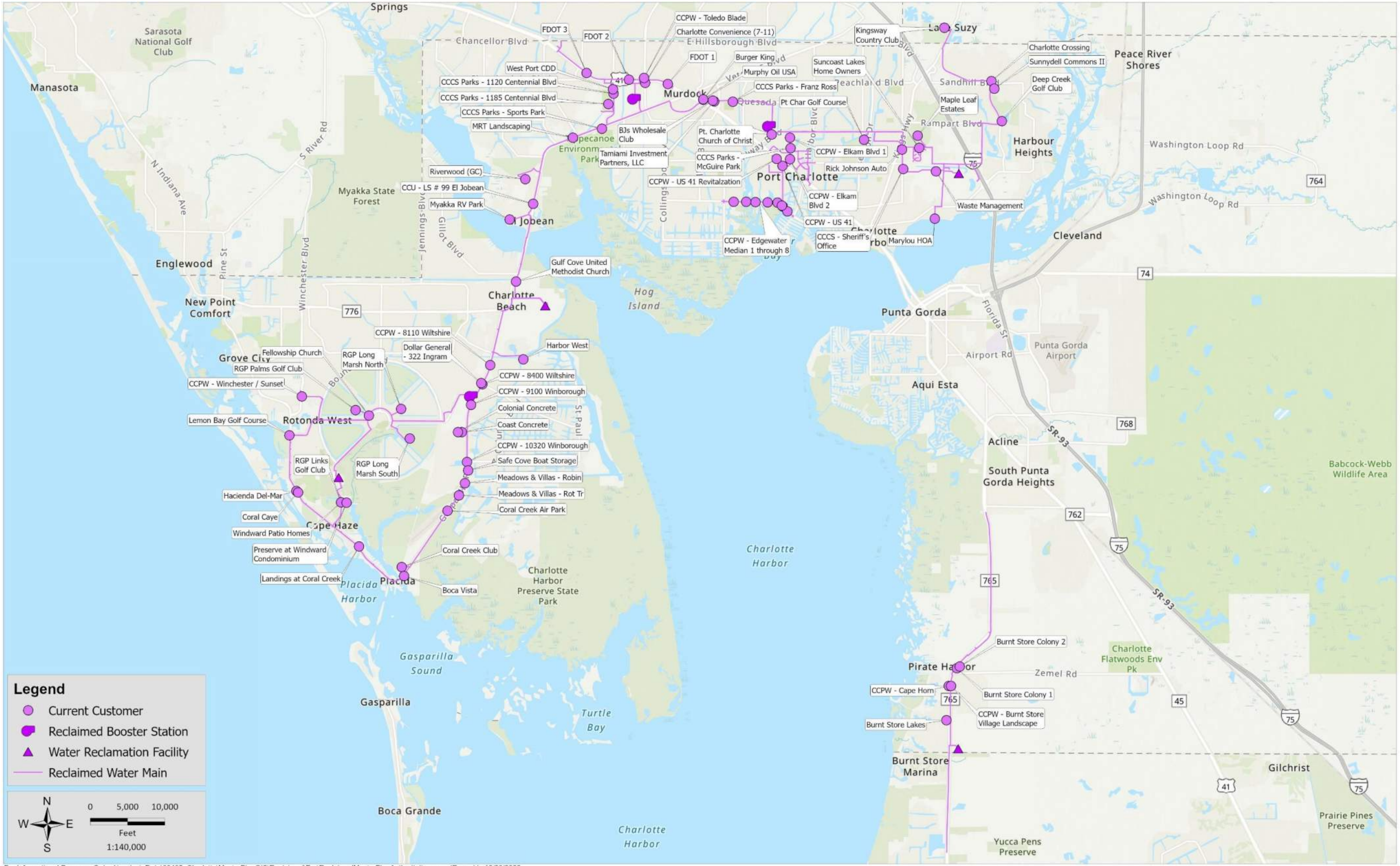
Reclaimed Water User/Sites	Connection Type	Agreement Amount (MGD)	Agreement Date
Boca Vista	Direct	0.008	7/21/2020
Cape Haze Resort	Direct	0.042	N/A
CCPW – 10320 Winborough	Direct	0.001	3/24/2010
CCPW – 8110 Wiltshire	Direct	0.001	3/24/2010
CCPW – 8400 Wiltshire	Direct	0.001	3/24/2010
CCPW – 9100 Winborough	Direct	0.001	3/24/2010
CCPW – Winchester / Sunset	Direct	0.020	3/9/2017
Coast Concrete	Direct	0.060	12/22/2015
Colonial Concrete	Direct	0.008	6/13/2019
Coral Caye (Placida Commons)	Direct	0.095	4/2/2020
Coral Creek Air Park	Direct	0.045	8/15/2013
Coral Creek Club	Pond	0.310	6/10/2008
Coral Creek Landings	Direct	0.120	12/15/2014
Dollar General – 322 Ingram	Direct	0.002	11/2/2016
Family Dollar- Rampart	Direct	0.00072	4/23/2015
Fellowship Church	Direct	0.027	4/29/2013

Reclaimed Water User/Sites	Connection Type	Agreement Amount (MGD)	Agreement Date
Gulf Cove United Methodist Church	Direct	0.012	10/28/2016
Hacienda Del-Mar	Direct	0.105	12/2/2014
Harbor West	Pond	0.144	5/2/2019
Lemon Bay Golf Course	Pond	0.340	4/23/2019
Meadows & Villas Conservation Area – Robin	Direct	0.002	4/15/2015
Meadows & Villas Conservation Area – Rotonda Trace	Direct	0.002	4/15/2015
Preserve at Windward Condominium	Direct	0.005	10/30/2009
RGP Links Golf Club	Direct	0.290	1/28/2009
RGP Long Marsh North	Pond	0.225	1/28/2009
RGP Long Marsh South	Pond	0.225	1/28/2009
RGP Palms Golf Club	Pond	0.290	1/28/2009
Safe Cove Boat Storage	Direct	0.003	5/22/2017
Windward Patio Homes	Direct	0.250	6/13/2007
Total West County Demand		**2.632**	

Table 2-3 Existing South County Reclaimed Water Customers

Reclaimed Water User/Sites	Connection Type	Reclaimed Amount (MGD)	Agreement Date
Burnt Store Lakes	Direct	0.048	10/31/2016
Burnt Store Colony	Direct	0.0156	2/2/2012
Burnt Store Villages	Direct	0.0038	5/27/2016
Charlotte County Public Works	Direct	0.0001	4/26/2010
Burnt Store Dollar General	Direct	0.0029	Pending
Burnt Store Marina & Golf Course	Pond	0.25	Pending
Heritage Landings[1] Golf & Country Club	Pond	0.125	Pending
Total South County Demands		**0.0675**	
Total South County Demands w/Pending Customers		**0.445**	

Figure 2-4 Current Reclaimed Water Customers (as of February 1, 2022)



For Informational Purposes Only J:\project_Data\03405_Charlotte\MasterPlanGIS\Reclaimed\Pro\ReclaimedMasterPlanAuthoritative.aprx JReynolds 12/20/2022

2.4 Ongoing Projects and Programs

2.4.1 Ongoing Capital Improvement and Maintenance Program Projects

CCU's numerous ongoing projects related to system improvements and maintenance needs include WRFs upgrades, pump station repairs and installations, and reclaimed water main extensions and replacements. CCU's ongoing capital and maintenance projects include:

- Rehabilitation of Gertrude RWBS – currently on hold.
- AWT Burnt Store WRF expansion.
- AWT East Port WRF expansion.
- Installation of reclaimed water main on Cochran Boulevard
- Pump rehabilitation at Rotonda Boulevard East RWBS.
- Pump Rehabilitation at Walenda RWBS.

2.4.2 Ongoing Operation and Maintenance Programs

The ongoing O&M for the reclaimed water distribution systems is conducted by CCU's Reclaimed and Support Services Division. The division is also responsible for maintaining CCU's Cross-Connection Control and Backflow Prevention (CCCP) Program and Potable Water Fire Hydrant Meter Maintenance. Utilities that serve potable and reclaimed water must establish and implement a CCCP Program in accordance with Rule 62-550.360, FAC. The purpose of the CCCP Program is to implement routine cross-connection control procedures to detect and prevent cross-connections that create or may create an imminent and substantial danger to public health. CCU's CCCP is titled *Manual of Rules and Regulations Governing Cross-connection Control and Backflow Prevention* and was prepared in accordance with the guidelines set forth in AWWA Manual M14: *Recommended Practice for Backflow Prevention and Cross-Connection Control*. In support of this program, CCU's responsibilities include site surveys for new and existing reclaimed customers to assess hazard levels and identify potential cross-connections, establishing appropriate backflow-prevention devices and testing requirements, recordkeeping for most recent 10 years of data, and enforcement of violations or non-compliance.

2.4.3 Ongoing Studies

Lastly, CCU has several ongoing projects related to tracking inventory, workload management, and system optimization. These include:

- Updating and refining reclaimed water hydraulic models.
- Incorporating reclaimed water infrastructure and maintenance into CCU's asset management system.

3. WATER RECLAMATION FACILITIES

OVERVIEW

As stated in Chapter 2, CCU owns and operates four WRFs throughout Charlotte County. The East Port WRF primarily serves Mid County, West Port and Rotonda WRFs serve the West County service area, and the Burnt Store WRF serves South County service area. The WRFs are designed and permitted to treat and dispose of a specific volume of wastewater and treated effluent. In addition, each WRF must meet effluent water-quality requirements before reuse or disposal. The WRFs are unique in their design and treatment approach and are designed to produce reclaimed water, although CCU is upgrading each WRF to meet AWT standards. This chapter discusses the four WRFs owned by CCU and summarizes the permitted and historical disposal quantities, permitted and historical effluent water quality, and current infrastructure including pumping, effluent storage, and wet-weather storage capacities to assess permit compliance and identify limitations for each WRF.

3.1 East Port WRF

3.1.1 Permitted and Historical Effluent Quantity

The East Port WRF uses a two-stage activated-sludge process followed by multi-media filtration and basic- and high-level disinfection to treat domestic wastewater collected from the Mid County service area. The permitted treatment capacity of East Port WRF is 6.0 MGD AADF. According to Discharge Monitoring Report (DMR) data, the East Port WRF received and treated approximately 4.5 MGD AADF in December 2021. The East Port WRF is permitted for three effluent reuse and disposal options including deep injection wells (U-001), the Master Reuse System (R-001), and sprayfields (R-002) as described in FDEP Permit No. FL0040291.

The deep injection wells (IW-1 and IW-2) are permitted as a Class I underground injection system (U-001) at the average annual disposal rate of 9.60 MGD AADF. However, IW-1 and IW-2 are permitted individually on a maximum daily flow (MDF) basis of 2.04 MGD and 7.56 MGD, respectively. The Master Reuse System R-001 is permitted as a slow-rate public-access land application system and is used to distribute 8.79 MGD AADF of reclaimed-quality water to Mid and West County areas. The East Port WRF can also practice on-site disposal with sprayfields and is permitted for slow-rate restricted-access land application R-002 These sprayfields include over 187 acres with a permitted irrigation rate of 1.70 MGD AADF. Table 3-1 summarizes the permitted allocations for each effluent reuse and disposal option.

Table 3-1 East Port WRF Reclaimed Water Reuse and Disposal Options

Permit Code	Reuse or Disposal Method	Permitted Effluent Capacity (MGD)	Monitoring Site(s)
U-001	Deep Injection Wells	9.60 AADF	FLW-03, FLW-05
R-001	Master Reuse System	8.792 AADF[1]	FLW-02
R-002	Sprayfields	1.70 AADF	FLW-04

[1]Maximum permitted Master Reuse System combined East Port, West Port, and Rotonda flows = 8.792 AADF MGD.

Figure 3-1 compares historical daily IW-1 and IW-2 effluent flows at East Port WRF from 2015 through 2021 against the permitted maximum daily flows of 2.04 MGD and 7.56 MGD, respectively. Daily flows reported for IW-1 and IW-2 were typically between 0 MGD and 0.7 MGD and 4.0 and 7.0, respectively. Two exceedances of the maximum permitted values were noted during the period of record, which are expected to be due to recording errors. Figure 3-2 compares historical rolling annual average R-001, R-002, and U-001 effluent flows against the permitted AADFs of 8.792 MGD, 0.5 MGD, and 9.60 MGD, respectively. The figure also depicts the total flows entering the Master Reuse System, which combines flows from the Eastport, West Port, and Rotonda WRFs. The maximum AADFs for R-001, R-002, and U-001 were 1.70 MGD, 0.29 MGD, and 3.81 MGD, respectively. The data show that the East Port WRF has historically operated within its permitted effluent capacities.

Figure 3-1 Historical East Port WRF Injection Well MDFs

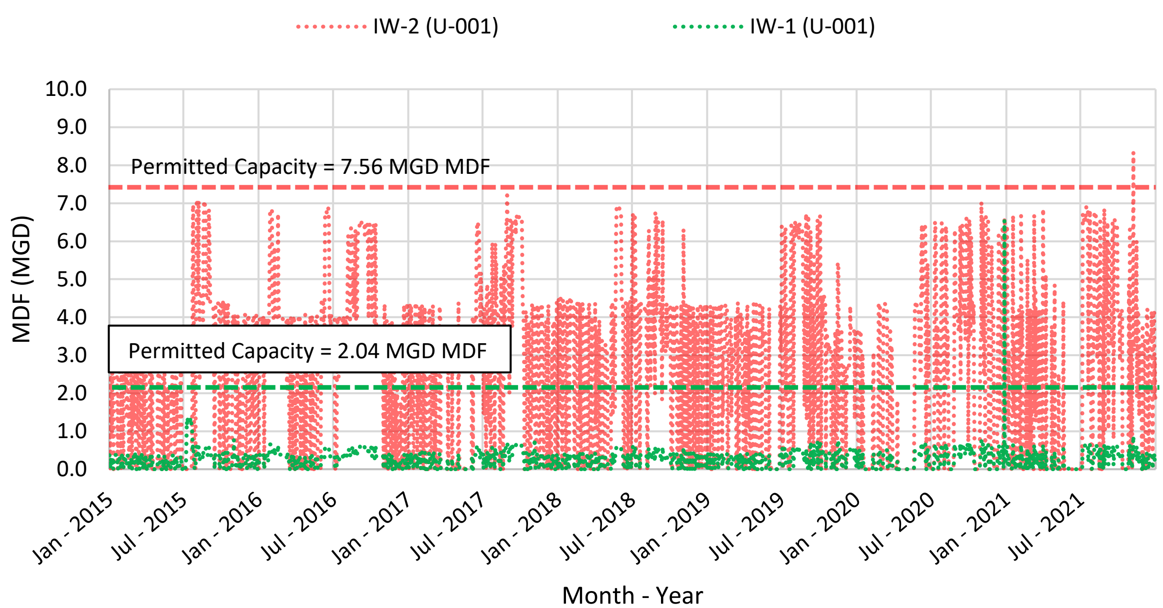
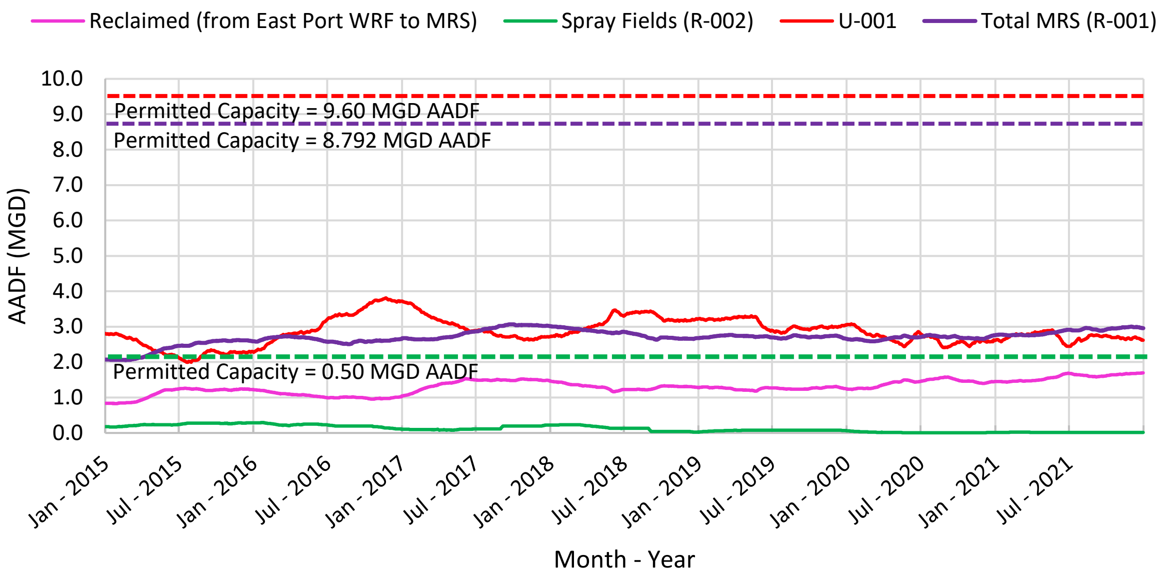


Figure 3-2 Historical East Port WRF Reuse System and Sprayfields AADFs



Note: R-001 includes reclaimed flow contributions from East Port, West Port, and Rotonda WRFs.

At the East Port WRF, reclaimed effluent options are managed to maximize sales and distribution of reclaimed water using the Master Reuse System. If reclaimed water does not meet applicable standards or if customers cannot accept delivery, then flows are diverted to the deep injection wells, sprayfields, or on-site reject storage pond. Seasonal variations in flow and groundwater conditions can significantly impact customer demand and sprayfield capacity, which limits these disposal options. Therefore, the East Port WRF primarily uses the deep injection wells to provide 100-percent backup to the Master Reuse System as required per the APRICOT Act of 1994, FS Section 403.086(8).

Historically, development of the reclaimed distribution system in Charlotte County has led to steadily increasing flows to the Master Reuse System while flows to the sprayfields have steadily declined. In 2021, the sprayfields reported an average annual flow of 0.014 MGD, or less than 1 percent of permitted capacity (1.70 MGD AADF), and the Master Reuse System reported an average annual flow of 1.70 MGD for the East Port WRF, or 19 percent of the total permitted capacity for the Master Reuse System (8.792 MGD AADF).

In 2020, the East Port WRF began undergoing plans for subsequent expansions from 6.0 MGD to 9.0 MGD, with a buildout capacity of 12 MGD AADF. The expansion includes upgrading the facility to meet AWT standards and will include new components for preliminary treatment, biological treatment, and tertiary treatment.

3.1.2 Permitted and Historical Effluent Quality

The East Port WRF is permitted for three effluent standards – one for the deep injection wells (U-001), one for public-access reuse (R-001) levels requiring high-level disinfection, and one for the on-site sprayfields (R-002) requiring basic-level disinfection. Table 3-2 lists the permitted flows and primary water-quality requirements for each effluent reuse and disposal method.

Table 3-2 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: #/mL = number per milliliter.
Statistical Bases: [a]annual average; [b]monthly average; [c]weekly average; [d]single sample; [e]monthly geometric mean.

The East Port WRF produces a high-quality reclaimed water and operates within the permitted water quality limits. For instance, in 2021, the maximum single-sample BOD and TSS values were 9.9 mg/L and 1.1 mg/L, respectively, showing no violations of the single-sample limits for BOD or TSS. Consequently, the BOD and TSS annual average, monthly, and weekly concentration requirements were also met in FY 2021. The maximum fecal coliform counts rarely exceeded 1/100mL and were well within public-access reuse standards.

3.1.3 In-Plant Reclaimed Water Pump Stations

The East Port WRF has two reclaimed water high-service pump stations (HSPSs). Historically HSPS No. 1 was the only method to convey reclaimed flows from East Port WRF to the master reuse system. It has three variable-frequency drive (VFD)-controlled 100-horsepower (HP) vertical turbine pumps that allow the pumps to operate at high speeds to meet reuse system demands and at low speeds to provide reclaimed water on site for O&M purposes. As part of a previous WRF upgrade, a second HSPS was constructed to meet additional demands and increase operational flexibility. HSPS No. 2 has five VFD-controlled pumps sized to distribute 9.0 MGD at 108 pounds per square inch (psi). The system includes four 120-micron self-cleaning filters to remove algae that grows in the reclaimed water storage pond. The self-cleaning filters are currently in bypass mode because operators have indicated the screens frequently clog and require cleaning. Currently, staff primarily used HSPS No. 2 to convey reclaimed water to the Master Reuse System and HSPS No. 1 to convey reclaimed water throughout the WRF.

3.1.4 On-Site Reclaimed, Substandard Effluent, and Wet-Weather Storage

The East Port WRF contains a 95-MG lined storage pond that provides reclaimed water and wet-weather storage. The East Port WRF also contains a 45-MG lined effluent reject storage pond that is used to store substandard effluent before retreatment or disposal via injection well and/or sprayfields. The reject storage pond also serves as additional wet-weather storage. The 95-MG reclaimed water storage pond is designed to overflow into the reject pond during extreme wet-weather events for a total wet-weather storage volume of 140 MG. The 95-MG and 45-MG pond liners are in good condition and currently provide sufficient storage to meet effluent requirements and wet-weather flows.

3.1.5 East Port WRF Short-Term Recommendations

As identified in the *Sewer Master Plan (*Jones Edmunds 2017), the East Port WRF will soon require capacity expansion. In 2018, the East Port WRF began undergoing design plans for subsequent expansions to 9.0 MGD AADF and then 12.0 MGD. The 9.0-MGD will increase

WRF capacity and improve reclaimed effluent quality to AWT standards; the expansion is planned for construction beginning in 2023 and will include the following upgrades:

- Adding a 1.4-MG Equalization Tank (EQ) and a Pump Station.
- Adding 48-inch ductile iron pipe (DIP), 42-inch DIP bypass, and process- and air-conveyance piping.
- Adding Clarifiers No. 3 and No. 4 and Scum Pump Stations No. 1 and No. 2.
- Adding Effluent Filters No. 3 and No. 4.
- Adding process- and air-conveyance piping including 42-inch DIP bypass and connections for Filter Nos. 1, 2, 3, 4, and 5.
- Constructing Chlorine Contact Chamber (CCC) Nos. 3 and 4 and transfer pumps.
- Adding 0.800-MG Aerobic Digester Tank No. 4 and associated appurtenances.
- Constructing a new blower station.
- Constructing a centralized dewatering facility.
- Performing effluent disposal improvements to provide 100-percent backup to the public-access reclaimed water system:
  - Preparing and submitting FDEP Underground Injection Control (UIC) Permit Modification to re-rate the disposal capacity of deep injection well IW-2 from 7.56 MGD to 12.96 MGD.
  - Constructing approximately 4,000 feet of 24-inch-diameter force main from the Irrigation Pump Station to deep injection wells IW-1 and IW-2.
- Constructing AWT upgrades to improve the annual average effluent water quality to BOD, TSS ≤5 mg/L; TN ≤ 3mg/L; and TP ≤ 1mg/L:
  - Adding Anoxic/Aeration Basins, 2nd Anoxic/Aeration Basins with blower systems, and Internal Recycle (IR) Pump Station.
  - Adding carbon and ferric sulfate dosing systems to enhance nutrient removal.
- Perform electrical, instrumentation and control, and supervisory control and data acquisition (SCADA) system improvements for the modifications and unit treatment processes.

3.2 West Port WRF

3.2.1 Permitted and Historical Effluent Quantity

The West Port WRF uses a two-stage activated-sludge process with cloth media filtration to treat domestic wastewater in the West County service area. The permitted design capacity at West Port WRF is 1.2 MGD AADF; according to DMR data reported to FDEP in December 2021, the West Port WRF produced approximately 0.74 MGD AADF. Reclaimed water production, reclaimed disposal, and reuse applications at West Port WRF are regulated and operated through FDEP Permit No. FLA014048.

The West Port WRF has historically been permitted to dispose of its treated effluent using a deep injection well, sprayfields, and a local public access reuse system. The sprayfields and reclaimed effluent flows have permitted capacities of 0.162 and 1.244 MGD AADF, respectively. In February 2014, the County revised the West Port WRF permit to use the Master Reuse System. In April 2016, the County removed the sprayfield disposal option from its permit since the WRF was not using this disposal method.

Today, the West Port WRF is permitted for two effluent reuse and disposal options including deep injection wells (U-001) and the Master Reuse System (R-001). IW-1 is permitted as Class I underground injection system U-001 at the maximum daily disposal rate of 4.75 MGD MDF. IW-1 is not permitted based on an annual average flow. The West Port WRF also shares the Master Reuse System allocation of 8.79 MGD AADF with the East Port and Rotonda WRFs. Table 3-3 summarizes the permitted allocations for each effluent reuse and disposal option.

Table 3-3 West Port WRF Reclaimed Water Reuse or Disposal Options

Permit Code	Reuse or Disposal Method	Permitted Effluent Capacity (MGD)	Monitoring Site
U-001	Deep Injection Well IW-1	4.75 MDF[1]	FLW-02
R-001	Master Reuse System	8.792 AADF[2]	FLW-04

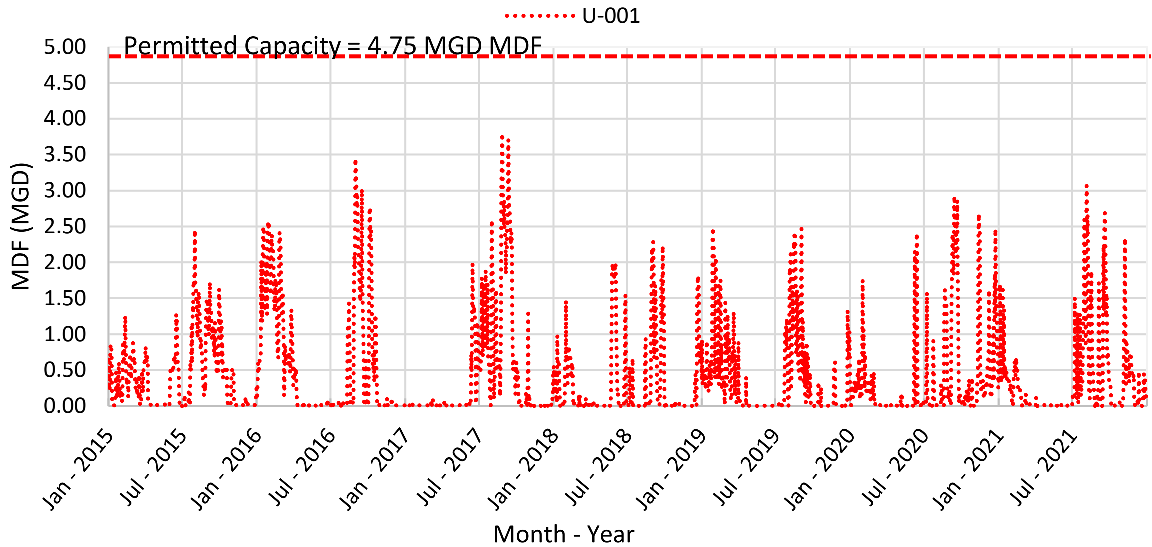
[1]Maximum permitted West Port IW-1 combines West Port and Rotonda flows = 4.75 MGD MDF.
[2]Maximum permitted system combines East Port, West Port, and Rotonda flows = 8.792 MGD AADF.

At the West Port WRF, reclaimed effluent options are managed to maximize sales and distribution of reclaimed water using the Master Reuse System. If reclaimed water does not meet applicable standards or if customers cannot accept delivery, then flows are diverted to deep injection well or on-site reject storage. The deep injection well 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 Rotonda WRF. These flows originate at the Rotonda WRF, are conveyed to West Port WRF via the Master Reuse System, and enter the West Port WRF clearwell before being conveyed to the deep injection well. When this occurs, the West Port WRF can only dispose of 1.872 MGD due to capacity limitations of the clearwell supplying the injection well.

Figure 3-3 compares historical daily MDFs for U-001 at the West Port WRF from 2015 through 2021 against the permitted capacity of 4.75 MGD. According to DMR data, the West Port WRF has sufficient capacity for present-day effluent disposal. The MDF conveyed to U-001 occurred in August 2017 at 3.8 MGD and was below the permit capacity of 4.75 MGD.

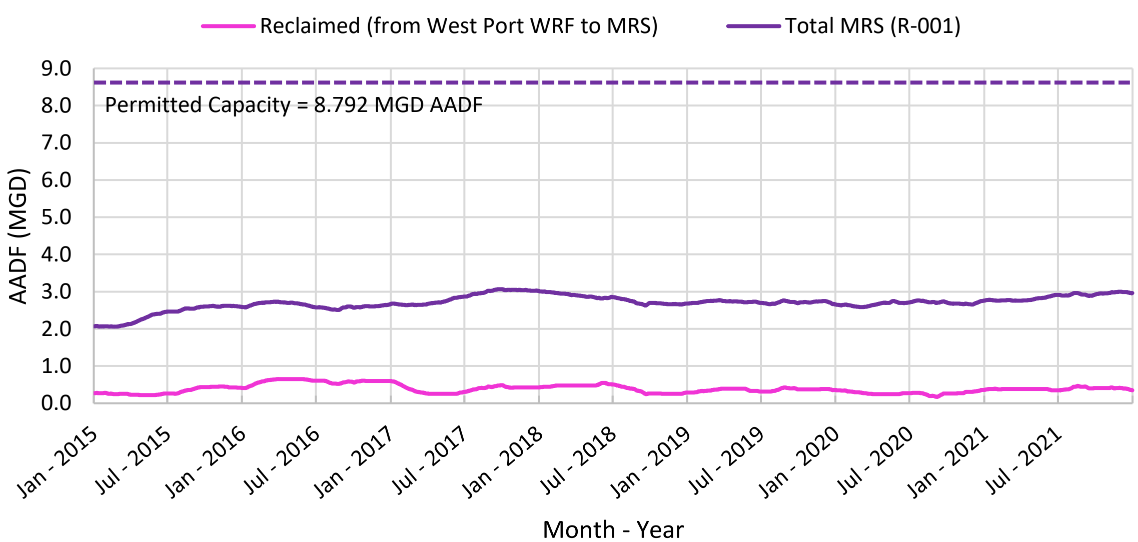
Figure 3-4 depicts the historical reclaimed water flows from the West Port WRF (R-001) and the combined Master Reuse System flows on an annual average basis. The figure indicates that the West Port WRF contributes to approximately 20 percent of the existing total Master Reuse System flows and that overall flows entering the Master Reuse System are well below the permitted capacities of 8.792 MGD.

Figure 3-3 Historical West Port WRF Injection Well MDFs



Note: U-001 includes flows conveyed from Rotonda WRF through the Master Reuse System.

Figure 3-4 Historical West Port WRF Reuse System AADFs



Note: R-001 includes reclaimed flow contributions from East Port, West Port, and Rotonda WRFs.

3.2.2 Permitted and Historical Effluent Quality

The West Port WRF permitted for two effluent standards – one for disposal to the deep injection well (U-001) and the other for public-access reuse (R-001) that requires high-level disinfection. Table 3-4 lists the flow and primary water-quality requirements for each effluent reuse and disposal method.

Table 3-4 West Port WRF Effluent Requirements

Reuse/Disposal Method	R-001	U-001
Max Flow (MGD)	Report[a,b]	4.75[e]
Max BOD (mg/L)	20[a] /30[b] /45[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]
Total Fecal (#/mL)	25[d]	Not applicable

Notes: Statistical Bases – [a]annual average; [b]monthly average; [c]weekly average; [d]single sample; [e]instantaneous maximum.

In FY 2021, the maximum single-sample BOD and TSS values were 3.9 mg/L and 1.6 mg/L, respectively, showing no violations of the single-sample limits for BOD or TSS were recorded in FY 2021. Consequently, the BOD and TSS annual average, monthly, and weekly concentration requirements were also met in FY 2021. The maximum fecal coliform counts rarely exceeded 1/100mL except for 3 consecutive days in December 2020 and two events occurring in November and December 2021. However, during this time compliance was maintained by discharging effluent via U-001.

3.2.3 In-Plant Reclaimed Water Pump Station

The West Port WRF reclaimed water pump station feeds part of the Master Reuse System that interconnects with the Rotonda WRF and the East Port WRF reclaimed water systems. The HSPS contains two reclaimed water high-speed pumps (HSPs) and one jockey pump. However, the pump station operates over a limited pressure rating between 3 and 50 psi, as discussed in Section 5.2.1 of the RCW Hydraulic Modeling Assistance and Maintenance Technical Memorandum No. 1 (provided herein as Attachment 3). The maximum pressure of 50 psi limits transmission of reclaimed from West Port WRF to any desired customer.

3.2.4 On-Site Reclaimed, Substandard Effluent, and Wet-Weather Storage

The West Port WRF contains a 20-MG of lined pond storage that provides reclaimed water and wet-weather storage. The 20-MG of reclaimed water pond storage consists of two hydraulically connected ponds, one 15-MG and one 5-MG. If an extreme wet-weather event occurs, the ponds are designed to overflow to a local wet well to prevent unwanted discharges. Both pond liners are in good condition and currently provide sufficient storage to meet effluent requirements and wet-weather flows.

3.2.5 West Port WRF Short-term Recommendations

In April 2022, CCU issued a request for proposals to identify and design improvements for the West Port WRF expansion and to meet AWT standards. During this effort, future flows and loads will be determined to ensure that the West Port WRF has sufficient capacity for treating future flows including flows from the Rotonda WRF. The design project should identify improvements necessary to address the impact to deep injection well clearwell capacity that occurs when accepting flows from the Rotonda WRF and upgrades to the reclaimed water pump station.

3.3 Rotonda WRF

3.3.1 Permitted and Historical Effluent Quantity

The Rotonda WRF produces reclaimed water by means of a membrane bioreactor (MBR) process coupled with high-level chlorination. The design capacity at Rotonda WRF is 2.0 MGD AADF; according to DMR data reported to FDEP in December 2021, the Rotonda WRF produced approximately 1.12 MGD AADF. Reclaimed water production and reclaimed disposal and reuse applications are regulated and operated through FDEP Permit No. FLA014098.

The Rotonda WRF is permitted to use the County's Master Reuse System and to dispose of excess flows by conveying the effluent to the West Port WRF and using its deep injection well. During periods of low reclaimed water demand, the deep injection well is also used for reclaimed water disposal. The Rotonda WRF effluent must meet reclaimed water standards because of a lack of a dedicated conveyance pipe to transport flows to the Westport WRF deep injection well; instead, the effluent is conveyed through the Master Reuse System. As such, Rotonda WRF operators coordinate with the West Port WRF operators frequently to manage effluent flows between the two WRFs. Table 3-5 summarizes the permitted allocations for each effluent reuse and disposal option.

Table 3-5 Rotonda WRF Reclaimed Water Reuse or Disposal Options

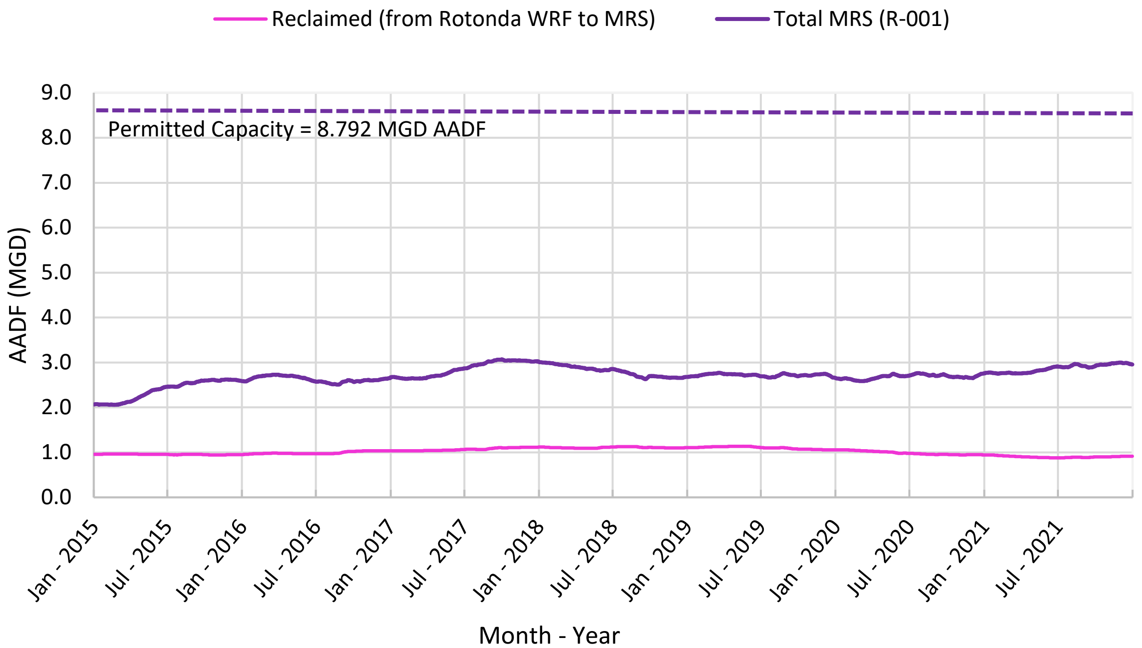
Permit Code	Reuse/Disposal Method	Permitted Effluent Capacity (MGD)	Monitoring Site
U-001	To West Port IW-1	4.75 MDF[1]	FLW-02 at West Port
R-001	Master Reuse System	8.792 AADF[2]	FLW-03

[1]Maximum permitted West Port IW-1 combines West Port and Rotonda flows = 4.75 MGD MDF.
[2]Maximum permitted Master Reuse System combines East Port, West Port, and Rotonda flows = 8.792 MGD AADF.

As discussed in Section 3.2.2, the Rotonda WRF is permitted to convey effluent to IW-1 (U-001) at West Port WRF for disposal. Figure 3-3 shows historical effluent flows for IW-1 from 2015 through 2021, which includes flows from both the West Port and Rotonda WRFs.

Figure 3-5 depicts the historical AADFs for R-001 at the Rotonda WRF and the total flows from the Master Reuse System from 2015 through 2021. The Rotonda WRF contributes an average reclaimed water flow of 0.91 MGD to the Master Reuse System, which is approximately 30 percent of the average Master Reuse System flows or 10 percent of the total permitted capacity (8.792 MGD AADF) of the Master Reuse System.

Figure 3-5 Historical Rotonda WRF Reuse System AADFs



Note: R-001 includes reclaimed flow contributions from East Port, West Port, and Rotonda WRFs.

3.3.2 Permitted and Historical Effluent Quality

The Rotonda WRF is permitted for two effluent standards – one for disposal to the deep injection well (U-001) and the other for a slow-rate public-access system (R-001) that requires high-level disinfection. Table 3-6 lists the flow and primary water quality requirements for each effluent reuse and disposal method. Recall the effluent water quality from the Rotonda WRF must meet reclaimed water standards because it does not have a dedicated reclaimed water main to the West Port injection well. The water quality monitoring requirements for deep injection are considered not applicable because the samples are taken at the well and reported on the West Port WRF DMRs.

Table 3-6 Rotonda WRF Effluent Requirements

Reuse/Disposal Method	R-001	U-001
Maximum Flow (MGD)	Report[a,b]	4.75[a]
Maximum BOD (mg/L)	20[a]/30[b]/45[c]/60[d]	Not applicable
Maximum TSS (mg/L)	5.0[d]	Not applicable
Total Fecal (#/100mL)	25[d]	Not applicable

Notes: Statistical Bases: [a]annual average; [b]monthly average; [c]weekly average; [d]single sample.

In FY 2021, the maximum single sample BOD and TSS values were 3.1 mg/L and 1.2 mg/L, respectively, showing no violations of the single-sample limits for BOD or TSS in FY 2021. Consequently, the BOD and TSS annual average, monthly, and weekly concentration requirements were also met in FY 2021. The maximum fecal coliform counts never exceeded 1/100mL and were well within public-access reuse standards.

3.3.3 In-Plant Reclaimed Water Pump Station

Reclaimed water that meets public-access water quality is sent to the Master Reuse System using the reclaimed water pumps at HSPSs No.1 and No.2. HSPS No.1 uses two low-pressure submersible pumps with VFDs to provide reclaimed water to golf course storage ponds north of the Rotonda WRF. The golf course's high-pressure pumps then increase pressure for irrigation system use. Reclaimed water from the GST can be pumped to pressurized reuse customers using HSPS No. 2. HSPS No. 2 contains two HSPs and one jockey pump that are primarily used to convey reclaimed water to reuse customers and to golf courses south and west of the WRF.

3.3.4 On-Site Reclaimed, Substandard Effluent, and Wet-Weather Storage

The Rotonda WRF contains a 3.0-MG GST that provides reclaimed water and wet-weather storage. The WRF is also equipped with an unlined, 2.64-MG reclaimed water storage pond. This pond is in significant need of maintenance and experiences nearly a 50-percent loss due to high percolation into the ground, which cannot be recovered for reclaimed water sales. The Rotonda WRF also contains a 5.2-MG lined effluent reject storage pond that can be used to store substandard effluent. The substandard effluent is then conveyed back to the headworks for re-treatment. The total wet-weather storage is approximately 10.8 MG assuming no loss in the unlined pond.

3.3.5 Rotonda WRF Short-term Recommendations

County staff has reported the ineffectiveness of reclaimed water storage at the unlined storage pond at the Rotonda WRF. The pond should be cleaned and possibly replaced with a GST to provide more reclaimed water storage capacity and reduce algae growth. CCU is currently studying the feasibility of converting the Rotonda WRF to a Master Lift Station to convey all the wastewater flow collected and treated by Rotonda WRF to the West Port WRF as described in the *Sewer Master Plan (*Jones Edmunds 2017). If this occurs, a GST may be more beneficial for future use because the reclaimed water customers currently served by the Rotonda WRF will still require reclaimed flows. The conversion study should review the impacts that the modification would have on the reclaimed water distribution system including the need for additional storage and a RWBS. Since wastewater flows would no longer be treated at this site, the effluent disposal limitations at the Rotonda WRF would no longer be applicable.

3.4 Burnt Store WRF

3.4.1 Permitted and Historical Effluent Quantity

The Burnt Store WRF produces reclaimed water by using conventional activated sludge with effluent filtration and high-level chlorine disinfection. The permitted treatment capacity at the Burnt Store WRF is 0.5 MGD AADF as described in FDEP Permit No. FLA014083. According to DMR data, the Burnt Store WRF received and treated approximately 0.29 MGD AADF in 2021. The Burnt Store WRF is permitted for three effluent reuse and disposal options including deep injection wells, rapid infiltration basins (RIBs), and the Master Reuse System. Table 3-7 summarizes the permitted allocations for each effluent reuse and disposal option.

Table 3-7 Burnt Store WRF Reclaimed Water Reuse or Disposal Options

Permit Code	Reuse or Disposal Method	Permitted Effluent Capacity (MGD)	Monitoring Site(s)
U-001	Deep Injection Wells	3.444 MDF	OTH-03
R-001	RIBs	0.250 AADF	OTH-01
R-002	Reuse Customers	0.500 AADF[1]	OTH-02

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

Figure 3-6 compares historical daily MDFs for U-001 at the Burnt Store WRF from 2015 through 2021 against the permitted capacity of 3.44 MGD. Figure 3-7 compares historical (rolling-average) AADFs from R-001 and R-002 against the permitted capacities of 0.25 MGD and 0.5 MGD, respectively. The percolation ponds were shown to exceed permit capacity before July 2016, but staff report that this could have been a false reading from a meter that was replaced during that time. More recent data show that the Burnt Store WRF has managed its effluent flows within its permitted capacities. In addition, the Burnt Store WRF has disposed of most of its effluent using the RIBs and injection wells due to limitations in reclaimed water storage. As additional flows become available and more reclaimed customers are connected, the reuse system and injection wells are expected to become the primary sources of effluent disposal.

Figure 3-6 Burnt Store WRF Historical Effluent Flows for U-001

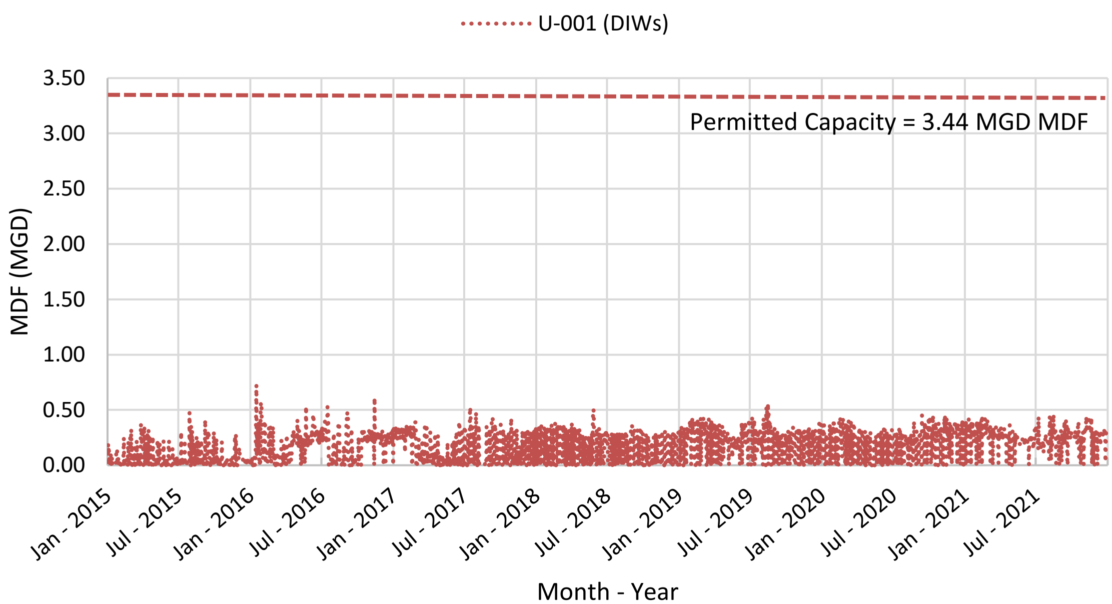
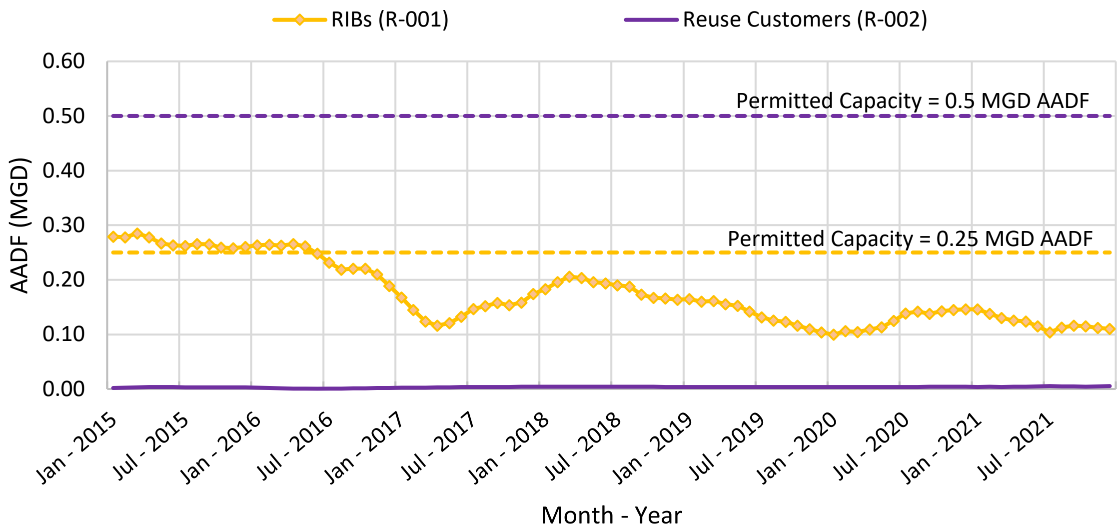


Figure 3-7 Burnt Store WRF Historical Effluent Flows for R-001 and R-002



In 2020, the Burnt Store WRF began plans for subsequent expansions from 0.5 MGD to 2.5 MGD, with a buildout capacity of 7.5 MGD AADF. The expansion includes upgrading the facility to meet AWT standards and will include new components for preliminary treatment, biological treatment, tertiary treatment, effluent storage, and disposal.

3.4.2 Permitted and Historical Effluent Quality

The Burnt Store WRF is permitted for three effluent standards – one for disposal to the deep injection wells (U-001), one for the RIBs (R-001) that requires basic disinfection and contains a nitrate limit, and one for public-access reuse (R-002) that requires high-level disinfection. Table 3-8 lists the flow and primary water-quality requirements for each effluent reuse and disposal method.

Table 3-8 Burnt Store WRF Effluent Requirements

Reuse/Disposal Method	R-001	R-002	U-001
Max Flow (MGD)	0.25[a]	0.500[a]	3.444[d]
Max BOD (mg/L)	20[a]/30[b]/45[c]/60[d]	20[a]/30[b]/45[c]/60[d]	20[a]/30[b]/45[c]/60[d]
Max TSS (mg/L)	20[a]/30[b]/45[c]/60[d]	5[d]	20[a]/30[b]/45[c]/60[d]
Total Fecal (#/mL)	200[a]/200[e]/800[d]	25[d]	Not applicable

Notes: Statistical Bases: [a]annual average; [b]monthly average; [c]weekly average; [d]single sample; [e]monthly geometric mean.

In FY 2021, the maximum single-sample BOD and TSS values were 3.6 mg/L and 11.5 mg/L, respectively. The maximum single sample TSS limit is 5 mg/L, but only applies for discharge to R-002, which was not used that day; no other single samples exceeded 5 mg/L. Therefore, no violations of the single-sample limits for BOD or TSS were recorded in FY 2021. Consequently, the BOD and TSS annual average, monthly, and weekly concentration requirements were also met in FY 2021. The maximum fecal coliform counts rarely exceeded 1/100mL and still met the effluent requirements for all three of Burnt Store WRF's permitted effluent methods.

3.4.3 In-Plant Reclaimed Water Pump Station

The Burnt Store WRF reclaimed water HSPS includes two constant-speed HSPs and two booster pumps that are used to convey up to 0.5 MGD AADF of reclaimed water to customers. The booster pumps are currently used to satisfy demand in the reuse system because of limitations to the reclaimed water storage and only a few reclaimed water customers. The reclaimed water pumps discharge into the South County Reuse System, which is composed of approximately 9 miles of 12- to 16-inch reclaimed water transmission main along Burnt Store Road. Although additional customers could be connected, the flow is limited by the reclaimed water produced and available storage on site.

3.4.4 On-Site Reclaimed, Substandard Effluent, and Wet-Weather Storage

The Burnt Store WRF reclaimed water storage is currently limited to the size of the clearwell, which is approximately 10,750 gallons (calculated from the total volume of the effluent chamber and reuse sump) and is beneath the reclaimed water pump station. This significantly inhibits the WRF's ability to store and provide high volumes of reclaimed water. The reclaimed water clearwell is hydraulically connected to the deep injection well clearwell, which can be used as a backup disposal method. However, since the clearwells are connected via a gravity pipe rather than pumped, the amount of reclaimed water that can be conveyed to the deep injection well clearwell is limited. Lastly, the WRF also contains RIBs, which are typically used to their maximum permitted capacity to encourage shallow groundwater recharge. The RIBs are alternately rested and allowed to dry and harrowed to enhance percolation. Limitations have been reported in the RIBs attributed to the high-groundwater conditions in the area, and therefore the RIBs are only available for limited wet-weather storage (less than 0.25 MG). These limitations are being addressed in the design of the Burnt Store WRF expansion project.

3.4.5 Burnt Store WRF Short-Term Recommendations

As mentioned previously, CCU is currently designing the Burnt Store WRF expansion to increase the capacity for increased flows. The new facility includes a new 5.0-MG reclaimed water storage tank and a new reclaimed water HSPS. The reclaimed water HSPS will be sized to deliver 2.5 MGD AADF and to be expandable to 7.5 MGD (5,200 gpm). Three of the existing four on-site percolation ponds (Ponds 1, 2, and 4) will be converted to reclaimed water storage for wet-weather storage. The future storage volume of Ponds 1, 2, and 4 will be 6 MG, 6 MG, and 7 MG, respectively, for a total reclaimed storage volume of approximately 19 MG. Two duplex submersible reclaimed water pond return pump stations will be constructed to convey pond water to a disk filtration system before being pumped to the reclaimed water GST. Pond 3 will be converted to reject storage with a total volume of approximately 2.7 MG. A reject return pump station will be constructed to return reject water to the headworks for re-treatment.

4. PROJECTED RECLAIMED WATER FLOWS

OVERVIEW

Since reclaimed water production is driven by wastewater flows, historical wastewater flow data play an essential role in planning reclaimed water system infrastructure improvements and determining future supplies. The wastewater flows in CCU are primarily driven by residential and commercial customers but are also impacted by rainfall patterns, seasonal residents, new developments, and septic-to-sewer infrastructure expansions. This chapter presents the projected reclaimed water flows for each WRF based on the expected growth over the next 20 years and discusses the impacts that wet weather and seasonal variations have on reclaimed water management strategies.

4.1 Annual Average Daily Flow Projections

Flow projections are typically estimated on an AADF basis, based on population and water demand projections. For consistency across CCU's planning documents, the population, water demand, and wastewater projections from the *Sewer Master Plan* (Jones Edmunds 2017) and the *Potable Water Master Plan* (Jones Edmunds 2022) were used as the basis for the wastewater flow projections. The average wastewater flows for each sewershed were calculated as the sum of the residential and non-residential wastewater flows assuming 80 percent of the potable water demand contributes to residential wastewater flows and 100 percent for non-residential wastewater flows. Nearly all the influent wastewater flow entering the WRFs is treated into reclaimed water; therefore, reclaimed water supply projections assume that 100 percent of the wastewater flows that are currently conveyed or planned for connection to the centralized sewer system will be processed through the WRFs to produce reclaimed water. The reclaimed water supply projections include infill growth from existing sewersheds, projected growth due to septic-to-sewer conversions, and growth from the integration of a private wastewater system identified in the *Sewer Master Plan* (Jones Edmunds 2017).

As the local population grows and infrastructure ages, the flows to the WRFs increase and eventually require the WRFs to be expanded. The timing for expansions and infrastructure improvements can be estimated using historical patterns and flow projections. FDEP requires WRFs to report the three-month annual daily flow (TMADF), which is often used in conjunction with the maximum TMADF (MTMADF) to determine when to begin planning, design, and construction of WRF expansions. Figure 4-1 through Figure 4-4 depict the historical and projected wastewater/reclaimed water flow available for each WRF. Historical flows were compiled from influent AADF reported on each WRF DMRs. The MTMADF is also depicted to assist with phasing WRF expansions and wet-weather storage considerations as discussed in Sections 4.3 and 4.4.

Figure 4-1 East Port WRF Reclaimed Water Projections

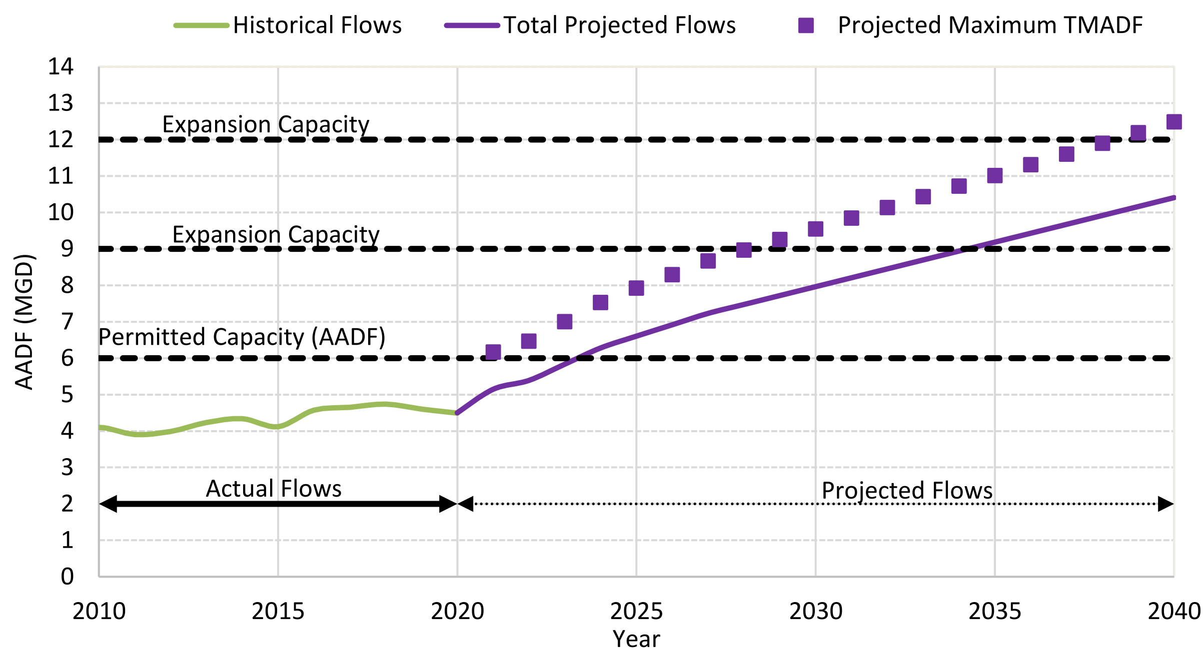


Figure 4-2 West Port WRF Reclaimed Water Projections

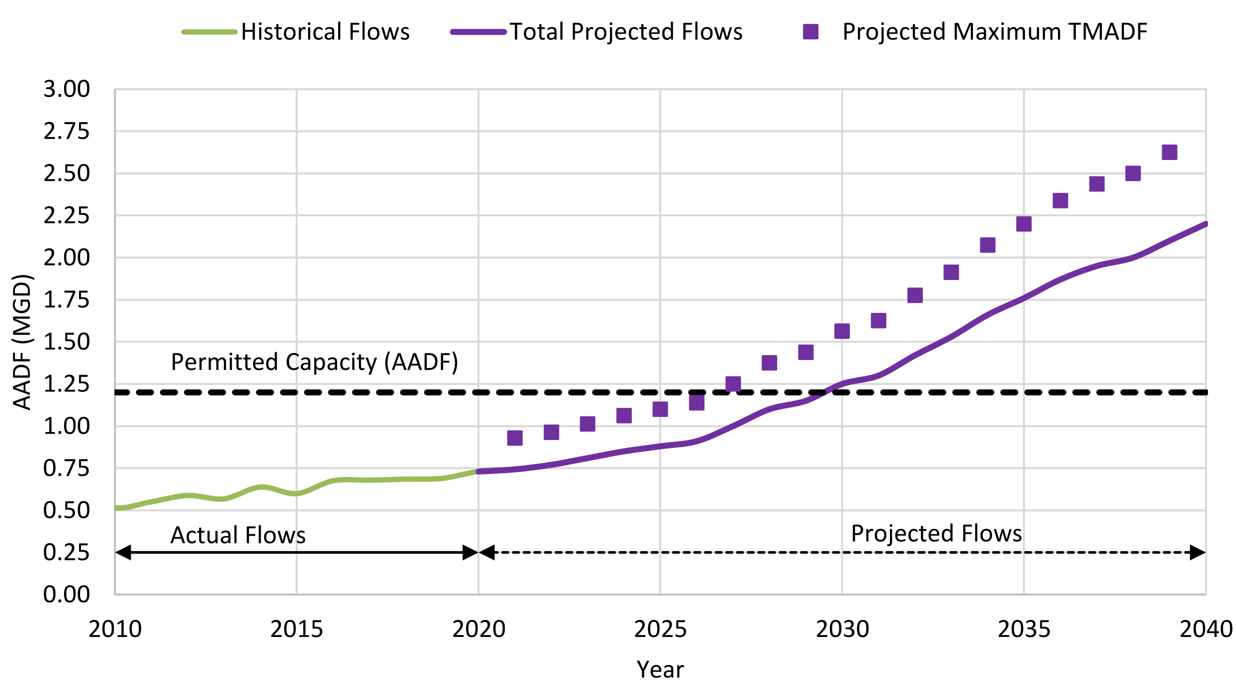


Figure 4-3 Rotonda WRF Reclaimed Water Projections

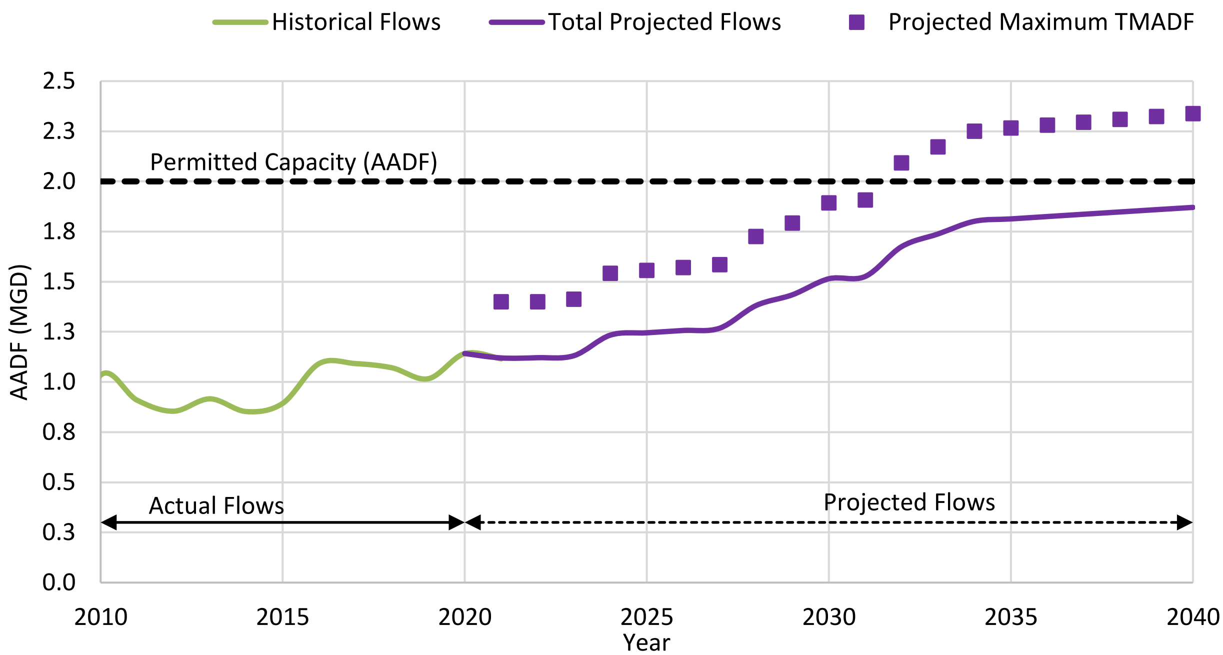


Figure 4-4 Burnt Store WRF Reclaimed Water Projections

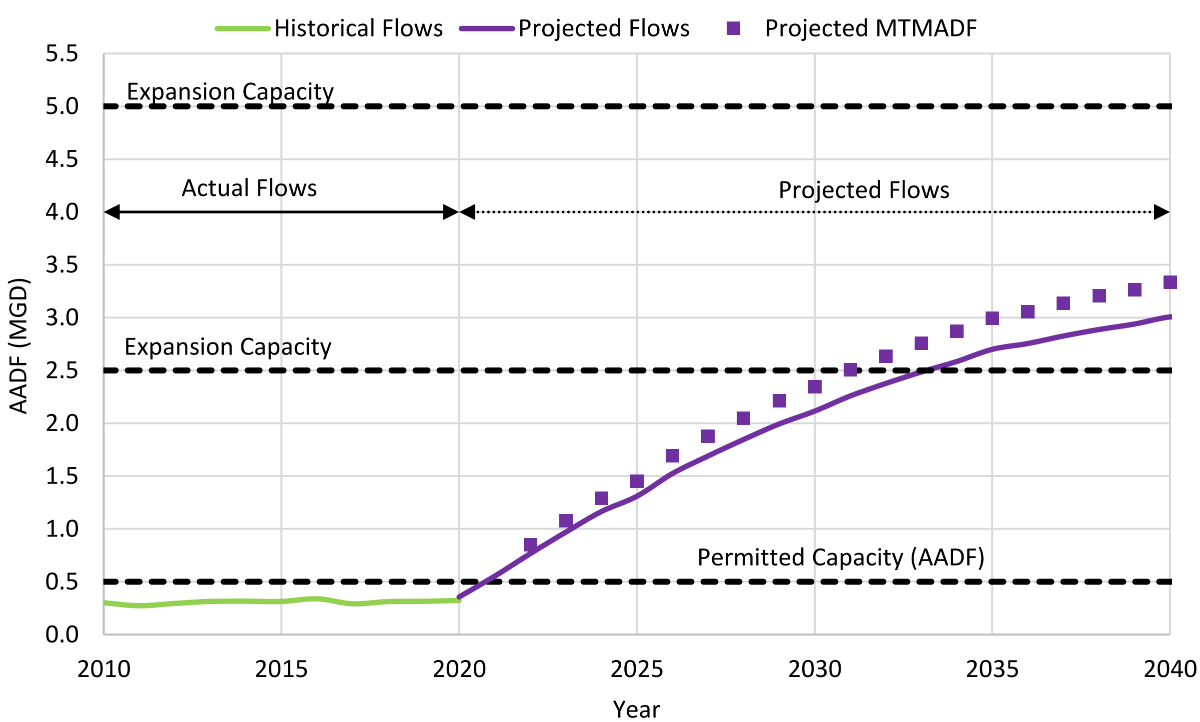


Table 4-1 summarizes the current reclaimed supply and future projected reclaimed water supply for each service area in Charlotte County. Based on the WRF flow projections discussed previously, reclaimed water supply is expected to increase by approximately 8.1 MGD in the Master Reuse System and 2.7 MGD in the South County Reuse System for a County-wide total of 10.8 MGD over the next 20 years. However, actual flows will be significantly impacted by CCU's adherence to the septic-to-sewer and pipe lining programs.

Table 4-1 Current and Projected Reclaimed Water Flows per WRF in MGD

WRF	2020	2025	2030	2035	2040
East Port	4.5	6.6	8.0	9.2	10.4
West Port	0.73	0.9	1.3	1.8	2.2
Rotonda	1.1	1.2	1.51	1.81	1.9
Burnt Store	0.32	1.3	2.1	2.8	3.0

4.2 Rainfall and Seasonal Residency

The reclaimed water supply depends on several human and environmental factors in and outside CCU's control. Human factors include growth patterns, seasonal occupancy, resident water-use habits, and even the implementation of low-flow point-of-use devices specified in plumbing codes. Reclaimed water supply is also impacted by environmental factors such as rainfall and groundwater levels. High-groundwater conditions caused by excess rainfall can enter the collection system through aging infrastructure that can cause significant increases to WRFs flows. This occurrence is referred to as inflow and infiltration (I&I).

Charlotte County typically experiences an average of 1.4 to 2.4 inches/month of rainfall between the dry-weather months of October through May. Conversely, Charlotte County experiences 5.4 to 5.6 inches/month of rainfall between the wet-weather months of June through September. Heavy rainfall typically leads to increased wastewater flows due to I&I. Figure 4-5 graphically displays the effects of I&I events, demonstrating the relationship between monthly average daily flow (MADF), monthly rainfall, and winter residency for the Burnt Store WRF. According to the graph, MADF experiences significant increases during the wetter months (June through September) for the Burnt Store WRF, which indicates that I&I is occurring.

Since 2005, CCU has implemented a robust sewer-lining program to reduce I&I that has assisted in reducing peak flows to the WRFs. More information on CCU's I&I efforts can be found in the *Sewer Master Plan* (Jones Edmunds 2017) and the *2021 Annual Report* (Jones Edmunds 2022). Pipe-lining efforts will continue to be required to prevent excess I&I as infrastructure ages.

Figure 4-5 Impact of Rainfall and Seasonal Variations in Flow (Burnt Store WRF)

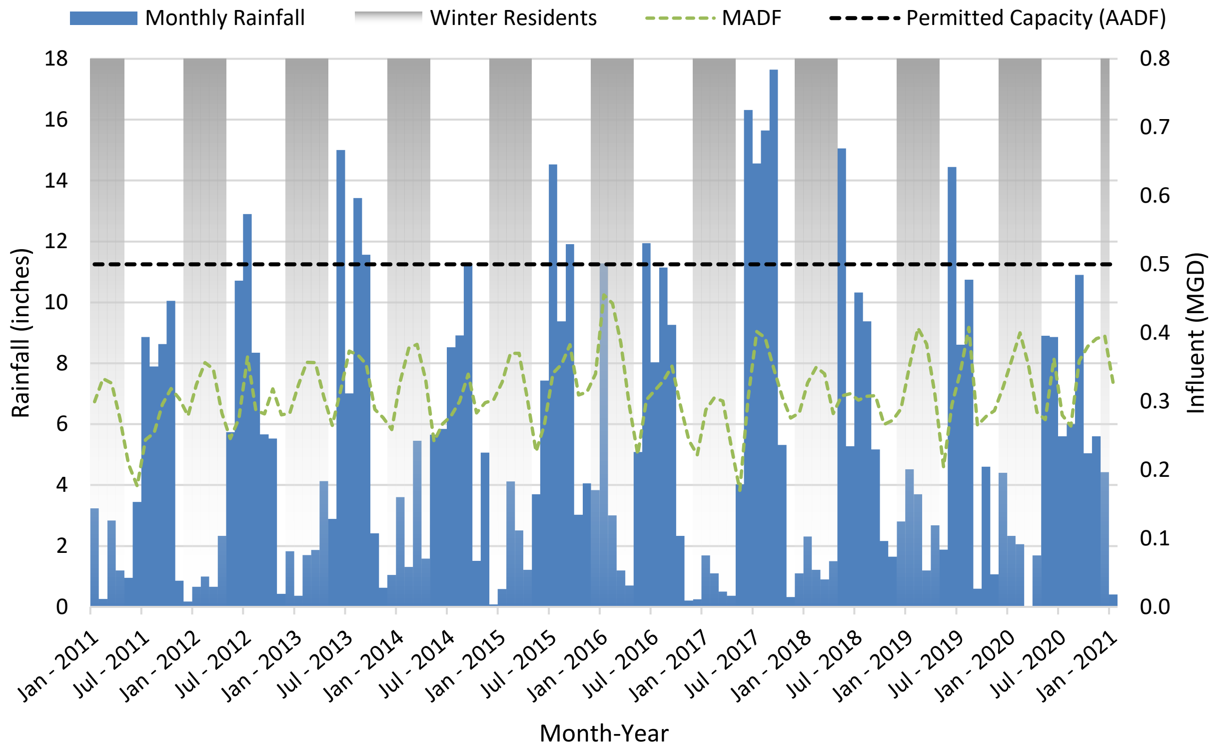


Figure 4-5 also shows flows increase in the dryer months (December through April). This is likely a result of Florida's snowbird season when seasonal residents return to warm-weather homes during the winter months and contribute to the wastewater flows. In the case for the Burnt Store WRF, neither I&I nor seasonal population impacts appear to be a more significant factor than the other, but the data indicate that the Burnt Store WRF is impacted by both factors. Although variations exist at each WRF, similar relationships can be observed at the East Port, West Port, and Rotonda WRFs as discussed in the *2017 Sewer Master Plan*.

Rainfall and winter residency are important factors when managing reclaimed water because they impact the reclaimed water production and how the reclaimed water is reused or disposed of. For example, during periods of prolonged or heavy rainfall, I&I increases resulting in more reclaimed water production, but disposal options are more limited as high groundwater prevents proper seepage into surficial aquifers and customers who use reclaimed water for irrigation are less likely to use reclaimed water during rainy days. Likewise, winter residents can contribute to the production of reclaimed water and the use of reclaimed water when occupying homes that use reclaimed water for irrigation. These factors can lead to significant fluctuations in reclaimed water supply and demand, which contribute to the utilities' challenges in managing reclaimed water.

4.3 Wet-Weather Flows and Peaking Factors

Considering the impacts of wet weather when designing and planning reclaimed water system infrastructure is important. Wet-weather events cause successive challenges to WRFs by increasing wastewater influent flows, upsetting the biological nutrient-removal processes, impacting effluent/reclaimed water quality, and increasing effluent/reclaimed water flows. As previously shown, wet-weather events can cause significantly large variations in the influent WRF flow, which results in much higher quantities of reclaimed water. Flow projections are typically conducted on an AADF basis, but multiple statistical bases and peaking factors should be considered to estimate future flows during wet-weather events.

Table 4-2 depicts the average historical peaking ratios for each WRF calculated over 10 years. Historical daily influent flows were compiled from the influent monitoring sites (FLW-01) for each WRF and organized into multiple statistical bases including MADF, AADF, maximum monthly average daily flow (MMADF), TMADF, MTMADF, and peak daily flow (PDF). The peaking ratios for MTMADF and MMADF are relevant to reclaimed water infrastructure planning because they are more representative of the long-term impact of a period of wet-weather flow on the system.

Table 4-2 Average Historical Peaking Ratios per WRF

WRF	MTMADF/AADF	MMADF/AADF	PDF/AADF	Reference*
East Port	1.31	1.63	2.49	A
West Port	1.09	1.16	1.87	B
Rotonda	1.22	1.35	2.38	B
Burnt Store	1.11	1.24	2.35	C

* A = East Port WRF *Basis of Design Report*; B = Calculated from DMRs from 2011 to 2021 for each WRF; C = Burnt Store WRF *Preliminary Engineering Report*.

Table 4-3 summarizes the projected reclaimed water MTMADF, MMADF, and PDF under wet-weather conditions in 2040. The wet-weather flow projections were based on historical seasonal ratios (provided in Table 4-2) for future storage and disposal sizing considerations and do not account for significant changes in climate and rainfall patterns. The wet-weather flow projections are used for various reclaimed water management planning purposes including modeling, sizing pumps and reclaimed water mains, monitoring requirements for permit compliance, estimating projected wastewater flows available for reclaimed water production, and sizing effluent and reclaimed water storage.

Table 4-3 Projected Reclaimed Water Flows During Wet Weather

WRF	2040 AADF (MGD)	2040 MTMADF (MGD)	2040 MMADF (MGD)	2040 PDF (MGD)
East Port	10.4	13.6	17.0	25.9
West Port	2.2	2.4	2.6	4.1
Rotonda	1.9	2.3	2.6	4.5
Burnt Store	3.0	3.3	3.7	7.1

4.4 Future Effluent Storage Capacity

Three types of effluent storage are identified in the FAC: reuse, substandard, and wet-weather storage. The amount of reuse storage required depends on the diurnal reclaimed water demand pattern. Reuse storage should be sized to augment system demand when the reclaimed water demand exceeds the supply and to store reclaimed water when demand is less than the available supply.

WRFs using unrestricted public-access sites with no other permitted means for effluent discharge are required to have a separate offline system to store substandard effluent. Substandard effluent is rejected water from the wastewater treatment process that does not meet the level-of-treatment requirements for unrestricted public-access reuse. As discussed previously, substandard effluent water quality can occur during wet-weather flow events, equipment malfunctions, or when other issues impact the biological treatment process.

Wet-weather storage is used when the weather conditions prohibit the application of treated effluent on turf areas. FDEP requires that WRFs have a wet-weather storage volume equal to 3 days of the WRF's ADF at a minimum, unless a water balance proves the requirement is less than 3 days. The water balance considers factors such as application rate, evaporation, and precipitation in determining the wet-weather storage. However, during Florida wet seasons, the storage volume requirement can typically be as great as 12 days considering these factors.

System storage is not required when other permitted reuse or disposal systems are incorporated, ensuring continuous facility operation and 100-percent backup disposal. If alternative reuse or disposal systems do not exist in sufficient capacity, then minimum reclaimed water storage must be provided. Table 4-4 summarizes the regulations in accordance with Chapter 62-610, FAC.

Table 4-4 Effluent Storage Regulations for Effluent Disposal

Type	Effluent Storage
Reuse	None required if reclaimed water flows will match the demand pattern during a diurnal cycle.
Substandard	Capacity shall be the volume equal to 1-day's flow at the average design flow or the average daily permitted flow of the reuse system, whichever is less.
Wet Weather	Minimum capacity shall be the volume equal to three times that portion of the average daily flow of the total reuse capacity for which no alternative reuse or disposal system is permitted.

Since the East Port, West Port, and Burnt Store WRFs have other reuse and disposal alternatives, they are not currently required to meet the storage requirements outlined in Table 4-4. However, for purposes of assessing the need of future storage and effluent requirements, the current storage volumes should be compared to future flows. Table 4-5 summarizes the current storage types and volumes available at each WRF based on information discussed in Chapter 3.

Table 4-5 Current Reclaimed Water Storage Capacity and Location

Service Area	WRF	Reclaimed (MG)	Substandard (MG)	Wet Weather (MG)
Mid County	East Port	95	45	140
West County	West Port	20	0	20
West County	Rotonda	5.6	5.2	10.8
South County	Burnt Store	0.01	0	0.25

Table 4-6 shows the potential future storage requirements if CCU did not have 100-percent backup disposal options. Reclaimed water diurnal patterns vary throughout the year due to Charlotte County's rainfall and seasonal residency. Therefore, reclaimed storage volumes were calculated from the PDF listed in Table 4-3 assuming this would be sufficient for meeting the criteria in Table 4-4. Substandard storage volumes were estimated from the 2040 AADF also listed in Table 4-3. Wet-weather storage volumes were calculated under the minimum requirement of three times the 2040 AADF and also for a secondary condition of 12 times the 2040 AADF.

Table 4-6 Future Storage Volume Requirements Without 100-Percent Backup Disposal

WRF	Reclaimed (MG)	Substandard (MG)	Minimum Wet Weather (MG)	Prolonged Wet Weather (MG)
East Port	25.9	10.4	31	125
West Port	4.1	2.2	7	26
Rotonda	4.5	1.9	6	23
Burnt Store	7.1	3	9	36

The potential storage deficiencies based on current and planned storage volumes at each WRF were determined by comparing the values between Table 4-5 and Table 4-6. Table 4-7 displays the results and shows that the West Port, Rotonda, and Burnt Store WRFs would have insufficient storage volumes to meet the storage criteria if 100-percent backup is not maintained at each WRF, which highlights the importance of maintaining backup effluent disposal options. Table 4-7 also shows that the West Port WRF would have sufficient volumes for reclaimed, substandard, and a 3-day wet-weather event if the Rotonda WRF were converted to a Master Pump Station as discussed in the *Sewer Master Plan* (Jones Edmunds 2017). Under this scenario, West Port WRF would not contain sufficient volumes to handle both the Rotonda and West Port WRF future flows under prolonged wet-weather events, but backup disposal methods or additional system storage may assist in managing reclaimed water during those times.

Table 4-7 Future Storage Deficiencies without 100-Percent Backup Disposal

WRF	Reclaimed	Substandard	Minimum Wet Weather	Prolonged Wet Weather
East Port	Sufficient	Sufficient	Sufficient	Sufficient
West Port	Sufficient	Sufficient	Sufficient	Deficient
Rotonda	Deficient	Sufficient	Sufficient	Deficient
Burnt Store	Deficient	Deficient	Deficient	Deficient

This analysis assumes that the full storage volumes at each WRF are always available, but actual storage capacities may be limited based on the operation of ponds and GST levels. A reclaimed water budget should be conducted for each WRF considering hourly and daily flow variations, storage options, and pond-level operations to maximize the sale of reclaimed water. This assessment should review the cost associated with capturing and maximizing reclaimed water sales and using alternative reuse and disposal methods and contribute to CCU's reclaimed water systems O&M manual. CCU maintains hydraulic models of its reclaimed water systems that can be used to optimize the system considering each WRF's reclaimed supply, demands, and storage capabilities. This is discussed in further detail in Chapter 6.

4.5 Future Effluent Reuse and Disposal Capacity

As stated in Rule 62-610.464, FAC, storage requirements depend on the number of effluent disposal options available to the WRF. Table 4-8 summarizes the current and future planned permitted effluent reuse and disposal options and the 2040 AADF for each WRF. As described in Chapter 3, effluent disposal options are permitted and limited based on various statistical bases. Reuse systems, sprayfields, and RIBs are permitted based on an AADF basis, and injection wells are permitted on AADF and MDF based on aquifer limitations.

Table 4-8 Current Permitted Reuse and Effluent Disposal Options

Service Area	WRF	Reclaimed Water Application	Permitted Capacity (MGD)	2040 AADF (MGD)
Mid County	East Port	Master Reuse Station	8.792 AADF[1]	10.4
		Sprayfields	1.70 AADF	
		IW-1 and IW-2	9.60 AADF	
West County	West Port	Master Reuse Station	8.792 AADF[1]	2.2
		IW-1	4.75 MDF[2]	
West County	Rotonda	Master Reuse Station	8.792 AADF[1]	1.9
		To West Port IW-1 via Master Reuse Station	4.75 MDF[2]	
South County	Burnt Store	Reuse System	0.500 AADF	3.0
		RIBs	0.250 AADF	
		IW-1 & IW-2	3.444 MDF	

Notes:
[1]Maximum permitted Master Reuse Station combines East Port, West Port, and Rotonda flows = 8.792 AADF MGD.
[2]Maximum permitted West Port IW-1 combines West Port and Rotonda flows = 4.75 MDF MGD.

Based on the 2040 projected flows, the permitted reuse and disposal capacities will need to be increased to maintain 100-percent backup and system resilience. The current reclaimed water and effluent disposal methods used by CCU WRFs include reuse systems, sprayfields, RIBs, and injection wells. The Master Reuse System serves the Mid and West County WRFs and therefore would need to be increased to approximately 14.5 MGD AADF to account for 2040 conditions if CCU continues to prioritize the use of reclaimed water for irrigation. The permit capacity of the reuse systems can typically be increased if additional reclaimed water demand is present within the reuse system (i.e., more customers), though expansion is also impacted by existing reclaimed water system infrastructure. Likewise, sprayfields and RIBs would require additional land to expand the infrastructure and capacity of these disposal methods. These options are discussed in greater detail in Chapters 5 and 6.

The final option for expanding existing disposal methods includes increasing the capacities of the deep injection wells. Deep injection wells can be costly to install, but the capacity can sometimes be expanded by rerating the injection wells. In 2021, ASRus, LLC conducted two studies reviewing CCU's UIC wells, included in Attachments 1 and 2. The studies identified the permitted and maximum allowable disposal capacities for each injection well based on the well casing sizes and maximum velocity requirements. Table 4-9 summarizes the information, which indicates that the East Port IW-2 and Burnt Store IW-2 wells can be rerated to increase capacity. These rerates would allow each WRF to use the UIC systems to maintain 100-percent backup disposal capability in 2040 conditions.

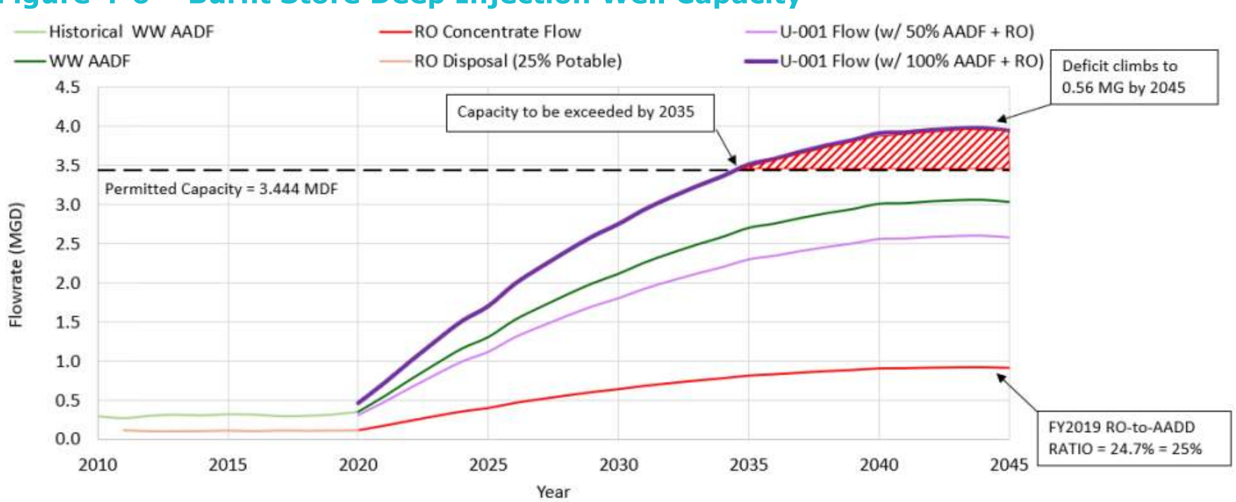
Table 4-9 Current Permitted and Maximum Allowable Injection Well Capacities

WRF	Injection Well (IW)	Permitted Capacity (MGD)	Max Allowable (MGD)
East Port	IW-1	2.04	2.04
	IW-2	7.56	12.73
West Port	IW-1	4.75	4.75
Burnt Store	IW-1	0.564	0.564
	IW-2	2.88	9.7

The timing for increasing the well capacities depends on WRF flows. Well capacity at the East Port WRF is solely dependent on the East Port WRF operations. As seen in Figure 4-1, flow projections indicate that the total (IW-1 and IW-2) existing injection well capacity of 9.6 MGD will be exceeded in 2036 based on AADF conditions. The Burnt Store injection well capacity is impacted by WRF flows and the reverse osmosis concentrate it receives from the CCU's Reverse Osmosis Water Treatment Plant (RO WTP). The timing and requirements associated with rerating the well must take this into consideration.

Figure 4-6 displays the projected Burnt Store WRF reclaimed water flows and RO WTP concentrate flows through 2045. The graph indicates that the existing permitted capacity may be exceeded in 2035 based on future water demands and wastewater flow projections. These timing considerations were based on AADF conditions and assume that CCU intends to maintain the wells to provide 100-percent backup to the reuse systems. As discussed previously, projections may change based on various factors, but wet-weather events can also cause daily flows to exceed AADF conditions much sooner; therefore, Jones Edmunds recommends CCU proceed with rerating the East Port and Burnt Store WRF injection wells within the next 5 years.

Figure 4-6 Burnt Store Deep Injection Well Capacity



4.6 Future Capacity Considerations

Since CCU has limited control of influent wastewater flows, CCU operators' options for addressing excess influent flows from I&I during wet-weather periods are to implement effluent storage and redundant effluent handling options. Under existing conditions, the WRFs can manage excess reclaimed water flows using their existing storage and effluent disposal methods; however, future storage requirements may be limited based on projected average daily and pending wet-weather flows. Therefore, maintaining the 100-percent backup disposal alternatives to prevent unpermitted discharges is beneficial.

As Section 4.1 states, reclaimed water flows will increase significantly in the next 20 years, requiring modifications to the WRFs' permitted effluent reuse and disposal capacities. Table 4-10 indicates that the largest AADF increase will occur at the East Port WRF in Mid County. CCU has various options in addressing future effluent reuse and disposal including expanding the reuse customers and rerating the injection wells. Chapter 5 considers additional reuse and disposal applications considering flows, water quality, regulations, operations, environment, and economics.

Table 4-10 Current and Future Reclaimed Water AADF Changes

Service Area	WRF	2020 AADF (MGD)	2040 AADF (MGD)	AADF Increase (MGD)
Mid County	East Port	4.5	10.4	5.9
West County	West Port	0.71	2.2	1.49
West County	Rotonda	1.07	1.9	0.83
South County	Burnt Store	0.32	3.0	2.68
	Totals	**6.6**	**17.5**	**10.9**

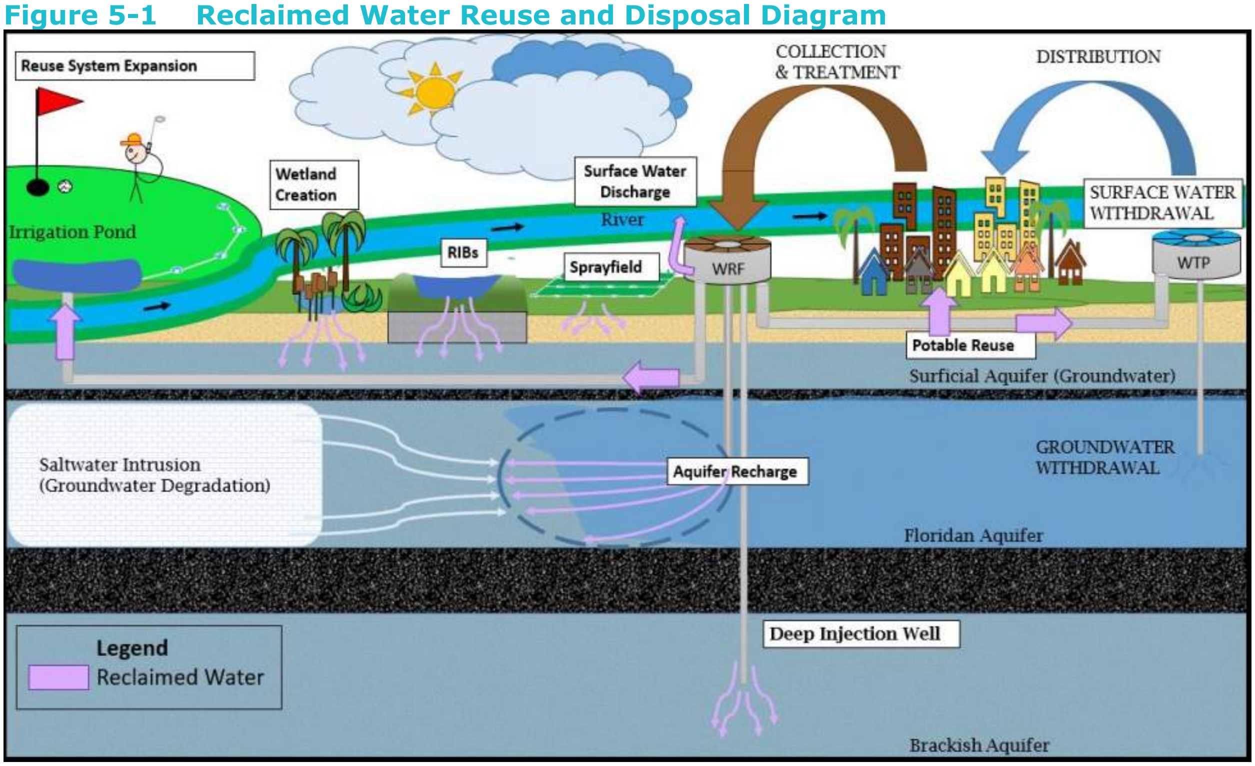
5. RECLAIMED WATER APPLICATIONS

OVERVIEW

Chapter 4 quantified the expected reclaimed water flows from each WRF and indicated that additional effluent reuse and disposal capacity will be required to maintain redundancy in the next 20 years. This chapter presents the common and innovative reclaimed water reuse and disposal applications that have been implemented or are being considered in Florida. These applications include surface water discharge, sprayfields, RIBs/adsorption fields, wetland hydration or creation, groundwater aquifer recharge (AR), deep injection wells, public-access reuse systems, and potable reuse. This chapter provides a brief overview, advantages and disadvantages, regulatory considerations, and WRF siting considerations for each option. The chapter concludes with site-specific recommendations for East Port, West Port, Rotonda, and Burnt Store WRFs as discussed in workshops with CCU staff.

Figure 5-1 illustrates reuse and disposal applications that will be further discussed in this report with respect to CCU's existing operations and future needs.

Figure 5-1 Reclaimed Water Reuse and Disposal Diagram



5.1 Surface Water Discharge

5.1.1 Overview

Surface water discharge (SWD) is the introduction of reclaimed water into a surface water body. Historically, the discharge of reclaimed water into a surface water body has been a viable disposal option for wastewater treatment facilities. Effluent treatment requirements vary based on the receiving water body. If the receiving water bodies are used for potable water production, they are defined as Class I Surface Waters. SWD into Class I Surface Waters is considered *indirect potable reuse* (IPR) and must meet more stringent requirements than other applications.

5.1.2 Regulatory

The US has worked to eliminate SWDs since 1972 through the National Pollution Discharge Elimination System (NPDES) Program a federal program established under the Clean Water Act (CWA) to control point source discharges. In addition, the primary regulations governing the permitting and operation of SWD in Florida are found in Chapters 62-610, 62-302, and 62-4.242, FAC. The regulations governing SWD have recently changed with the adoption of Senate Bill 64, effective July 29, 2021, which initiates the statewide elimination of all non-beneficial SWD by 2032. Most utilities with an SWD were required to submit an SWD elimination plan by November 1, 2021. To receive FDEP approval, the plan had to specify how the discharge would be eliminated, specify how it complies with the requirements of FS Section 403.086(10), or provide an affirmative demonstration that any of the following conditions apply to the remaining discharge:

1. The discharge is associated with an IPR project.
2. The discharge is a wet-weather discharge that occurs in accordance with an applicable FDEP permit.
3. The discharge is into a stormwater management system and is subsequently withdrawn by a user for irrigation purposes.
4. The utility operates domestic WWTFs with reuse systems that reuse a minimum of 90 percent of a facility's AADF, as determined by FDEP using monitoring data for the prior 5 consecutive years, for reuse purposes authorized by FDEP.
5. The discharge provides a direct ecological or public water supply benefit such as rehydrating wetlands or implementing the requirements of minimum flows and minimum water levels or recovery or prevention strategies for a waterbody.

5.1.3 Advantages and Disadvantages

The primary advantages to SWD are:

- May replenish surface water sources such as streams or rivers during dry seasons.
- May be used to assist with meeting minimum flow levels (MFLs).
- Historically least-expensive disposal option.

The primary disadvantages are:

- Must meet AWT standards.
- May require an NPDES permit, increased sampling, and monitoring.
- FDEP no longer permitting non-beneficial SWD.
- No direct recovery of reclaimed water for future sales to customers.

5.1.4 Siting Considerations

CCU does not currently operate a direct SWD system; however, three bulk users store reclaimed water provided by CCU in stormwater management system ponds that have outfalls leading to Class I Surface Waters. These reclaimed users are:

- Kingsway Country Club.
- Maple Leaf Golf Course.
- Deep Creek Golf Courses.

On July 8, 2021, CCU received a request from FDEP to submit an SWD elimination plan for East Port WRF citing these three stormwater management systems. The East Port WRF FDEP permit (No. FL0040291) establishes site-specific control points for the storage ponds so that reclaimed water may only be conveyed if the pond elevation is below its designated control point, typically set at 6 inches below control structure weir. CCU reports outfalls or overflows in accordance with the permit conditions.

In accordance with SB 64, Charlotte County submitted an SWD elimination plan to FDEP citing Option 3, which identifies that the discharge is into a stormwater management system and is subsequently withdrawn by a user for irrigation purposes. The plan also demonstrated that CCU properly operates conveyance of reclaimed water to the controlled ponds; reclaimed water is periodically discharged into the ponds and subsequently used as needed for irrigation. This operation provides a benefit to the environment since it reduces groundwater withdrawals for irrigation. The plan concludes by stating that CCU plans to continue reclaimed deliveries to the ponds as designed. The plan was approved by FDEP on April 19, 2022. Direct SWDs are not recommended for any of the WRFs; however, since significant environmental and economic benefits exist in providing reclaimed water to large pond users, CCU has begun upgrading each of their WRFs to AWT to produce higher-quality reclaimed water (i.e., enhance Nitrogen and Phosphorus removal) so that future large, reclaimed water users can benefit from this valuable resource.

5.2 Sprayfields

5.2.1 Overview

Sprayfields are surficial, slow-rate land applications designed to treat and disperse reclaimed water onto the ground. In this application method, reclaimed water is typically conveyed to a large portion of land and dispersed on site via a sprinkler system. This application is typically considered a reuse option since certain non-edible crops can be grown on the land and sold for revenue.

5.2.2 Regulatory

The primary regulations governing permitting and operation of reclaimed water sprayfields in Florida are in Chapter 62-610, FAC. Specifically, sprayfields are regulated as Part II, Slow-Rate Land Application Systems. Rules 62-610.400 through 62-610.426, FAC, provide regulations pertaining to constructing and operating sprayfields.

5.2.3 Advantages and Disadvantages

The primary advantages to sprayfields are:

- Inexpensive if land is available.
- Lesser treatment requirements (i.e., secondary treatment and basic disinfection).
- Benefits surficial aquifer supplies.
- Certain crops may be harvested and sold for revenue.

The primary disadvantages are:

- Requires largest footprint (~100 acres/MGD).
- Performance is limited due to high groundwater table in the area.
- No direct recovery of reclaimed water for future sale to customers.
- Requires maintenance of grasses or crops.

5.2.4 Siting Considerations

CCU currently operates sprayfields at East Port WRF. Sprayfields require substantial land for operations and offer limited performance and/or environmental benefits. CCU should continue to maintain reclaimed water applications as necessary for system resiliency; however, because of the limited excess County-owned land available at each WRF, sprayfields are not recommended as a reclaimed water application to address future flows.

5.3 Rapid Infiltration Basins (RIBs)

5.3.1 Overview

RIBs are a common tool for wastewater effluent disposal in Florida where the geology and hydrogeology are conducive to rapid infiltration. RIBs are designed to treat and disperse treated effluent. The permeable earthen basin allows the treated effluent to infiltrate then percolate through the soil, allowing for groundwater recharge that can be effective for surficial and shallow aquifers. This application is typically considered a reuse option.

5.3.2 Regulatory

The primary regulations governing permitting and operation of reclaimed water RIBs in Florida are in Chapter 62-610, FAC. Specifically, RIBs are regulated as Part IV, Rapid-Rate Land Application Systems. Rules 62-610.500 through 62-610.525, FAC, provide regulations pertaining to constructing and operating RIBs. In addition, RIB systems require groundwater monitoring wells to be installed and sampled quarterly to verify no adverse impacts (such as increased chloride or presence of fecal coliform) occur in the groundwater supply because of the operation of the RIB system.

5.3.3 Advantages and Disadvantages

The primary advantages to RIBs are:

- Cost-effective option for reclaimed water disposal.
- Benefits surficial aquifer supplies.
- Less maintenance than slow-rate reuse systems.
- Wet-weather storage not required.
- Disposal method uses little energy.

The primary disadvantages to RIBs are:

- Requires a large space of land conducive to rapid infiltration.
- Requires land to have a low water table.
- Requires annual removal of accumulated deposits of organic matter on the infiltration surfaces in the basins.
- No direct recovery of reclaimed water for future sales to customers.

5.3.4 Siting Considerations

CCU owns and operates an existing RIB system at the Burnt Store WRF. Due to poor performance, the RIB system will be removed and converted to reclaimed storage ponds in the upcoming Burnt Store WRF 2.5-MGD expansion. RIBs are not recommended as a future reclaimed water reuse option at any WRF site.

5.4 Wetland Creation/Hydration

5.4.1 Overview

Wetland creation/hydration refers to the practice of applying reclaimed water to a natural receiving or constructed wetlands. Wetland applications can provide additional polishing and natural treatment; however, since CCU is upgrading their WRFs to AWTs, the wetlands would not be used for the purpose of treatment. A *natural receiving wetland* is a wetland within the landward extent of Waters of the State used to receive reclaimed water. A *constructed wetland* refers to a wetland that was created solely because of human activity, such as scraping or contouring of uplands or the land application of reclaimed water, that then comes within the landward extent of Waters of the State. Wetlands are saturated or covered by shallow water at some point during the growing season each year and include hydric soils and hydrophytes. Wetlands are typically defined as a reuse option.

5.4.2 Regulatory

Florida regulations governing permitting and operation of reclaimed water wetland hydration/creation are complex and include Chapters 62-4, 62-300, 62-610, and 62-611, FAC. Chapter 62-611, FAC, establishes the quality and quantity of effluent that may be discharged to wetlands and the quality of water discharged from wetlands to contiguous surface waters. It also provides water quality, vegetation, and wildlife standards and establishes permitting procedures and extensive monitoring requirements for wastewater discharges to wetlands.

5.4.3 Advantages and Disadvantages

The primary advantages to wetland hydration/creation are:

- Natural water treatment before subsequent reuse applications.
- Wetlands are aesthetically pleasing and can serve as public recreation areas or parks.
- Benefits to fish and wildlife.
- Replenished surficial groundwater supplies.
- Large flow rates possible based on infiltration rates and soil conditions.

The primary disadvantages are:

- Requires large footprint (50 acres/1 MGD).
- May need to meet primary drinking water standards.
- Affected by weather patterns (i.e., flow limitations during the wet season).
- No direct recovery of reclaimed water for future sales to customers.

5.4.4 Siting Considerations

County-owned land at the existing WRF sites is insufficient for implementing wetland hydration/creation; however, Charlotte County owns additional parcels of land that may be sufficient for a wetland application. The County has also expressed interest in implementing wetland hydration. This option would be an engineered wetland that could be integrated with parks and recreation and provide the County with a natural preserve or observatory available to the public for free or for a small entry fee.

5.5 Aquifer Recharge (AR) Wells

5.5.1 Overview

AR includes pumping reclaimed water into an injection well to replenish or recharge an aquifer formation that has been or may be negatively impacted by excess use and/or saltwater intrusion. A large portion of Charlotte County falls within the Southern Water Use Caution Area (SWUCA), which is an area identified by the water management district in which water supplies are or will be considered critical in the next 20 years. An AR well can be used to reverse the impact of over-pumping and depleting fresh groundwater supplies. AR wells are typically installed in aquifers with total dissolved solids (TDS) concentrations between 3,000 and 10,000 mg/L. FDEP classifies aquifers with this TDS range as G-II or G-III aquifers. A G-II aquifer is classified for potable water use, whereas a G-III aquifer is classified as non-potable water use or no reasonable potential to be an underground source of drinking water (USDW). Most reclaimed water varies between 300 and 3,000 mg/L TDS depending on the potable source water and amount of coastal I&I that occurs in the collection system. Therefore, in some cases it may provide a benefit in diluting the TDS concentrations that are naturally present in the aquifers and enhance the treatability of the water. The secondary drinking water standard for TDS is 500 mg/L; therefore, aquifers with TDS exceeding 3,000 mg/L will require a treatment process for removing TDS if used for drinking water.

5.5.2 Regulatory

The primary regulations governing permitting and operation of reclaimed AR wells in Florida are in Chapters 62,520, 62-528, and 62-610, FAC. Regulations pertaining to classification, permitting, construction, and operation are regulated under Rules 62-528.600 through 62-528.645, FAC. Regulations pertaining to application limitations and degree of treatment are primarily under Chapter 62-610, Part V, FAC, and Rules 62-610.550 through 62-610.575, FAC. A FDEP UIC permit must be obtained to operate an AR well.

5.5.3 Advantages and Disadvantages

The primary advantages to AR wells are:

- Capable of large recharge volumes and rates when installed in permeable zones.
- Replenishes the aquifer and combats saltwater intrusion within the SWUCA.
- Requires small footprint.
- Potential to negotiate with SWFWMD for water-use credits that may complement CCU's potable water master planning efforts.

The primary disadvantages to AR wells are:

- Treatment requirements vary based on received aquifer conditions and the aquifer's USDW, which is defined as aquifers with TDS concentrations less than 10,000 mg/L.
- Must meet the minimum water quality criteria as specified in 62-520.400 and 62-610.550, FAC.
- Regulatory agencies are hesitant to issue water quality exemptions.
- No direct recovery of reclaimed water for future sales to customers.

5.5.4 Siting Considerations

As part of this effort, Jones Edmunds and ASRus conducted an UIC well evaluation for each WRF. The evaluation included a review of the geology, hydrogeology, and soils conditions in the County which were well documented in the Reuse Master Plan and Engineer Reports completed by Dufresne-Henry, Inc. in 2005. Based on findings outlined in the 2021 ASRus, LLC report, *Underground Injection Control Options for Domestic Wastewater Management, Charlotte County Utilities,* AR is a feasible alternative for addressing excess flows at the East Port and Burnt Store WRFs. Attachment 2 provides additional information.

5.6 Deep Injection Wells

5.6.1 Overview

Deep well injection is non-recoverable injection of treated effluent into a well below the USDW. This disposal method uses deep well systems typically constructed to 1,000 to 4,500 feet below land surface. Deep injection wells have receiving aquifer TDS concentrations exceeding 10,000 mg/L, and recharging into these systems typically has no recognized environmental benefits on the aquifer water quality. Deep injection wells still require frequent monitoring, and primary disinfection at a minimum must be met to maintain compliance with FDEP permits.

5.6.2 Regulatory

Permitting, construction, and operating requirements for deep injection wells are included in Chapter 62-528, FAC. Effluent disposal wells (i.e., deep injection wells) are permitted as Class I injection wells. Class I injection wells must be completed into an aquifer with TDS exceeding 10,000 mg/L. An FDEP UIC permit must be obtained to operate a deep injection well.

5.6.3 Advantages and Disadvantages

The primary advantages to deep injection wells are:

- Small footprint.
- Capability to dispose of large volumes at high rates.
- Least stringent effluent water-quality requirements.
- Fairly straightforward permitting process.

The primary disadvantages are:

- No recognized environment benefits.
- Well maintenance, monitoring, and reporting are required.
- No generated revenue.
- No direct recovery or options for credits.

5.6.4 Siting Considerations

CCU currently operates deep injection wells at the East Port, West Port, and Burnt Store WRFs. Based on UIC studies conducted by ASRus in 2021, deep injection wells remain viable options for effluent disposal. The East Port and Burnt Store WRFs each contain two wells, and rerating options are available for the larger wells at each WRF. The West Port WRF contains one well that is already rated for its maximum allowable capacity. Based on the hydrogeological conditions, the West Port WRF would be a suitable site for a second deep injection well if additional capacity or redundancy is required at this location.

Attachments 1 and 2 provide additional information related to the capacity and siting of deep injection wells.

5.7 Public-Access Reuse System Expansion

5.7.1 Overview

A public access reuse system is a reclaimed water infrastructure system designed for distribution of treated reclaimed water between a supplier and user, generally for irrigation purposes. Applications outside irrigation include industrial usage such as cooling water or rinse- or wash-water and construction usage such as dust control, truck washing, soil compaction, or concrete applications. Aligned with Charlotte County water conservation goals, it is a priority for CCU to maximize distribution of reclaimed water to the extent technically and economically feasible.

5.7.2 Regulatory

The primary regulations governing permitting and operation of reuse systems in Florida are in Chapter 62-610, FAC. Specifically, they are regulated as Part III, Slow-Rate Land Application Systems (Public-Access Reuse). Rules 62-610.450 through 62-610.491, FAC, provide regulations pertaining to construction and operation of public-access reuse systems. In addition, irrigation reuse systems require groundwater monitoring wells to be installed and sampled quarterly to verify no adverse impacts (such as increased chloride or presence of fecal coliform) occur in the groundwater supply because of the operation of the reclaimed water irrigation.

5.7.3 Advantages and Disadvantages

The primary advantages to expanding irrigation reuse system are:

- Generates revenue.
- Reduces large-user groundwater withdrawals for irrigation.
- Potentially reduces potable water demands in homes without wells.
- Reduces use of fertilizer for landscaping.
- Meets effective long-term reclaimed water expansion objective.

The primary disadvantages are:

- Requires customer base and agreements, accounting, metering, and billing.
- Must meet high-level disinfection.
- Requires infrastructure (pumps, piping, storage) maintenance.
- Requires storage to address variations in supply and demand.
- Some storage types allow for algae growth and require re-treatment.
- Additional backflow prevention and CCCP requirements apply to new users.

5.7.4 Siting Considerations

Siting considerations for public-access reuse system expansion is largely driven by customer interest, customer type, and WRF production. CCU uses County news, social media, community events, and more to promote and encourage the use of reclaimed water as an alternative water supply as part of its water conservation efforts. Residents, business owners, landowners, investors, etc., frequently express interest in future connection for reclaimed water service in Charlotte County. County Ordinance 2007-041 outlines the County's intent for the use and distribution of reclaimed water.

CCU currently prioritizes large users such as golf courses, athletic complexes, residential communities with irrigation systems (bulk users) and condominiums and does not currently, or plan to, distribute reclaimed water to detached single-family homes. Table 5-1, Table 5-2, and Table 5-3 summarize the potential future customers identified in Mid County, West County, and South County, respectively. The potential future-customer lists were developed based on information provided by CCU during data collection and include existing and planned developments as of February 1, 2022.

Table 5-1 Future Mid County Reclaimed Water Customers and Flows

Reclaimed Water User/ Sites	Connection Type	Requested Flow (MGD)
Auto Zone – 19682 Cochran	Direct	0.002
Biscayne	Pond	0.099
CCPW – Harbor Blvd	Direct	0.010
Kings Gate Golf Course	Pond	0.130
Kravin Chikin	Direct	0.002
Sonoma Preserve	Pond	0.260
Wal-Mart # 721	Direct	0.018
West Port Community Development District (CDD)	Pond	1.500
Total Additional Demands for Mid County		**2.02**

Table 5-2 Future West County Reclaimed Water Customers and Flows

Reclaimed Water User/ Sites	Connection Type	Requested Flow (MGD)
Anglers Club	Direct	0.020
Bel Aire	Direct	0.100
Eagle Preserve Estates	Direct	0.084
Fiddlers Green	Direct	0.037
Future Mixed Use	Pond	1.000
Hammocks	Direct	0.060
Hills Golf Club	Direct	0.540
Placida Bay Estates	Direct	0.059
Placida Harbor	Direct	0.419
Placida Pointe	Direct	0.043
Rotonda Lakes	Direct	0.022
Rotonda NW Golf Club	Direct	0.463
Rotonda Sands	Pond	1.427
South Gulf Cove	Direct	0.409
Thunderation	Direct	0.017
Total Additional Demands for West County		**4.70**

Table 5-3 Future South County Reclaimed Water Customers and Flows

Reclaimed Water User/ Sites	Connection Type	Requested Flow (MGD)
Burnt Store Dollar General*	Direct	0.0029
Burnt Store Marina & Golf Course Phase 1*	Pond	0.25
Heritage Landings Golf & Country Club*	Direct	0.125
Motorcoach Resort	Direct	0.07
Burnt Store Marina & Golf Course Phase 2*	Pond	1.92
Heritage Landings Golf & Country Club	Pond	1.5
Simple Life	Pond	TBD
Seminole Lakes Golf & Country Club	Pond	TBD
Total Additional Demands for South County		**3.50**

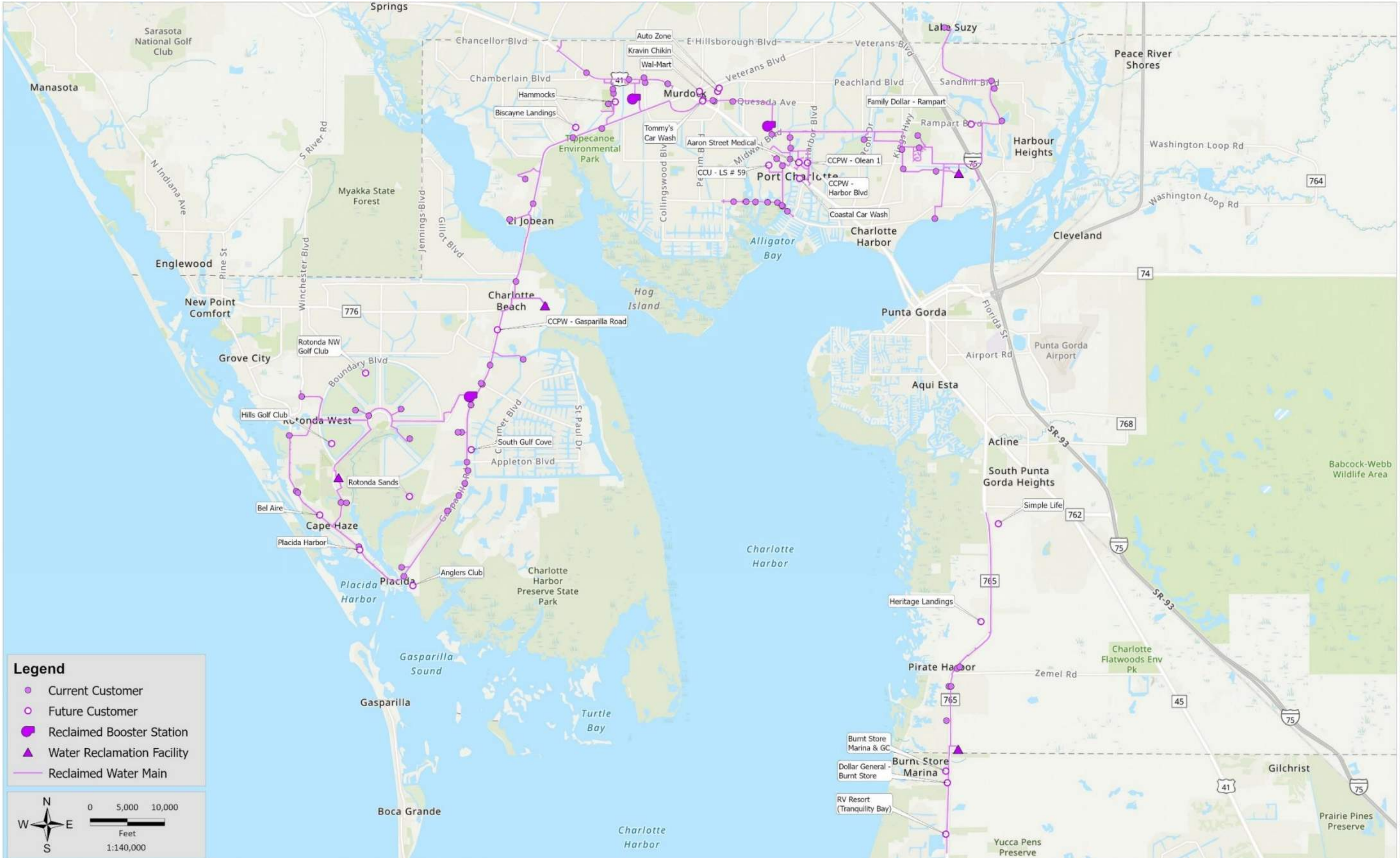
Note: *Pending Customers (i.e., reclaimed customers under agreement but not yet connected;
TBD = To Be Determined.

Table 5-4 summarizes the current and future projected reclaimed water demands for each service area in Charlotte County. Reclaimed water demands were based on current and future reclaimed user agreements and noted interests from specific developers to acquire reclaimed water in the near future. Figure 5-2 displays the locations of the current and potential future customers.

Table 5-4 Current and Future Potential Customer Demands

Service Area	2020 AAD Demand (MGD)	Future AAD Demand (MGD)	Total AAD Demand (MGD)
Mid County	3.01	2.02	5.03
West County	2.63	4.70	7.33
South County	0.07	3.5	3.57
Totals	**5.71**	**10.2**	**15.9**

Figure 5-2 Current and Future Potential Reclaimed Water Customers (as of February 1, 2022)



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5.8 Potable Reuse

5.8.1 Overview

According to *Framework for the Implementation of Potable Reuse in Florida* (prepared for the Florida Potable Reuse Commission [PRC], January 2020), *potable reuse* is defined as the augmentation of a drinking water supply with advanced treated water. Potable reuse may be classified in two categories – indirect (IPR) or direct (DPR). IPR introduces advanced treated water into an environmental buffer (such as a river, wetland, or aquifer) before potable water treatment/distribution, whereas DPR *directly* introduces advanced treated water into the potable water treatment/distribution system. The use of an environmental buffer has several purposes, including providing system storage, conveyance of water resources, and/or an additional barrier between the advanced treated water and the public. Arguably, IPR has been in practice for decades, but DPR has seldomly been used in the US since its first successful application in 1978 by the Upper Occoquan Service Authority in Fairfax County, Virginia.

Due to increasing water demands and limited water supply, Florida recently established *One Water Florida*, a statewide initiative to promote the reuse of reclaimed water by educating the public on the many benefits that reclaimed water can safely provide. The program highlights the benefits of recycled water including the use of potable reuse for drinking, cooking, and bathing. This program features partners from regulatory agencies and professional organizations such as FDEP, Florida's water management districts, Florida Section of the American Water Works Association, PRC, Florida Water Environmental Association, and WateReuse Florida who offer funding and support for utilities conducting potable reuse feasibility studies and projects.

5.8.2 Regulatory

No current federal regulations specifically govern potable water reuse. EPA has published two documents addressing water reuse in potable water sources. Chapter 2.6 of *2004 Guidelines for Water Reuse* (EPA, 2004) discusses the augmentation of potable water supplies with reuse also known as potable reuse. The 2017 *Potable Reuse Compendium* (EPA, 2021) was published in response to growing interest in DPR across the country and outlines key science, technical, and policy considerations. These publications support the development of state regulations.

For Florida, the development of new regulations was influenced by the *Framework for the Implementation of Potable Reuse in Florida* (PRC, 2020) in which the authors suggest that drinking water regulations should be rewritten to include reuse and have all potable water produced to meet primary and secondary drinking water standards. In addition, treatment must meet the requirements for advanced treatment water facilities, which requires a multi-barrier approach in selecting a treatment process train. Advanced treatment water facilities for potable reuse refers to technologies including soil aquifer treatment (SAT), ozonation/biologically active filtration (BAT), low-pressure membrane filtration, reverse osmosis, and ultraviolet (UV)-advanced oxidation process (UV-AOP). FDEP is developing regulations under the new Chapter 62-565, FAC, and updating Chapters 62-610, 62-550, and 62-550, FAC. The Notice of Rule Development for Chapters 62-565 and 62-610, FAC, was announced in June 2023. FDEP does not specify a completion date for potable reuse regulations.

Chapter 62-555.318, FAC, also stipulates a 12-month pilot testing program is required before full implementation of potable reuse projects. This regulation requires acceptable demonstration of the system's ability to consistently meet required treatment and disinfection criteria. The pilot test should identify critical points for improved process control and provide 12 months of data to be used in the final treatment process design. During this phase, water quality should be monitored and reported to demonstrate reliability and consistency in the existing facility's ability to achieve desired levels of treatment and disinfection. Currently, no permitted full-scale potable reuse facilities exist in Florida, but some utilities have ongoing feasibility and pilot studies. Permitting for pilot systems must be obtained from FDEP's Domestic Wastewater and Source and Drinking Water Programs, and the utility must have an Industrial Pretreatment Program before approval of the pilot can progress.

5.8.3 Advantages and Disadvantages

The primary advantages to potable reuse are:

- Generates more revenue than reclaimed water sales.
- Reduces well withdrawals/offsets purchased water allocation.
- May significantly reduce disposal quantities.
- Minimizes environmental impacts.

The primary disadvantages are:

- Large capital investment.
- Must undergo advanced drinking water treatment in addition to meeting primary and secondary drinking water standards.
- Pending regulatory framework.
- May adversely affect local water rates.
- Requires storage/constant rate of production/treatment.
- Possible residual handing issues.
- Impacts reclaimed water supply for irrigation.

5.8.4 Siting Considerations

The following criteria were used to determine the potential impacts to expanding potable reuse at each WRF site in Charlotte County. Table 5-5 summarizes the results:

- Reclaimed Water Supply Availability – Availability of reclaimed supply with respect to reclaimed water demand, where an excess supply is considered a good ranking.
- Land Availability – The extent of on-site and adjacent County-owned land available for potable reuse expansion. Takes into account ongoing WRF expansion project footprints and land suitability. Adequate space is considered a good ranking.
- Suitability of Existing Treatment– The extent of treatment quality of each plant, where MBR treatment is considered good and AWT is considered fair.
- Proximity to Water Distribution System – The proximity between the WRF and the closest potable water main (10-inch diameter minimum) or facility available for delivery of potable reuse effluent, where good means within 1,000 feet and fair means within 1 mile.
- Need for Alternative Water Supply – Need for additional water supply to meet future demands.

Table 5-5 Potable Reuse Siting Matrix

WRF Location	Reclaimed Water Supply Availability	Land Availability	Suitability of Existing Treatment	Proximity to Water Distribution System	Need for Alternative Water Supply	Relative Ranking
East Port (Mid County)	Good Current supply excess. Projected future supply excess.	Good Adequate land to support the ongoing 9-MGD expansion, future expansions, and potable reuse implementation.	Fair Construction of the 9.0-MGD expansion with AWT will be complete by 2026.	Good 12-inch main located along north property line of WRF.	Low Adequate water supply mains provided by existing Authority mains and new Authority Phase 2B pipeline.	Good
West Port (West County)	Good Current supply excess. Projected future supply excess.	Poor/Fair Limited land available after the 5.0-MGD expansion, some of which may be impacted by wetlands.	Poor Design of the 5.0-MGD expansion with AWT ongoing. Timeline for construction is not guaranteed but will likely occur by 2030.	Fair 20-inch main located approximately 1 mile away along McCall Road.	High Inadequate water transmission main capacity to meet future demand.	Fair
Rotonda (West County)	Poor Current supply deficit. Projected future supply deficit.	Good Minimum land available after expansion. Nearby parcel is available and in County ownership.	Good MBR treatment system produces high-quality effluent that pairs well with potable reuse requirements.	Good 10-inch main located at west side of the WRF along Cape Haze Drive.	High Inadequate water transmission main capacity to meet future demand.	Good
Burnt Store (South County)	Fair Current supply matches current and projected future demand.	Fair Adequate land but must share with the Burnt Store RO WTP. Poor soil suitability and wetlands impact considerations.	Fair Construction of the 2.5-MGD expansion with AWT will be complete by 2027.	Good WRF shares a site with the RO WTP.	Low Adequate main sizing for additional raw water transmission and developer cost-share opportunities for new and future mains.	Fair

[1] Future Water Supply Deficit based on the Water Supply Level of Service Update presented by Jones Edmunds to the BCC at a monthly workshop on June 20, 2023.

NOTE: For above-listed WRFs, CCU annually reports no industrial users, thus they have not been considered. If significant or categorical industrial users are identified, the methodology and results of this matrix may need to be reevaluated, updated, and/or modified.

5.9 Reclaimed Water Use Summary

A prudent approach is to have multiple methods to dispose of reclaimed water that protect WRF reliability and benefit the environment and residents' way of life. Table 5-6 provides the justification and relative ranking to each reclaimed water disposal option based the County's goals of sustainability, reliability, and environmental stewardship. The relative rankings were developed during CCU workshops based on current regulatory drivers, future reclaimed water flows, and the advantages and disadvantages listed in this chapter.

Table 5-6 Reclaimed Water Options

Options	Relative Ranking	Justification
Reuse System Expansion (Public Access)	Good	▪ Requires infrastructure maintenance but system already in place. ▪ Generates revenue for the utility. ▪ Reduces groundwater withdrawals and water demands for irrigation. ▪ Supported by local, state, and federal water agencies and promotes conservation.
Potable Reuse	Good	▪ High capital costs. ▪ Requires treatment to meet primary and secondary DWS and advanced treatment water facilities processes. ▪ Benefits CCU's water supply deficit and reclaimed supply surplus in some areas. ▪ Regulations pending, but feasibility and pilot projects have gained support.
Wetland Hydration/ Creation	Fair	▪ Publicly appealing IPR option; can be implemented in parks or used to create wildlife ▪ Requires large amount of land.
AR (Class V)	Fair	▪ Reclaimed application rate varies with geologic conditions. ▪ Regulatory agencies hesitant to issue exemptions. ▪ Applications may require meeting primary and secondary DWSs. ▪ Requires small footprint. ▪ Environmental benefit to protecting groundwater sources in CCU.
Deep Injection Well (Class I)	Fair	▪ Fast reclaimed application rate (disposal). ▪ Smallest footprint. ▪ Typically permitted for high disposal rates (8 to 12 MGD). ▪ Several deep injection wells already permitted within CCU.
RIBs	Poor	▪ Require sufficient land ownership (large footprint). ▪ Moderate reclaimed application rates. ▪ Effectiveness varies with weather and soil conditions.

Options	Relative Ranking	Justification
Sprayfields	Rule Out	▪ Requires substantial land ownership (largest footprint). ▪ Lowest reclaimed application rates. ▪ Effectiveness varies with weather and soil conditions.
SWD (Augmentation)	Rule Out	▪ New FDEP rules will require higher treatment before discharge (increased costs). ▪ No current discharges benefit MFLs and unclear how to show benefit.

Table 5-7 presents feasible strategies for managing excess reclaimed water at each WRF considering various factors such as flow quantities, site location, hydrogeology, and current site constraints. The site-specific recommendations are highly dependent on ongoing regulations related to AR, potable reuse, and emerging contaminants and studies should be conducted to determine the ultimate use of future reclaimed water supplies produced at each WRF.

Table 5-7 Feasible Strategies for Managing Excess Reclaimed Water per WRF

Location	Reclaimed Water Management Strategy
East Port WRF	Conduct feasibility studies for potable reuse and aquifer recharge. Evaluate the installation of an additional deep injection well, or wetland for rehydration to handle excess flows.
West Port WRF	Upgrade existing HSPS to increase reclaimed water distribution to customers. Evaluate installation an additional deep injection well to handle excess flows.
Rotonda WRF	Conduct feasibility study for potable reuse. Evaluate replacement of unlined storage pond with GST storage to increase available water for distribution. Evaluate installation of a new deep injection well to handle excess flows; this improvement would eliminate the need to install an additional deep well at West Port WRF.
Burnt Store WRF	Conduct a feasibility study for AR/ASR to mitigate saline intrusion and evaluate potential for wetland rehydration.

6. RECLAIMED WATER DISTRIBUTION SYSTEMS

OVERVIEW

Chapter 5 identified that expansion of the public access reuse systems are beneficial uses of reclaimed water based on CCU's social, environmental, and economical goals. This chapter discusses CCU's hydraulic reclaimed water models, calibration efforts, and level of service criteria for modeling simulations. The models were used to determine the infrastructure required to serve the existing reclaimed water customers (current scenarios) and identify the improvements required to expand service to potential future reclaimed water customers (future scenarios). Multiple modeling scenarios were conducted for both the Master Reuse System and South County reuse system with respect to reclaimed water customer demands.

6.1 Hydraulic Model Overview

System modeling is commonly used by engineers for master planning efforts as the primary way to evaluate distribution system performance and identify improvements under various demand scenarios. Jones Edmunds maintains a hydraulic model for CCU's existing Master Reuse System and developed a hydraulic model for the South County Reuse System as part of the master planning effort. The base models for the CCU reclaimed water distribution system were developed using Bentley WaterGEMS. CCU plans to regularly use the reuse system hydraulic models to identify the cost/benefit of adding additional reclaimed water customers in coordination with developers and other infrastructure projects.

As part of this RWMP effort, workshops were held with CCU staff to discuss ongoing improvement projects in the planning, designing, and construction phases and identify current distribution system infrastructure and pumping conditions. The Master Reuse System contains approximately 60 miles of transmission mains, three active RWBSs, and two 0.5-MG GSTs at the RWBSs. The RWBSs are used to maintain the flow and pressure throughout the system and work in conjunction with the reclaimed pumping stations at the WRFs (previously discussed in Chapter 3). The Eagle Street RWBS and Walenda RWBS each contain two pumps and a 0.5-MG GST. Rotonda Boulevard East RWBS contains three pumps. The Rotonda Boulevard East RWBS can be used to boost pressure and convey flow originating from Mid County to West County reclaimed customers and convey flow from Rotonda WRF to the West Port WRF for deep well disposal if reclaimed demands are insufficient. The South County Reuse System does not contain any RWBSs; rather, the pump capacity is provided solely from the Burnt Store WRF reclaimed water pump station (previously discussed in Chapter 3).

Table 6-1 and Table 6-2 summarize details for the supporting facilities and pump operations for the Master Reuse System and South County Reuse System models, respectively.

Table 6-1 Master Reuse System Infrastructure and Model Inputs

Reuse Facilities	Storage Facilities	Pump Station	
		No. of High Service Pumps	Pump Description (gpm)
East Port WRF	Lined Pond: 95 MG	5	2-1,100 gpm @ 252 feet 3-2,000 gpm @ 252 feet (VFD pressure setpoint 70 psi)
Eagle Street RWBS	GST: 0.5 MG	2	1-577 gpm @ 206 feet 1-1,440 gpm@ 206 feet (VFD pressure setpoint 70 psi)
Walenda RWBS	GST: 0.5 MG	2	1-577 gpm @ 206 feet 1-1,440 gpm@ 206 feet (VFD pressure setpoint 73 psi)
West Port WRF	Lined Ponds: 20 MG	2	2-500 gpm @ 109 feet (VFD pressure setpoint 53 psi)
Rotonda WRF	Lined Pond: 2.4-MG GST: 3.0 MG	5	Pump Station #1: 2-1,800 gpm @ 135 feet (VFD pressure setpoint 75 psi) Pump Station #2: 2-1,388 gpm @ 282 feet, 1-20 gpm @285 feet (VFD pressure setpoint 90 psi)
Rotonda Boulevard East RWBS	None	3	2-1045 gpm @ 86 feet 1-972 gpm @ 200 feet (VFD pressure setpoint 80 psi)

Table 6-2 South County Reuse System Infrastructure and Model Inputs

Reuse Facilities	Storage Facilities	Pump Station	
		No. of High-Service Pumps	Pump Description (gpm)
Burnt Store WRF	0.01 MG	2	2-955 gpm @ 65 feet

6.2 Hydraulic Model Development, Updates, and Calibration

After verifying the current system conditions, Jones Edmunds developed and/or updated the models to reflect the current reclaimed water distribution system, storage and pumping capacities for each WRFs and RWBS, existing reclaimed water user demands, and modified the Master Reuse System model to include discharge assemblies for larger users receiving reclaimed water into golf course irrigation ponds as specified in Section 2.3. Discharge assemblies were modeled using a throttling control valve to simulate system hydraulic losses and maintain transmission system pressures and a reservoir to simulate the maximum pond water levels.

The Master Reuse System model was calibrated using SCADA data to improve the level of correlation between model predictions and actual system flows. Actual pump operational pressures were assigned to respective pumps for each facility in the hydraulic model based on SCADA information provided by CCU. The SCADA data provided from a data analysis on May 29, 2020, was used for model calibration since it was reported to represent typical system conditions. Model calibration was accomplished by simulating the SCADA flows and pressures for each WRF and RWBS in the hydraulic model and then adjusting modeling parameters until the simulated results closely matched the observed field test results. This process was accomplished by adjusting roughness coefficients (Hazen-Williams C-values) of the distribution system piping to fine-tune model results until satisfactory. Calibration was determined to be complete when the model predicted results within an accuracy of ±5 percent of field data. As a part of the calibration process, the model was run for an extended period simulation (EPS) with a 24-hour average day diurnal pattern applied to the customer demands. The diurnal pattern for each customer was determined using the SCADA data for its service area's WRF. The diurnal pattern was adjusted during the calibration process to achieve pump station flows in each service area that replicated the SCADA information.

This process provides a hydraulic model that can accurately simulate current and future conditions in the Master Reuse System. Results from this hydraulic model should confidently provide the results necessary to make future planning decisions and implement CIPs through 2040. Calibration of the South County Reuse System was unnecessary due to its simplicity and few customers and since the reclaimed pump station will soon be upgraded as part of the Burnt Store WRF Expansion. CCU should calibrate the South County Reuse System after the Burnt Store WRF Expansion is complete and additional customers have been added to the reuse system.

6.3 Modeling Analysis and Level of Service (LOS) Criteria

Each hydraulic model was used to evaluate the reclaimed water systems with respect to (1) supply and demand budget, (2) storage requirements, (3) pumping capacities, and (4) pipeline hydraulics under the current (2020) and future (2040) conditions. CCU provides most of its reclaimed water in the Master Reuse System to large-user pond irrigation systems; CCU maintains high system pressures throughout the day that generally allow users to accept reclaimed delivery at any time of day at their convenience. Current reclaimed water delivery operations for South County occur as needed and are limited to 12 hours per day due to operator work schedules. In the future, CCU intends to operate the South County Reuse System in similar fashion as the Master Reuse System. CCU has operational control of these systems and can convey reclaimed water at off-peak times to prevent large hourly surpluses and deficits. Unlike instantaneous irrigation demands from residential customers, the pond systems do not need to be met on an instantaneous basis but can be filled throughout the day. Therefore, the reuse systems were evaluated during average-day-demand conditions.

Reclaimed water modeling is unique in that modeling scenarios must consider both the reclaimed water from both a supply and demand viewpoint. A reclaimed water budget was performed to evaluate the capacity of the reclaimed water supply with respect to reclaimed water demands for each service area. This type of analysis is especially useful for the Master Reuse System since CCU is capable of diverting flow between service areas.

To ensure that sufficient storage exists for the Master Reuse System and South County Reuse System, the evaluation considered the requirements stated in Rule 62-610.464, FAC, *Storage Requirements*, which specifies, *at a minimum, system storage capacity shall be the volume equal to three times that portion of the average daily flow of the total reuse capacity for which no alternative reuse or disposal system is permitted*. CCU is not required to meet this criterion since each WRF has other methods of disposal, but for redundancy and reliability CCU wants to maintain sufficient storage within their systems. Storage also allows CCU to maximize the sale of reclaimed water and better ensure reclaimed water is available to all customers year-round.

Pump stations were considered acceptable if they have adequate pumping capacity to distribute reclaimed water under average daily demand conditions. For existing systems, this was based on total pumping capacity with no back-up provided. However, pump redundancy should be provided whenever possible for reliability purposes and to facilitate repair and replacement without impacting operations. Each pump station should provide sufficient capacity to match demand if the largest pump is out-of-service (also known as firm pumping capacity). Therefore, for future systems adequate pumping capacity is based on total pumping capacity with the largest pump out of service.

Lastly, an analysis was completed to identify deficiencies in the transmission and distribution pipeline hydraulics. Table 6-3 depicts the LOS criteria used to determine deficiencies and necessary improvements when modeling current and future reclaimed water distribution systems modeling scenarios. The LOS criteria include standards for system pressures and transmission pipeline velocities and were based on existing system performance characteristics, past criteria used by the County, and current industry standards.

Table 6-3 LOS Criteria

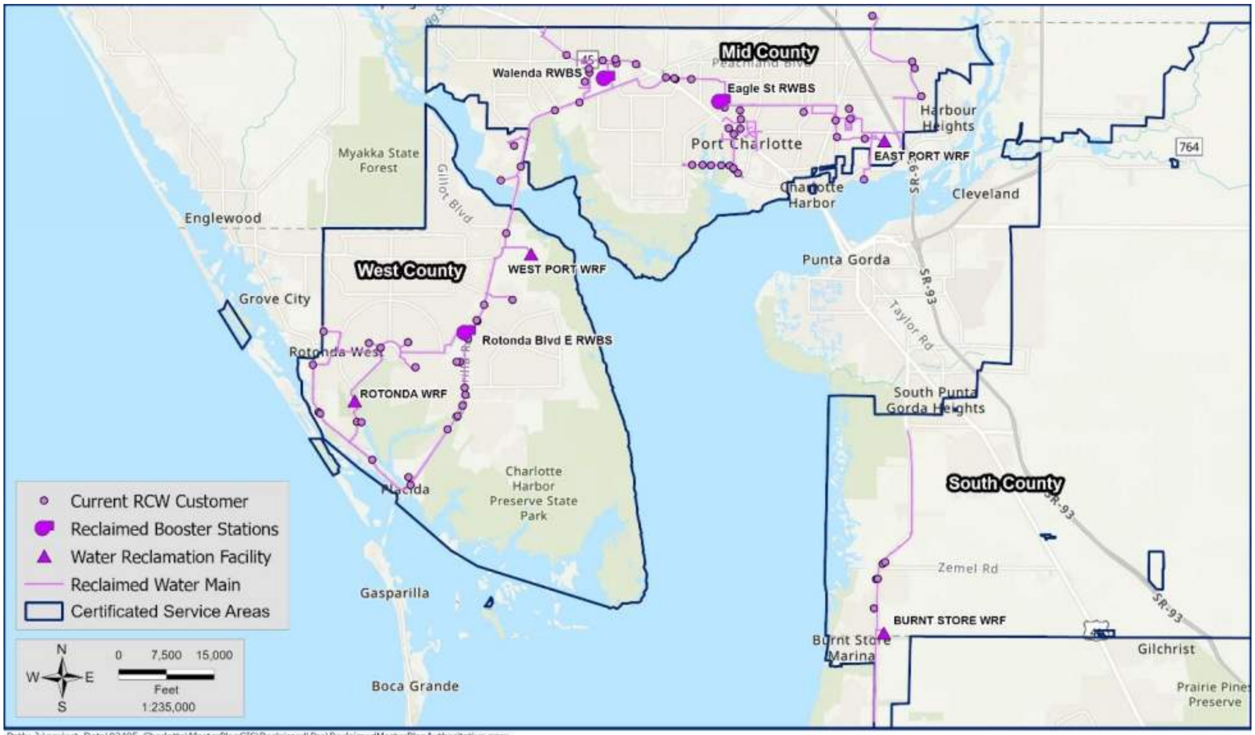
Criteria	Minimum LOS
Maximum Pipeline Flow Velocity	7 fps
Minimum Transmission Pipeline Pressure	50 psig
Maximum Transmission Pipeline Pressure	80 psig

Note: fps = foot per second; psig = pounds per square inch gauge.

6.4 CURRENT SYSTEM HYDRAULIC MODELING

This section presents the results of the modeling analysis, described previously, under current flow and infrastructure conditions for each reuse distribution system. The section presents the Master Reuse System and South County Reuse System separately since the systems are independent systems. Figure 6-1 shows the existing reclaimed water distribution infrastructure and customers used when modeling the current system conditions.

Figure 6-1 CCU Reclaimed Water Distribution Systems with Current Customers



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6.4.1 Master Reuse System

6.4.1.1 Supply and Demand Analysis

Table 6-4 summarizes the results of the supply capacity analysis on an annual average daily (AAD) basis. The reclaimed water supply was based on 2020 influent wastewater flows (AADFs) presented in Section 4.1. The annual average daily demands (AADDs) were calculated from current reclaimed water customers in the Mid and West County service areas presented in Section 2.3. Overall, CCU's supply currently exceeds system demands under average day conditions. However, the West County reclaimed water supply does not meet current system demands. This currently requires transfer of approximately 0.85 MGD from Mid County to West County.

Table 6-4 Existing Reclaimed Water Supply and Demand Analysis

Master Reuse System	Reclaimed Water Supply (MGD)	Reclaimed Water Demand (MGD)	Surplus/(Deficit) (MGD)
Mid County	4.50	3.01	1.49
West County	1.78	2.63	(0.85)
Total	**6.28**	**5.64**	**0.64**

6.4.1.2 Storage Capacity Analysis

Since the East Port, West Port, and Rotonda WRFs feed the Master Reuse System, the reclaimed water storage components at each WRF as well as the storage at the Eagle Street and Walenda RWBSs contribute to the overall Master Reuse System storage. The East Port and West Port WRFs contain 95- and 20-MG reclaimed water pond storage, respectively. Rotonda WRF, Eagle Street RWBS, and Walenda RWBS contain 3-, 0.5-, and 0.5-MG GSTs, respectively. Table 6-5 summarizes the minimum reclaimed water storage required based on current flow conditions if no other effluent disposal options were available for backup. The analysis shows no current storage deficiencies for the Master Reuse System.

Table 6-5 Current Master Reuse System Reclaimed Water Storage Capacity

Service Area	Minimum Reclaimed Water Storage (3 x AADD) (MGD)	Existing Reclaimed Storage Capacity (MG)	Surplus/(Deficit) (MG)
Mid County	13.5	96.0	82.5
West County	5.4	23.0	17.6
Total	**18.9**	**119.0**	**100.1**

6.4.1.3 Pumping Capacity Analysis

A reclaimed water pumping analysis was performed, and Table 6-6 summarizes the results. Overall, the County's pumping stations and RWBSs have adequate pumping capacity to meet average day demands under existing conditions. However, the Eagle Street and Walenda RWBSs do not have backup capacity. For future conditions, each RWBS should provide a firm pumping capacity equaling the largest pump out of service. Since the Gertrude RWBS is not currently active, it was not included in this analysis.

6.4.1.4 Distribution System Analysis

The Master Reuse System pipe network is relatively simple and includes transmission and distribution mains. The hydraulic model was used to assess the existing system operations and pressures. The analysis indicates that the system pressures and velocities are within the County's LOS standards listed in Table 6-3 and that no improvements are required to meet current conditions.

Table 6-6 Existing Master Reuse System Pumping Analysis

Location	Pump Station	Pump Unit	Rated Capacity		Total Pump Station Capacity		Firm Capacity		Service Area Pump Station Capacity Requirement[1]	Service Area Pump Station Capacity Surplus / (Deficit)
			gpm	MGD	gpm	MGD	gpm	MGD	MGD	MGD
Mid County Pump Stations	East Port HSPS	1	1,100	1.58	8,200	11.81	6,200	8.93	3.01	8.80
		2	1,100	1.58						
		3	2,000	2.88						
		4	2,000	2.88						
		5	2,000	2.88						
	Eagle Street RWBS	1	577	0.83	2,017	2.90	577	0.83	0.85	2.05
		2	1,440	2.07						
	Walenda RWBS	1	577	0.83	2,017	2.90	577	0.83		
		2	1,440	2.07						
West County Pump Stations	West Port WRF	1	500	0.72	1,000	1.44	500	0.72	1.78	3.69
		2	500	0.72						
	Boulevard East RWBS	1	1,045	1.73	3,062	4.41	2,017	2.90		
		2	1,045	1.73						
		3	972	1.73						
	Rotonda WRF HSPS#1	1	1,800	2.59	3,600	5.18	1,800	2.59		
		2	1,800	2.59						
	Rotonda WRF HSPS#2	1	1,388	2.00	2,797	4.03	1,409	2.03		
		2	1,388	2.00						
		3	20	0.03						

Note: [1]Transfer of 0.85-MGD reclaimed water supply from Mid County to West County is not required to satisfy reclaimed water demands. Therefore, WRF was analyzed for adequate pumping capacity in addition to the Walenda RWBS for the transfer requirement.

6.4.2 South County Reuse System

6.4.2.1 Supply and Demand Analysis

Table 6-7 summarizes the results of the supply capacity analysis for the South County Reuse System. The reclaimed water supply was based on 2020 influent wastewater AADFs presented in Section 4.1. The AADDs were calculated from current reclaimed water customers in the South County service area presented in Section 2.3. Overall, the South County supply currently exceeds system demands under average day conditions, indicating that additional reuse customers could be added to the system from a supply-and-demand perspective.

Table 6-7 Existing Reclaimed Water Supply and Demand Analysis

Reuse System	Reclaimed Water Supply (MGD AADF)	Average Day Demand (MGD AADD)	Surplus/(Deficit) (MGD AADF)
South County	0.32	0.07	0.25

6.4.2.2 Storage Capacity Analysis

The South County Reuse System is currently limited to the storage in the reclaimed water HSPS pumping clearwell. Table 6-8 summarizes the minimum reclaimed water storage required based on current flow conditions if no other effluent disposal options were available for backup. The analysis shows storage deficiencies would occur for the South County Reuse System if additional backup disposal options were not currently implemented at the WRF.

Table 6-8 Current South County Reclaimed Water Storage Capacity

Service Area	Minimum Reclaimed Water Storage (3 x AADF) (MGD)	Existing Reclaimed Storage Capacity (MG)	Surplus/(Deficit) (MG)
South County	0.96	0.01	(0.95)

6.4.2.3 Pumping Capacity Analysis

The South County Reuse System does not currently contain any RWBSs; rather, the pump capacity is provided solely from the Burnt Store WRF reclaimed water pump station. A reclaimed water pumping analysis was performed, and Table 6-9 summarizes the results. Overall, South County has adequate pumping capacity to meet average day demands under existing conditions. CCU operations staff indicated that due to the low demand, reclaimed water is currently distributed using a small jockey pump. However, the existing 20-HP vertical turbine effluent transfer pumps are reported to receive routine exercise and maintenance and are said to be in good working condition.

Table 6-9 Current South County Pumping Capacity Analysis

Pump Station	Pump Unit	Rated Capacity		Total Pump Station Capacity		Firm Capacity		Pump Station Capacity Requirement	Pump Station Capacity Surplus / (Deficit)
		gpm	MGD	gpm	MGD	gpm	MGD	MGD	MGD
Burnt Store WRF	1	955	1.375	1,910	2.75	955	1.375	0.07	1.305
	2	955	1.375						

6.4.2.4 Distribution System Analysis

The South County Reuse System pipe network is relatively simple and primarily composed of a single transmission main along Burnt Store Road. The existing transmission main extends south to NW 40th Lane (near the City of Cape Coral Fire Department Station 7) and north to Notre Dame. The hydraulic model was used to assess the existing system operations and pressures. The analysis indicates that the system pressures and velocities are within the County’s LOS requirements listed in Table 6-3 and that no improvements are required. However, the model predicted very low pipeline velocities, indicating that the current distribution system is oversized for the existing demands and has sufficient capacity to connect additional customers.

6.4.3 Current System Improvements

Table 6-10 summarizes the results from the modeling analysis of the existing Master Reuse and South County Reuse Systems. The Master Reuse System has an overall excess of reclaimed water, but a deficiency exists within West County due to a larger number of large users in the area. The South County Reuse System is currently able to satisfy its customers’ demand based on the reclaimed water budget, but the Burnt Store WRF has limited storage capacity. Since the Burnt Store WRF has a backup disposal method, CCU is not required to meet the storage requirements; however, the limitation prevents the Burnt Store WRF from conveying large flows to the South County Reuse System and will thus limit the number of customers that can be connected in the future without improvements. The Master Reuse System also has sufficient storage requirements even without the backup disposal alternatives implemented at each WRF, which serves to increase the WRF resilience and provides flexibility for maintenance events. Modeling results show the pumping capacity of the Master Reuse System and Burnt Store Reuse System are sufficient to serve the existing customers and that pipeline pressures and velocities are within the CCU minimum LOS as specified in Table 6-3.

Table 6-10 Master Reuse and South County Reuse Systems Improvement Summary for Meeting Current Conditions

System	Supply Capacity	Storage Capacity	Pumping Capacity	Distribution System
Master Reuse	Satisfactory	Satisfactory	Satisfactory	Satisfactory
South County	Satisfactory	Satisfactory	Satisfactory	Satisfactory

Based on these analyses, CCU can continue serving the current reclaimed water customers under the current operating conditions without significant capital improvements. However, since reclaimed water flows will continue to increase as discussed in Chapter 4, CCU will need to perform upgrades to expand the reuse systems or investigate alternative methods of reuse and disposal.

6.5 Future System Hydraulic Modeling

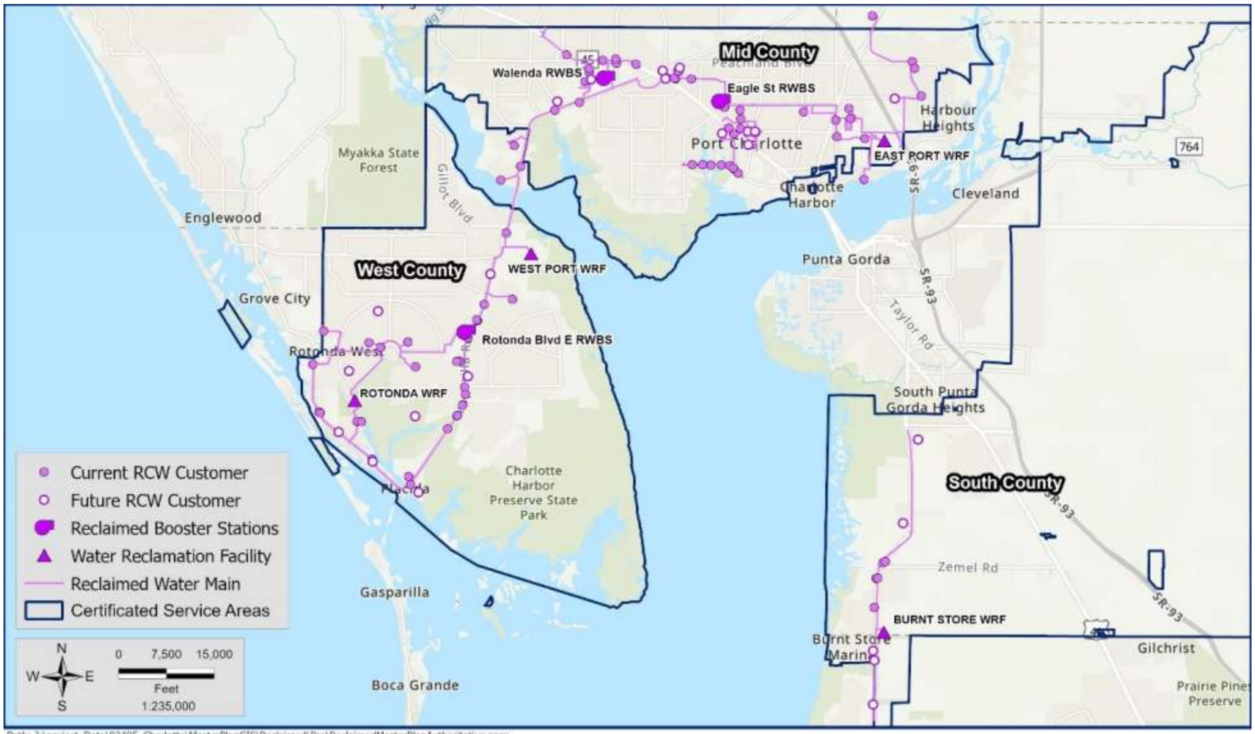
This section presents the results of the modeling analysis under future flow (supply and demand) conditions to identify the reuse systems improvements needed to maximize the sale of reclaimed water under future flow conditions. Future modeling conditions considered reclaimed flows in 2040, which requires upgrading the capacities of the East Port WRF, West Port WRF, and Burnt Store WRF. Future modeling scenarios assume that the ongoing improvements at the East Port WRF and Burnt Store WRF are completed in the next 5 years. Modeling scenarios use the existing WRFs as the reclaimed water supply locations. Future demand locations were modeled based on current customers, future potential customers, and hypothetical customers locations. The initial modeling analysis included current and future potential customers for assessing the reclaimed water budget, storage capacity, pumping capacity, and distribution improvements required for each system.

The initial analysis showed the improvements required to address reclaimed water flows in 2040 conditions. To determine the phasing for each project, modeling scenarios were conducted at various threshold capacities. Threshold capacities were determined from system demands based on future potential customers for the Master Reuse and South County Systems.

Additional modeling scenarios were performed showing alternative demand scenarios for the Master Reuse System and South County System. These scenarios provide demand conditions to assess how the locations of reclaimed water customers impact the recommendations. The demands were not based on currently known potential users but hypothetical conditions to account for changes in customer locations and County development. Lastly, a preliminary modeling analysis was conducted to assess the impact of combining the West County WRFs on the reclaimed water distribution system. This scenario was conducted to determine the reclaimed water system improvements needed if the Rotonda WRF was converted to a Master Lift Station.

Figure 6-2 shows the existing reclaimed water distribution infrastructure and the current and future customers modeled for the future system analyses.

Figure 6-2 CCU Reclaimed Water Distribution Systems with Current and Future Customers (as of February 1, 2022)



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6.5.1 Master Reuse System

6.5.1.1 Supply Capacity Analysis

Table 6-11 presents the future supply capacity in terms of service area. The reclaimed water supply was based on 2040 influent wastewater AADFs as presented in Section 4.1. The AADDs were calculated from future reclaimed water customers in the Mid and West County service area presented in Section 5.7.4. As seen with the current system, CCU's future supplies in Mid and West County exceed the system demands under average day conditions but demonstrate that West County continues to have a deficit in meeting demands. The amount required to transfer from Mid County to West County has increased from 0.85 MGD under current conditions to 3.23 MGD for 2040 conditions.

Table 6-11 Master Reuse System Reclaimed Water Supply and Demand Analysis under 2040 Conditions

Service Area	Reclaimed Water Supply (MGD AADF)	Average Day Demand (MGD AADD)	Surplus/(Deficit) (MGD)
Mid County	10.4	5.03	5.37
West County	4.1	7.33	(3.23)
Total	**14.5**	**12.4**	**2.14**

6.5.1.2 Storage Capacity Analysis

Table 6-12 shows the storage analysis for the Master Reuse System under 2040 conditions. The data indicate that West County has a local deficiency but overall the County has sufficient storage in the Master Reuse System under future conditions. The future scenario does not consider the 0.5-MG GST at the Walenda RWBS since the GST does not have sufficient capacity to keep pace with the required pump station improvements (discussed further in Section 6.5.1.5). The West County storage availability includes the existing 20-MG West Port WRF storage pond and 3-MG Rotonda WRF GST. Additional storage could be obtained by replacing the unlined pond at the Rotonda WRF or using the reject pond at the Rotonda WRF if the WRF is converted to a Master Pump Station.

Table 6-12 Master Reuse System Storage Analysis under 2040 Conditions

Service Area	Minimum Reclaimed Water Storage (3x AADF) (MGD)	Existing Storage Capacity (MG)	Surplus/(Deficit) (MG)
Mid County[1]	31.2	95.5	64.3
West County (MGD)[2]	12.3	23.0	10.7
Total	**43.5**	**118.5**	**75.0**

[1]Mid County storage assumes removal of 0.5 MG at the Walenda Booster Pump Station.
[2]Assumes the 20-MG storage pond at West Port WRF is brought online under 2040 conditions.

6.5.1.3 Pumping Capacity Analysis

Overall, CCU's existing pump stations do not have adequate pumping capacity to meet average day demands under future conditions. For the Mid County service area, the Eagle Street and Walenda RWBSs did not meet requirements for total or firm pumping capacity. Similarly for West County, the West Port WRF pump station did not meet requirements for total or firm pumping capacity.

Modeling results indicate Eagle Street RWBS and Walenda RWBS will require expansion to meet the average day demands under 2040 conditions. The Eagle Street RWBS requires a firm pumping capacity of 4.32 MGD (3,000 gpm), and the Walenda RWBS will require upsizing to 7.92 MGD (5,500 gpm). According to model results, the increased pumping capacity at the Walenda RWBS will turn over the existing 0.5-MG tank 10 to 12 times per day. Therefore, a new inline RWBS should be constructed near El Jobean Road.

The new Walenda inline RWBS will provide additional transfer capacity from Mid to West County and will replace the existing Walenda RWBS instead of using the existing RWBS site and tank. According to model results, the proposed inline Walenda RWBS and associated transmission system improvements (discussed in the following section) can transfer approximately 3.94 MGD during the 2040 condition to the West Port 20-MG storage pond. From there, the West Port WRF pump station will be required to supply system demands in West County. This will require improvements to the West Port WRF HSPS. Modeling results indicate that the West WRF HSPS will require a firm pumping capacity of 2.88 MGD (2,000 gpm). Table 6-13 presents the ultimate pump station requirements as indicated in the hydraulic analysis.

Modeling scenarios also considered the use of the currently inactive Gertrude RWBS under future conditions. However, the results indicate that the Gertrude RWBS provides no benefit for the operation of the Master Reuse System under future conditions due to its location and size limitations. Therefore, the facility can be decommissioned.

Table 6-13 Master Reuse System Pumping Capacity Analysis under 2040 Conditions

Location	Pump Station	Pump Unit	Existing Pump Station Rated Capacity		Firm Existing Pump Station Capacity		Service Area Pump Station Capacity Requirement[3]	Service Area Pump Station Capacity Surplus/(Deficit)
			gpm	MGD	gpm	MGD	MGD	MGD
Mid County Pump Stations	East Port WRF HSPS	1	1,100	1.58	6,200	8.93	5.03	3.89
		2	1,100	1.58				
		3	2,000	2.88				
		4	2,000	2.88				
		5	2,000	2.88				
	Eagle Street RWBS[1]	1	577	0.83	577	0.83	4.32	(3.49)
		2	1,440	2.07				
	Walenda RWBS[2]	1	577	0.83	577	0.83	7.92	(7.09)
		2	1,440	2.07				
West County Pump Stations	West Port WRF HSPS	1	500	0.72	500	0.72	2.88	(2.16)
		2	500	0.72				
	Boulevard East RWBS	1	1,045	1.50	2,017	2.90	3.62	1.88
		2	1,045	1.50				
		3	972	1.40				
	Rotonda WRF HSPS#1	1	1,800	2.59	1,800	2.59		
		2	1,800	2.59				
	Rotonda WRF HSPS#2	1	1,388	2.00	1,408	2.03	1.84	0.19
		2	1,388	2.00				
		3	20	0.03				

Notes:

[1]Required for boosting system pressures downstream. The hydraulic model indicated a required ultimate firm pumping capacity of 4.32 MGD.
[2]Required for boosting system pressures downstream and transferring reclaimed water supply to West County. The hydraulic model indicated a required ultimate firm pumping capacity of 7.92 MGD.
[3]Based on ultimate service area demands taken from the hydraulic model.

6.5.1.4 Distribution System Analysis

The hydraulic model was used to assess the 2040 system operations and pressures. The analysis indicates that the system pressures and velocities do not meet the County's LOS requirements and that improvements are required to expand the reclaimed water system. The existing system is limited hydraulically by two major transmission mains that prevent the transfer of reclaimed water from East Port WRF to future Mid and West County reclaimed water customers:

- The 16-inch transmission main from the East Port WRF limits the transfer of reclaimed water supply to Mid and West County. As mentioned in previous sections, the East Port WRF has the largest storage and pumping capacity in the system. This supply must be shared with West County to meet 2040 system demands. Therefore, expanding the transmission system at the East Port WRF is required.
- In 2040, approximately 3.23 MGD must be transferred to West County from the East Port WRF. The hydraulic model indicated a high amount of head loss within the 16-inch transmission main that connects Mid County to West County (5.5 miles). That head loss limits the transfer capacity of the proposed inline Walenda RWBS. Providing an additional parallel 16-inch transmission main would increase the transfer capacity and provide redundancy in the event of an emergency.

6.5.1.5 Timing Considerations

CCU has already identified more potential reclaimed water users (and their demands) than the volume produced at CCU's WRFs. Since the reclaimed water demand for the Master Reuse System exists today, the timing for infrastructure expansions and improvements is primarily driven by reclaimed water supply (dictated by wastewater flows) and funding restraints.

As the reclaimed supply at the WRFs increases, certain pipeline and pumping upgrades will be required to convey the additional flows to current and future reclaimed water users. Since there are no guarantees with future reclaimed water users, threshold capacities were developed to determine the timing of required infrastructure improvements as a function of potential total future system demands. The threshold capacity demands were determined as a sum of current and potential future user demands based on future user connection timing and conveying excess supply from Mid County to West County. Table 6-14 presents the threshold capacities for each service area. All threshold capacity improvements will be completed sequentially.

Table 6-14 Master Reuse System Threshold Capacity Analysis

Service Area	Existing System Demands (MGD)	Threshold Capacity 1 Demands (MGD)	Threshold Capacity 2 Demands (MGD)	Threshold Capacity 3 Demands (MGD)	Alternative 1
Mid County	3.01	3.54	5.03	5.03	5.03
West County	2.63	2.63	2.75	7.33	7.33
Total	**5.64**	**6.17**	**7.78**	**12.36**	**12.36**
Approximate Transfer of Supply from Mid to West*	0.85	1.38	3.73	3.94	0

*Note: This value reports the approximate transfer of future reclaimed water supplies (refer to Table 6-11) from Mid to West County to the West Port 20-MG Pond and reclaimed water users. This will provide CCU with the flexibility to meet future excess demands in West County with future excess supply from Mid County. The Boulevard East RWBS is capable of conveying excess reclaimed water back to Mid County, if needed.

The following section provides details of the improvement projects required to serve CCU's reclaimed water customers and identifies the order of the projects based on the threshold capacities presented in Table 6-14. The pipelines range from 6 to 20 inches and use the existing right-of-way paths. Some of the proposed transmission main alignments may change as development plans are revised or refined in the future.

Threshold Capacity 1

This scenario estimates that all Mid County future reclaimed water users are online except the 1.5-MGD demand associated with the proposed West Port development. Under this threshold, the system demands total approximately 6.17 MGD, with 3.54 MGD in Mid County and 2.63 MGD in West County. During this scenario, with all recommended improvements the total flow being transferred from Mid County to West County is approximately 1.38 MGD.

The following improvements are required for meeting Threshold Capacity 1:

- The Eagle Street RWBS currently operates as needed to meet system demands during the existing condition. However, to meet Threshold Capacity 1 demands, the Eagle Street RWBS must sustain pressures along Quesada Avenue and El Jobean Road, directing reclaimed water supply to the new inline Walenda RWBS (see next improvement) on El Jobean Road. This proposed Eagle Street RWBS improvement recommends an increase in firm pumping capacity to 4.32 MGD (3,000 gpm) with an operational VFD pressure setpoint of 80 psi.
- Future demands require increased pumping capacity at the existing Walenda RWBS. Under current system model conditions, the existing 0.5-MG storage tank turns over on average two to three times per day; however, under future system model conditions, the storage tank turns over 10 to 12 times per day. Therefore, the existing Walenda RWBS should be converted to a new inline RWBS and relocated along the south side of El Jobean Road near Flamingo Boulevard. The new inline Walenda RWBS would be the main driver directing excess reclaimed water from Mid County to West County. This improvement assumes an operational VFD pressure setpoint pump of 80 psi. The new Walenda RWBS will require upsizing in two phases to meet the Threshold Capacities

established herein Section 6.5.1. The future firm pumping capacity (2040) required for the new Walenda RWBS is 7.92 MGD (5,500 gpm). However, a firm pumping capacity of 3.96 MGD (2,750 gpm) is only required to meet the overall Threshold Capacity 1 demand of 6.17 MGD at this time. In addition, provisions should be made to install a check valve north of El Jobean along Coho Street to prevent excess recirculation from occurring through the new West Port CDD.

- Approximately 11,400 linear feet (LF) of new 16-inch reclaimed water main is proposed on El Jobean Road between Enterprise Drive and ending after Charlotte Sports Park. This pipeline will parallel the existing 16-inch transmission main, aid in transferring flows to the new West Port CDD, and provide an additional suction line to the new Walenda RWBS. An upcoming CCU project will upsize (replace) the 12-inch potable water main in this area. Initially, the 12-inch potable water main (to be replaced) was considered for conversion to the reclaimed water system. However, the hydraulic analysis concluded that a 16-inch reclaimed water main is required.
- This improvement supplements the previously mentioned improvement and may be combined into a single project. Approximately 500 total LF of 16-inch reclaimed water main (two separate main approximately 250 LF) will be required for upstream and downstream connection of the proposed 16-inch pipeline along El Jobean Road from Enterprise Drive to Charlotte Sports Park with the existing 16-inch pipeline along El Jobean. “Upstream” and “downstream” connections are assumed to be at the suction and discharge sides of the new Walenda RWBS.
- The 20-MG storage pond at the West Port WRF is assumed to be online and functional when demands approach Threshold Capacity 1. A pressure-sustaining valve must be installed on the pond fill line to sustain distribution system pressures. The model indicated that the pressure-sustaining valve is required to prevent pump cavitation at the Boulevard East RWBS.
- Approximately 2,700 LF of new 8-inch reclaimed water main is proposed to extend the Master Reuse System north along Kings Highway (CR-769) from Aileron Golf Club (formerly Kingsway Country Club) to serve future pond user Sonoma Preserve. This improvement greatly supports CCU’s objectives to prioritize large users and to expand the public access reuse system when feasible, as described in Section 5.7.4.

Threshold Capacity 2

This scenario estimates that all Mid County future users are online and a future-user demand totaling 2.75 MGD in West County. Under this threshold, the system demands total approximately 7.78 MGD, with 5.03 MGD in Mid County and 2.75 MGD in West County. During this scenario, with all recommended improvements approximately 3.73 MGD of reclaimed water is transferred from Mid County to West County.

The following improvements are required for meeting Threshold Capacity 2:

- Approximately 14,700 LF of new 20-inch reclaimed water main is required from East Port WRF, east to Loveland Boulevard and north to Midway Boulevard. This improvement will provide additional reclaimed water supply capacity for Mid County and West County future users by increasing discharge capacity from the East Port WRF to central Mid County. From central Mid County, flows are redistributed by Eagle Street and Walenda RWBSs.

- Approximately 13,000 LF of new 16-inch reclaimed water main is required along Loveland Boulevard and Westchester Boulevard. This will provide an additional route for reclaimed water supply to travel to West County via the new Walenda inline booster pump station. This improvement in conjunction with the proposed pipeline along Flamingo Boulevard and Edgewater Drive eliminates the need for additional improvements along Midway Boulevard.
- Approximately 9,000 LF of new 16-inch reclaimed water main is required along Tamiami Trail from Westchester Boulevard to Elkcam Boulevard. This line will connect the previously mentioned 16-inch transmission main along Loveland Boulevard and Westchester Boulevard to the reclaimed water distribution system in central Mid County. This improvement should include an additional connection to the existing 8-inch pipe at Harbor Boulevard.
- Approximately 24,500 LF of new 16-inch pipeline is proposed along Flamingo Boulevard and Edgewater Drive from Midway Boulevard to El Jobean Road. In conjunction with other improvements, this line will provide additional transfer capacity from East Port WRF to the new Walenda RWBS. This improvement should be timed with the upcoming Flamingo Boulevard roadway improvement project.
- Approximately 17,100 LF of new 16-inch pipeline is proposed leaving Eagle Street RWBS along Eagle Street and Quesada Avenue. This pipeline will provide additional transfer capacity from Eagle Street to the new Walenda RWBS.
- In Threshold Capacity 1, the Walenda RWBS was recommended to be converted to an inline RWBS and relocated along the south side of El Jobean Road at Flamingo Boulevard. Phase 2 of this recommendation is to upgrade the firm pumping capacity from 3.96 MGD (2,750 gpm) to 7.92 MGD (5,500 gpm).
- Approximately 23,400 LF of new 16-inch reclaimed water main is required along El Jobean Road and South McCall Road. This line will be a parallel line constructed alongside the existing 16-inch reclaimed water transmission main; the new line will provide additional transfer capacity to West County, as well as system redundancy. This improvement includes horizontal directional drilling or bridge pipe construction along the El Jobean Bridge (across the Myakka River). Additionally, the County plans to remove a 16-inch potable main from service along this route but may decide to convert to a reclaimed water main if suitable.

Threshold Capacity 3

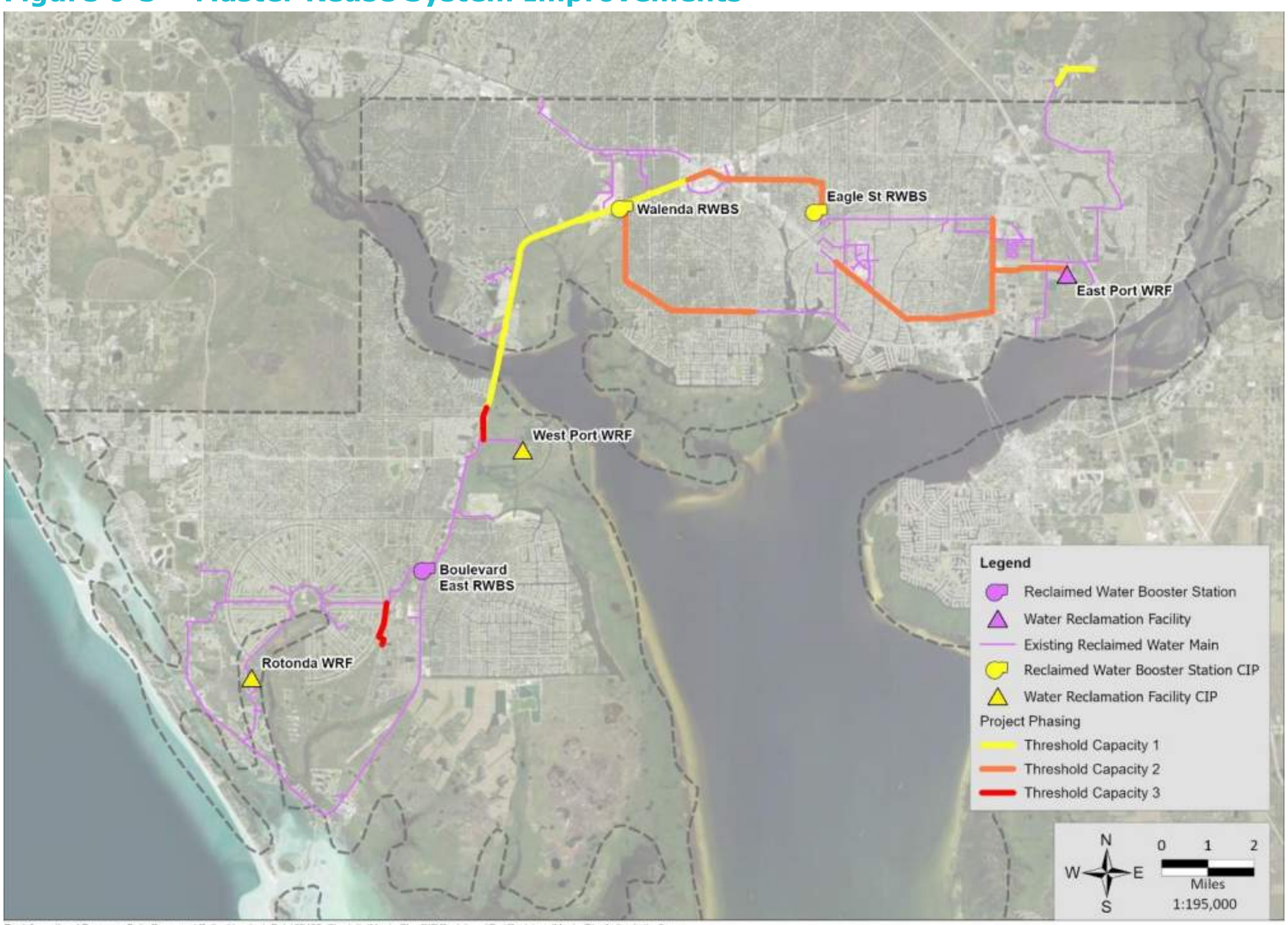
This scenario estimates that all Mid County and West County future users are online. Under this demand scenario, the system demands total approximately 12.36 MGD, with 5.03 MGD in Mid County and 7.33 MGD in West County. The reclaimed water system is transferring approximately 3.94 MGD of reclaimed water from Mid County to West County. This scenario has a total demand of 12.36 MGD; however, modeling iterations indicated that the improvements required for Threshold Capacity 2 must be in place before demands reach 7.78 MGD. The infrastructure improvements necessary for Threshold Capacity 2 are also required for the ultimate system conveyance, with the support of additional improvements outlined in the subsequent sections.

The following improvements are required for meeting Threshold Capacity 3:

- Approximately 3,600 LF of new 16-inch pipeline is proposed along South McCall Road, extending from the Threshold Capacity 1 El Jobean pipeline improvement across the Myakka River to Cattle Dock Point Road. This line will provide additional transfer capacity to West County future users, while adding system redundancy.
- The firm pumping capacity of the West Port WRF will need to be increased to 2.88 MGD to supply ultimate demands. Pump control will be via VFDs with a set point of 80 psi. The increased pump capacity is not required to be online until the future demand increases in the West Port reclaimed water service area, which was assumed to be during Threshold Capacity 2 – 7.78 MGD. Under this scenario, the model also indicated that the no additional storage is required to supply Mid County demands.
- Approximately 5,000 LF of 12-inch reclaimed water line is proposed along Boundary Boulevard. This line will serve future pond user Rotonda Sands.

Figure 6-3 identifies the improvements needed to meet minimum LOS requirements within the Master Reuse System based on the hydraulic modeling analysis at 2040 flow conditions. The improvements needed to meet each threshold capacity are shown and include proposed pump station and storage upgrades discussed previously.

Figure 6-3 Master Reuse System Improvements



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6.5.1.6 Additional Modeling Scenarios

Alternative 1 – No Transfer from Mid County to West County

As mentioned previously, another modeling scenario was conducted to determine the viability of recommended improvements if CCU does not improve transfer capacity from Mid County to West County. Instead, flows would be conveyed to a significant customer or customers requesting reclaimed water in northwest Mid County, just north of Riverwood Golf Course. No major customers or storage ponds currently exist in this area, but interest is increasing in developing this area. During this scenario, a demand node of 3.23 MGD was applied near the existing transmission main along El Jobean Road. This demand mimics the West County supply transfer requirement under 2040 demand conditions.

The hydraulic analysis concluded that this option is viable. The new inline Walenda RWBS would not require the ultimate pumping capacity recommended during the previous analysis. The pump station instead would only require a design capacity of 2,000 gpm with a total dynamic head of 184 feet. The transmission main improvements along South McCall Road W-RM-10 would not be required since no reclaimed water will be transferred to West County. The transmission main improvement would only be required to parallel the existing 12-inch main to Cornelius Boulevard and not continue along El Jobean Road. Additionally, the 20-MG pond and pressure-sustaining valve (W-WP WRF-1) at the West Port WRF site are not required to store transferred reclaimed water supply from Mid County under this scenario. Increased pumping capacity at the West Port WRF site (W-WP WRF-2) would not be required if no reclaimed water is transferred from Mid County to West County. This option would only be needed if additional supply is identified at the West Port WRF or other augmentation sources are available for reclaimed supply. All other improvements are necessary to supply future system demands under this scenario. In addition, a storage tank or storage pond is required in northwest Mid County in the vicinity of Chamberlain Boulevard and Cornelius Road as well as additional transmission main improvements along Cornelius Road connecting the existing transmission main on El Jobean Road to the new storage tank. Alternative 1 varies significantly from the current and future system hydraulic modeling conditions. Thus, further evaluation is recommended if the County desires to pursue this option.

Potential Impacts of Conversion of Rotonda WRF to Master Lift Station and RWBS

The County has discussed removing the Rotonda WRF from service and expanding the West Port WRF. This would require converting Rotonda WRF to a combination Master Lift Station and RWBS. This would allow the County to continue to support the high-pressure users south of Rotonda WRF.

In this scenario, the model was simulated by connecting the reclaimed water transmission main to the existing Rotonda GST. The worst case for this scenario included pumping to the high-water level (HWL) of the tank, which is 56.58 feet. The HWL was assumed based on a 3-MG GST with a 95-foot diameter. The hydraulic analysis concluded that the Boulevard East RWBS has the capacity required to direct flows to the Rotonda GST under this scenario, and it is a viable option for the County. A pressure-sustaining valve will be required on the tank fill line to maintain pressures above the LOS requirements for transmission mains (50 psig). Further analysis is recommended if the County desires to pursue this option.

6.5.2 South County Reuse System

6.5.2.1 Supply and Demand Analysis

Table 6-15 summarizes the results of the supply capacity analysis for the South County Reuse System at 2040 conditions. The reclaimed water supply was based on 2020 influent wastewater AADFs as presented in Section 4.1. The AADDs were calculated from current reclaimed water customers in the South County service area presented in Section 2.3. Overall, the South County supply currently exceeds system demands under average day conditions, indicating that additional reuse customers could be added to the system from a supply-and-demand perspective.

Table 6-15 South County Reuse System Supply and Demand Analysis under 2040 Conditions

Service Area	Reclaimed Water Supply (MGD)	Average Day Demand (ADD-MGD)	Surplus/(Deficit) (MGD)
South County	5.0	3.56	1.44

6.5.2.2 Storage Capacity Analysis

Table 6-16 summarizes the minimum reclaimed water storage required based on future-flow conditions if no other effluent disposal options were available for backup. The analysis was conducted based on three times the 2040 average day demands, which equates to 10.68 MGD. The analysis shows no storage deficiencies for the South County Reuse System once the Burnt Store WRF 2.5-MGD expansion is complete as the future storage capacity is 24 MG. In the interim, the deep injection wells will serve as an additional backup disposal option.

Table 6-16 South Reuse System Storage Analysis under 2040 Conditions

Service Area	Minimum Reclaimed Water Storage (3 x AADD) (MG)	Future Storage Capacity (MG)	Surplus/(Deficit) (MG)
South County	10.68	24.0	13.32

6.5.2.3 Pumping Capacity Analysis

A future reclaimed water pump station analysis was performed with respect to the design specifications of the ongoing Burnt Store WRF expansion. Table 6-17 summarizes the results. Overall, CCU’s future pump station adequately meets firm pumping capacity requirements for average daily demands under future conditions, based on the assumption that large future customers are not directly fed but will be supplied using on-site ponds. Also, the future pump station design currently includes two different pump models on VFDs capable of supporting a large range of operations from less than 1 MGD up to 17 MGD.

Table 6-17 South County Reuse System Pumping Capacity Analysis under 2040 Conditions

Pump Station	Pump Unit	Rated Capacity		Total Pump Station Capacity		Firm Capacity		Service Area Pump Station Capacity Requirement	Service Area Pump Station Capacity Surplus / (Deficit)
		gpm	MGD	gpm	MGD	gpm	MGD	MGD	MGD
Burnt Store WRF	1	3,500	5.04	10,500	15.12	7,000	10.08	3.56	6.52
	2	3,500	5.04						
	3	1,750	2.52						
	4	1,750	2.52						

6.5.2.4 Distribution System Analysis

The hydraulic model was used to assess the 2040 system operations and pressures. The analysis indicates that the system pressures and velocities meet the CCU's LOS requirements and that improvements are not required to expand the reclaimed water system. However, the existing system is limited hydraulically by the 12-inch reclaimed water main connecting the Burnt Store WRF clearwell to the reclaimed water main along Burnt Store Road. According to the modeling analysis, the 12-inch main experiences high headloss at 2040 demands. However, the 2.5-MGD Burnt Store WRF expansion project has included upsizing the pipe to a 24-inch reclaimed water main, which would substantially increase hydraulic capacity.

6.5.2.5 Timing Considerations

Similar to the Master Reuse System, the South County Reuse System has the potential to serve more reclaimed water users once wastewater flows increase and CCU can produce more reclaimed water. Threshold capacities were also developed for the future South County Reuse System as for the future Master Reuse System. Table 6-18 presents the demands for the threshold capacities modeling scenarios for the South County reclaimed water service area. All threshold capacity improvements will be completed sequentially.

Table 6-18 South County Reuse System Threshold Capacity Analysis

Service Area	Existing System Demands (MGD)	Threshold Capacity 1 Demands (MGD)	Threshold Capacity 2 Demands (MGD)	Threshold Capacity 3 Demands (MGD)
South County	0.07	0.4455	2.12	3.56

Threshold Capacity 1

This scenario estimates that all existing South County customers are online as well as the future pending reclaimed water customers including Burnt Store Dollar General, Burnt Store Marina & Golf Course, and Heritage Landings Golf and Country Club.

No additional improvements are required for meeting Threshold Capacity 1.

Threshold Capacity 2

This scenario estimates that all existing South County customers are online as well as the future in-progress reclaimed water customers including Burnt Store Dollar General, Burnt Store Marina & Golf Course, and Heritage Landings Golf and Country Club. In addition, this scenario includes the requested allocation increase of 1.92 MGD from Burnt Store Marina & Golf Course.

No additional improvements are required for meeting Threshold Capacity 2 after the Burnt Store WRF has been expanded.

Threshold Capacity 3

This scenario estimates that the South County future in-progress reclaimed water customers are online as well as the existing system demands. This includes the current customers and future pond and direct customers including Burnt Store Dollar General, Burnt Store Marina & Golf Course, and Heritage Landings Golf and Country Club.

No additional improvements are required for meeting Threshold Capacity 3 after the Burnt Store WRF has been expanded.

6.5.3 Future System Improvements

Table 6-19 summarizes the results from the modeling analysis under future conditions for the Master Reuse and South County Reuse Systems, assuming the recommended improvements herein this Chapter are completed. The Master Reuse System has an overall excess of reclaimed water, but like the current condition the reclaimed water deficient within West County requires pumping and transmission main upgrades to convey flows to West County and maximize the sale of reclaimed water. The storage capacity for the Master Reuse System contains adequate storage for 2040 conditions.

Table 6-19 Master Reuse and South County Reuse Systems Improvement Summary for Meeting Future Conditions

System	Supply Capacity	Storage Capacity	Pumping Capacity	Distribution System
Master Reuse	Satisfactory	Satisfactory	Satisfactory	Satisfactory
South County	Satisfactory	Satisfactory	Satisfactory	Satisfactory

The South County Reuse System is also expecting significant flow increases and therefore will be able to connect future reclaimed water customers. The storage capacity for the South County Reuse System will have adequate storage after the expansion to the Burnt Store WRF is completed. The pumping capacity and transmission systems are adequately sized to meet 2040 conditions serving the existing and potential future customers.

Based on this analysis, CCU should proceed with the improvements identified to serve Threshold Capacity 1 for the Master Reuse System and continue the 2.5-MGD Burnt Store WRF expansion that includes increasing the storage and pump station capacities and upsizing the transmission main leaving the WRF to Burnt Store Road to 24 inches. This will allow CCU to continue to add reclaimed water customers and the supply increases. In general, CCU should continue to analyze the feasibility of each current and potential future customer on a case-by-case basis, use the hydraulic models when necessary to confirm system capacity and infrastructure requirements, and work with developers to share in infrastructure upgrades.

7. CAPITAL MAINTENANCE AND IMPROVEMENT PROJECTS

OVERVIEW

This chapter summarizes the O&M and CIP projects for the CCU reuse systems. The CIP projects identified in Chapters 3 through 6 include recommendations for short-term improvements based on existing needs, storage, and disposal capacity increases for each WRF based on future projections; further studies to determine feasible reclaimed water use alternatives; and improvements required to continue maximizing reuse for irrigation purposes. Chapter 7 summarizes the recommendations from each chapter and provides a recommended improvement plan for implementing the CIP projects.

7.1 Maintenance Projects, Capital Maintenance Programs (CMPs), and Reports and Studies

Utilities must perform numerous rehabilitation and replacement (R&R) tasks necessary to maintain reclaimed water system infrastructure and continue providing quality service to their customers. CCU organizes routine R&R and O&M tasks into Capital Maintenance Programs (CMPs) for budgeting and planning purposes whereas non-routine maintenance tasks are occasionally identified and typically are addressed under a general maintenance budget.

The following sections organize the recommendations from this planning effort into maintenance projects, recommendations to enhance the existing CMP, and planning-related reports and studies. Maintenance projects refer to projects that were identified through the master planning effort but are less routine than typical O&M items. These projects generally exceed $100,000 and are often identified from the various CMPs. The second section includes recommendations for enhancing CCU's existing CMPs. The recommendations herein were developed to enhance CCU operations to meet industry BMPs and to comply with local ordinances and regulations. The final section lists the planning-related projects, which include system condition evaluations, permitting efforts, and feasibility studies. Reports and studies allow utilities to conduct evaluations at an as-needed level of detail and make informed decisions based on results – a critical component for long-term success of utility operations and prioritizing CMP projects.

7.1.1 Recommended Maintenance Projects

As discussed in Chapters 3 and 4, the CCU WRFs are projected to increase reclaimed water flows from 5.85 to 17.5 MGD by 2040. These increases cause deficiencies in the storage capacities of the individual WRFs without the use of alternative disposals or shared storage within the reuse system. As such, CCU should proceed with the following:

- Address the deficiency in the West Port deep injection well clearwell capacity that occurs when accepting flows from the Rotonda WRF.

- Clean and possibly replace the unlined pond at the Rotonda WRF with a GST to increase the amount of usable reclaimed water serving the area. The results from the West Port WRF study should be considered in this recommendation.
- Increase the disposal capacity of the East Port WRF by rerating IW-2 to the maximum allowable flow of 12.73 MGD to provide 100-percent backup disposal to the Master Reuse System under future-flow conditions.
- Increase the disposal capacity of the Burnt Store WRF by rerating IW-2 to the maximum allowable flow of 9.7 MGD to provide 100-percent backup disposal to the Burnt Store WRF under future-flow conditions.
- Pending the improvements of the deep injection wet well and the results from the Rotonda Conversion Feasibility Study, install a new injection well at the West Port WRF to provide 100-percent backup disposal to the Master Reuse System under future-flow conditions.

7.1.2 Capital Maintenance Program Recommendations

CCU's Reclaimed and Support Services Division is responsible for preventative maintenance on the reclaimed water system assets including storage and boosting facilities (RWBSs), distribution system valves, pond discharge valves, and customer meters. In addition, this Division is also responsible for maintaining the CCCP Program and potable water fire hydrant meter maintenance. These tasks, in addition to the following CMP recommendations, should be conducted to support the CCU reclaimed system:

- Continue to integrate the reclaimed water infrastructure and processes into CCU's asset management program.
- Continue to update the hydraulic models with additional information including pipeline improvements, elevation refinements, and geometry information to improve the accuracy of the models.

7.1.3 Reports, Permits, and Studies

CCU, along with various consultants, is developing the following reports related to the reclaimed water system:

- West Port and Rotonda WRFs Upgrades – As part of this effort, consultants are determining the costs associated with upgrading the West Port and Rotonda WRFs to meet AWT standards. The study is comparing the feasibility of upgrading both WRFs versus upgrading only the West Port WRF and de-commissioning or repurposing the Rotonda WRF as a booster station. Assessing the feasibility of converting the Rotonda WRF to a Master Lift Station and further study impacts on the reclaimed water system will be included in this work.

As discussed in Chapter 5, various reuse and disposal applications exist for reclaimed water that were identified as good and fair options for addressing the increased reclaimed water flows in the future. Since many regulations are being reviewed by FDEP, additional detailed studies should be conducted in the short-term to determine the most economical option for alternative reuse applications. These studies include:

- Conduct a feasibility study for potable reuse at the Rotonda WRF and East Port WRF. Because the WRFs are interconnected via the Master Reuse System, excess reclaimed water availability can be shifted from the East Port WRF to the Rotonda WRF once the recommended infrastructure to maximize transfer is in place (recommendations included in this report, i.e., El Jobean Road reclaimed water main improvements M-RM-1, M-RM-2, and M-RM-9). The feasibility study should include evaluating the means for DPR and IPR. The study should generally include the following:

  - Water quantity balancing – Assess the need to implement potable reuse. Compare current and future potable water supplies against demand. Potable reuse should be considered an option to augment identified water shortages.
  - Water quality assessment – Evaluate the source water quality, screen against primary and secondary drinking water standards and contaminants of emerging concern (CECs). A water quality sampling plan should be developed and included. The evaluation of additional WRF sites will require additional samplings, adding cost and time to the feasibility study.
  - Review of potable reuse regulations – Florida regulations are being developed with no timeline for completion. The feasibility study should include reviewing the new regulations. If they are not yet available, then the Notice of Rule Development or Draft rules should be used to inform some assumptions for the ensuing regulations.
  - Treatment technology review – Evaluate treatment technologies and develop treatment train alternatives suitable for achieving potable drinking water quality. Consider the applications of both DPR and IPR.
  - Cost Estimation – Identify the capital and O&M cost for each treatment train alternative.
  - Funding opportunities – Identify grant and loan opportunities available for potable reuse implementation. Some opportunities may be specific to DPR or IPR projects. Funding options can be narrowed or expanded as the feasibility study progresses.

- Assess the viability of AR (Class V) and/or ASR at in Charlotte County where excess reclaimed water could be used to supplement aquifer supplies within the SWUCA via aquifer recharge, ASR, or wetland hydration, and to increase the resilience of the Burnt Store wellfield. Studies should consider the impact of sea level rise on groundwater supplies, existing system infrastructure, regulatory and permitting considerations, treatment requirements, and public outreach. This assessment should also be considered when investigating a potable reuse project.

7.2 Capital Improvement Projects (CIPs)

CIPs can be differentiated from CMP projects in that CIPs typically involve new construction that increases the overall value of the system. As mentioned in Chapters 2 and 3, some ongoing improvements impact the reclaimed water systems and effluent water quality of the WRFs. CCU should continue with their ongoing efforts to meet AWT standards as well as address some current limitations at the WRFs, which are discussed in the *Sewer Master Plan* (Jones Edmunds, 2017) and include:

- Upgrade the East Port WRF to meet AWT standards and expand the WRF capacity to 9.0 MGD.
- Upgrade the Burnt Store WRF to meet AWT standards and expand the WRF capacity to 2.5 MGD. The expansion should address the clearwell limitations since it will include upgrades to the reclaimed water and effluent handling facilities (pump stations, storage,

and conveyance) and increase the transmission main from the WRF to Burnt Store Road to a 24-inch pipe.

As Chapter 6 discusses, the Master Reuse System requires significant expansion to shift excess future reclaimed water supplies from the East Port WRF to existing and future customers in West County, and the South County Reuse System has high customer interest and potential for reuse but a low reclaimed water supply due to low wastewater flows in the developing area. Expanding the Master Reuse System requires upgrading pump stations and transmission mains to convey excess reclaimed water flows from Mid County to West County customers. The County should proceed with near-term improvements to meet Threshold Capacity 1, which will increase CCU's conveyance capacity and allow more reuse customers to be connected to the Master Reuse System. Other long-term improvements should be reconsidered based on the results of the studies listed in Section 7.1.3.

7.3 CAPITAL IMPROVEMENT PLAN

Table 7-1 summarizes the recommended CMP projects and CIPs required to increase capacity and resilience of CCU's reclaimed water infrastructure. The table includes the project type, identifier, project name, priority, area served, and project cost. The identifier was developed to establish a naming convention consistent with other CCU planning documents. It specifies the location (M-Mid County, S-South County, W-West County), type (RWBS – Reclaimed Water Booster Station, RM – Reclaimed Water Main, WRF – Water Reclamation Facility), and number for each project. CIP costs account for design and permitting, contractor mobilization/demobilization, overhead and profit, and construction contingency. Total project costs presented in the CIP tables represent planning-level estimates and do not include inflation, administrative fees, or capitalized interest.

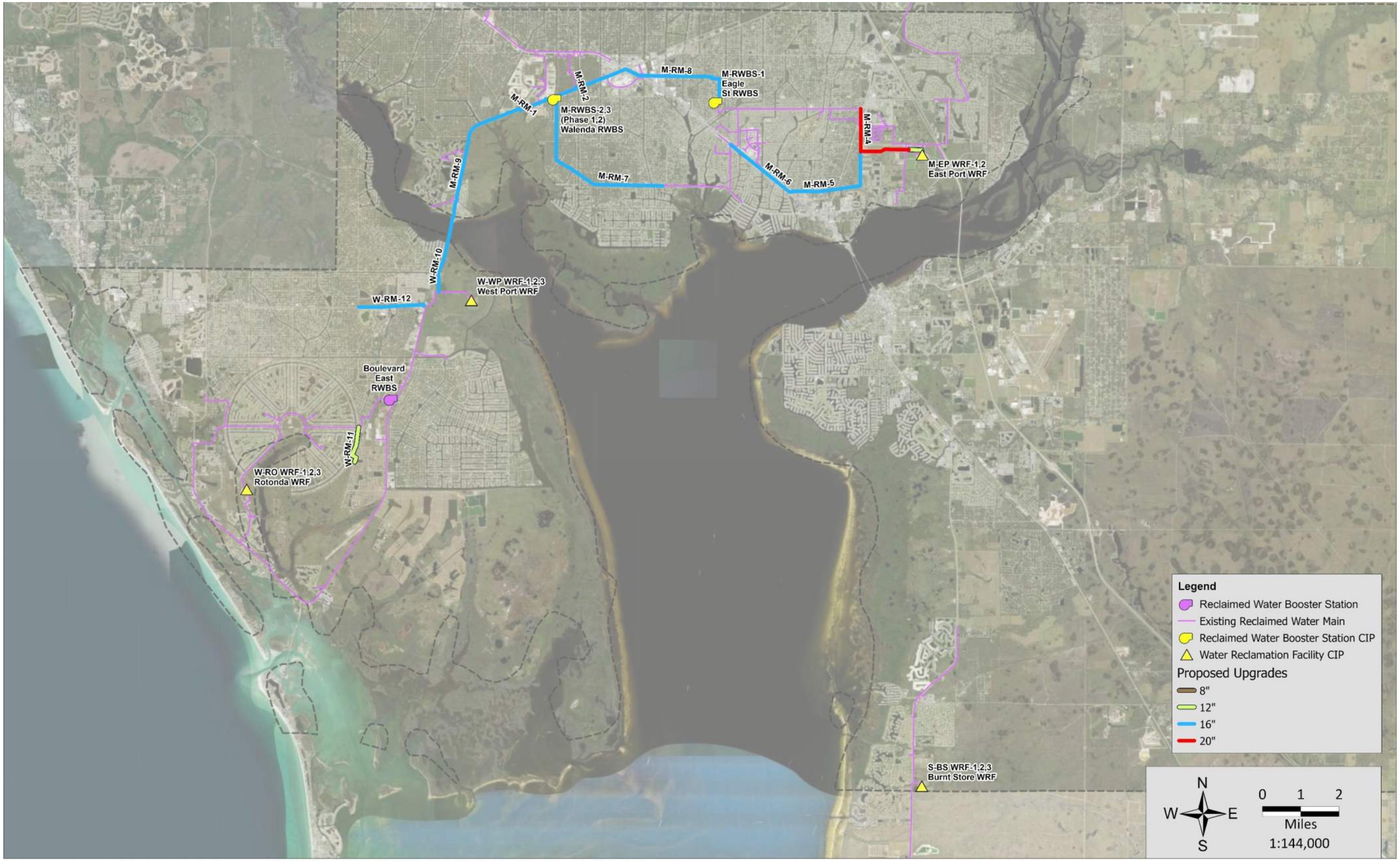
Figure 7-1 displays the County-wide project location map including the size and route of the recommended pipeline CIPs based on modeling results discussed in Chapter 6. Since CCU has backup disposal capacities at each WRF, the schedule and start time for each project are based more on maintaining resilience and driven by the extent that CCU wants to pursue reuse expansion rather than the need for disposal. Phasing for the reclaimed water CIPs be accelerated or deferred as required to account for changes in development schedules, reclaimed water users, funding availability, and other external considerations.

Appendix B includes additional details for each project identified in the capital improvement plan.

Table 7-1 Capital Maintenance Program and Capital Improvement Plan Projects

Project Type and Projects	2026–2030	2031–2035	2036–2040	2041–2045	Grand Total
Pipeline	**$16,500,000**	**$18,000,000**	**$10,800,000**	**$22,400,000**	**$67,700,000**
W-RM-7 – Flamingo Boulevard – New 16-inch Reclaimed Water Main (25,000 LF)	$12,500,000	$0	$0	$0	$12,500,000
W-RM-12 – SR-776 – New 16-inch Reclaimed Water Main (8,000 LF)	$4,000,000	$0	$0	$0	$4,000,000
M-RM-1 – El Jobean Road 1 – New 16-inch Reclaimed Water Main (12,000 LF)	$0	$6,000,000	$0	$0	$6,000,000
M-RM-2 – El Jobean Road 2 – Connect New 16-inch Reclaimed Water Main to Existing 12-inch Main	$0	$250,000	$0	$0	$250,000
M-RM-9 – El Jobean Road 3 - New 16-inch RCW Main (23,500 LF)	$0	$11,750,000	$0	$0	$11,750,000
M-RM-4 – East Port WRF Discharge – New 20-inch Reclaimed Water Main (15,000 LF)	$0	$0	$9,000,000	$0	$9,000,000
W-RM-10 – McCall Road – New 16-inch Reclaimed Water Main (3,600 LF)	$0	$0	$1,800,000	$0	$1,800,000
M-RM-5 – Loveland And Westchester Boulevard – New 16-Inch Reclaimed Water Main (13,000 LF)	$0	$0	$0	$6,500,000	$6,500,000
M-RM-6 – Tamiami Trail – New 16-inch Reclaimed Water Main (9,000 LF)	$0	$0	$0	$4,500,000	$4,500,000
M-RM-8 – Eagle Street – New 16-inch Reclaimed Water Main (17,000 LF)	$0	$0	$0	$8,500,000	$8,500,000
M-RM-3 – MRS Expansion for Sonoma Preserve Connection (3,000 LF)	$0	$0	$0	$900,000	$900,000
W-RM-11 – MRS Expansion for Rotonda Sands Connection (5,000 LF)	$0	$0	$0	$2,000,000	$2,000,000
Facilities	**$0**	**$50,000**	**$5,000,000**	**$2,500,000**	**$7,550,000**
W-WP WRF-2 – West Port WRF HSPS Upgrades	---------------Cost budgeted as part of the West Port WRF 5.0-MGD Expansion--------------				
W-WP WRF-1 – West Port Pond Valve	$0	$50,000	$0	$0	$50,000
M-RWBS-1 – Eagle Street RWBS Upgrades	$0	$0	$1,500,000	$0	$1,500,000
M-RWBS-2 – Walenda RWBS Upgrades – Phase 1	$0	$0	$3,500,000	$0	$3,500,000
M-RWBS-3 – Walenda RWBS Upgrades – Phase 2	$0	$0	$0	$2,500,000	$2,500,000
Reports/Studies	**$550,000**	**$0**	**$0**	**$0**	**$550,000**
W-Ro WRF-3 – Rotonda Conversion Feasibility Study	---------------Cost budgeted as part of the West Port WRF 5.0-MGD Expansion--------------				
M-Ro WRF-2 – Potable Reuse Feasibility Study	$300,000	$0	$0	$0	$300,000
S-BS-WRF-1 – Aquifer Recharge Feasibility Study	$250,000	$0	$0	$0	$250,000
Excess Effluent Disposal/Reject Water Improvements	**$5,350,000**	**$3,000,000**	**$150,000**	**$0**	**$8,500,000**
M-EP WRF-1 – East Port WRF Deep Injection Well Force Main Upsizing to 36 inches	$5,200,000	$0	$0	$0	$3,200,000
M-EP WRF-2 – East Port WRF Deep Injection Well No. 2 Capacity Increase (Rerating and Permitting)	$150,000	$0	$0	$0	$150,000
W-Ro WRF-1 – Convert Rotonda WRF Unlined Pond to GST	$0	$3,000,000	$0	$0	$3,000,000
S-BS-WRF-2 – Burnt Store WRF Deep Injection Well No. 2 Capacity Increase (Rerating and Permitting)	$0	$0	$150,000	$0	$150,000
W-WP WRF-3 – Improve Wet Weather Disposal Capacity at West Port WRF	---------------Cost budgeted as part of the West Port WRF 5.0-MGD Expansion--------------				
Grand Total	**$22,400,000**	**$21,050,000**	**$15,950,000**	**$24,900,000**	**$84,300,000**

Figure 7-1 Capital Improvement Program Project Map



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8. FINANCING AND FUNDING OPTIONS

OVERVIEW

One objective of the RWMP is to aid Charlotte County in implementing policies that encourage and promote the use of reclaimed water to the extent technically and economically feasible. This chapter discusses avenues for Charlotte County to accomplish this through customer forecasts, reclaimed water rates and agreements, and funding sources potentially available to Charlotte County.

8.1 Customer Forecast and System Attributes

The Charlotte County website encourages interested bulk-quantity reclaimed users such as commercial businesses, residential developments, and golf courses to contact CCU at 941.764.4504 or CCUReclaim@CharlotteCountyFL.gov. As the County continues to grow, additional customers can be added to the reuse systems. CCU maintains an active list of interested reclaimed water customers (as provided in Section 5.7.4). Because of CCU’s historical commitment to water conservation and public engagement on reclaimed water, most residents and businesses support the use of reclaimed water. However, some developers have expressed concerns over Charlotte County’s backflow-prevention device standards and refused to connect to the reclaimed water systems. Therefore, Charlotte County has also adopted Water & Sewer (WSW) Policy 4.2.9 and WSW Policy 4.2.10 into the *2050 Charlotte County Comprehensive Plan* as a means to promote water conservation and increase distribution of reclaimed water to the extent possible:

- WSW Policy 4.2.9 requires all new developments to connect to recycled water systems for non-potable uses (such as irrigation) whenever said systems are made available, where *made available* refers to the recycled water system having adequate capacity to support the developer’s needs and a functioning reclaimed water main is within 500 feet, or if the cost to extend said pipeline within 500 feet of the property is feasible for the utility.
- WSW Policy 4.2.10 requires that non-potable water uses be met by reclaimed water supplies whenever possible.

If reclaimed water is not available, the user is permitted to use groundwater sources for irrigation. However, CCU works with new developers to eliminate unnecessary private irrigation wells and expand the reclaimed distribution system to the greatest extent technically and economically feasible.

8.2 Reclaimed Water Customer Types

Considerations for the development and expansion of reclaimed water distribution systems should include a comparison between the costs associated to supply the user and the potential benefits it may offer to the environment, the community, and the utility (as it relates to O&M). This can help determine the optimal customer base best suited for each utility, reducing overall reclaimed O&M costs, and freeing up capital for further reuse expansion or investments elsewhere. This process is especially important for utilities that historically do not net profit from sales of reclaimed water.

The following categories were selected to guide a qualitative cost-benefit analysis for existing and potential customers in the CCU service area(s).

- Operational Flexibility – The ability of a system to function under various conditions in which less equipped systems may incur unexpected costs and/or result in failure.
- Environmental/Societal Benefit – The impact the customer has on water supply and groundwater withdrawals.
- Offset of Raw or Potable Water – The level of water conservation achieved by using non-potable water for non-potable application such as irrigation. Large users should be considered more valuable customers.
- Infrastructure Investment – The practicality and flexibility of the piping improvements necessary to connect a user. Small users typically require smaller-diameter distribution mains.
- O&M Considerations – The cost of O&M by the utility to upkeep the connection with the user. This includes associated costs such as site inspections, cross-connection control, delivery, metering, and more.
- Cooperative Funding Opportunities – The potential for the user or an outside agency to contribute to the capital investments required for reclaimed water delivery including connection and extension of the reclaimed water mains.
- Revenue Considerations – The potential for the utility to generate revenue through the sale of reclaimed water based on current rate structure.

Although reclaimed water may be used in many residential, commercial, municipal, industrial, and agricultural applications, the reclaimed water customers within Charlotte County are typically composed of residential, commercial, and municipal customers. These customers were grouped into four primary reuse user types based on CCU's existing customer base, existing infrastructure, community zoning, and new and/or interested developments throughout Charlotte County. These customer types for current and/or potential future reuse users are as follows:

- Golf Courses
- Athletic Complexes and Schools
- Parks and Roadway Medians
- Residential (bulk customers)
- Residential (individual customers)

Table 8-1 summarizes the results of the qualitative cost-benefit analysis for the primary customer types in Charlotte County. Based on this analysis, CCU should continue to prioritize large users such as golf courses, athletic complexes, condominiums, and other bulk residential customers, rather than detached individual single-family homes.

Table 8-1 Reclaimed Water Customer Type Comparison

Customer Type	Operational Flexibility	Environmental/ Societal Benefit	Ground or Potable Water Offsets	Infrastructure Investment	O&M Considerations	Cooperative Funding Opportunity	Revenue Considerations
Golf Courses	Good Private infrastructure (stormwater ponds) provides storage.	Good Offsets large surficial aquifer groundwater withdrawals	Poor Golf courses do not irrigate with potable water.	Good Requires large transmission mains and meters.	Fair Requires metering and SCADA implementation and maintenance of transmission main, meter, and discharge valve station.	Good Likely to receive funding support.	Fair Bulk reclaimed water user rate.
Athletic Complexes and Schools	Fair Storage typically not provided by user, but capacity is large.	Good Offsets medium surficial groundwater withdrawals	Fair Medium potential to offset potable water use.	Fair Requires large transmission mains, distribution system, meters, and backflow prevention.	Fair Requires metering and SCADA implementation and maintenance of transmission main and meter maintenance.	Poor Unlikely to receive funding support.	Fair Bulk reclaimed water user rate.
Parks and Roadway Medians	Fair Storage is not provided but capacity is large.	Fair Enhances positive biophilia effect on society	Poor alternative is not to irrigate the area.	Fair Requires large transmission mains and distribution system.	Good Requires transmission main maintenance.	Fair Potential to receive funding support.	Poor Little to no direct revenue source.
Residential Areas (Bulk Customers)	Good Storage may or may not be provided, and capacity is large.	Good Offsets surficial aquifer groundwater withdrawals / potable use.	Good Medium potential to offset potable water use.	Fair Requires large transmission mains, distribution system, bulk meters, and backflow prevention.	Fair Requires metering and SCADA implementation and maintenance of transmission main and meter maintenance.	Poor Unlikely to receive funding support.	Fair Bulk reclaimed water user rate.
Residential Areas (individual / non-Bulk customers)	Poor Storage is not provided, and capacity is small.	Fair Offsets small surficial aquifer groundwater withdrawals / potable use.	Good Medium potential to offset potable water use.	Poor Requires large transmission mains, distribution system, many meters, and backflow prevention.	Poor Requires transmission main, distribution main, and meter maintenance.	Poor Unlikely to receive funding support.	Good Highest reclaimed water rates.

8.3 Reclaimed Water Rates

As mentioned in the previous section, the O&M costs for supplying reclaimed water to the customer and the reclaimed water usage rate have a significant impact on CCU's targeted reclaimed water customer type. Historically, reclaimed water rates were originally based on the cost of disposal rather than the value of the resource. Over recent years, regulations governing reclaimed water have become more stringent, which has led to increased costs to operate and maintain reclaimed water systems. These costs are expected to continue to increase with discussions of emerging contaminants, which will drive reclaimed water use policy decisions.

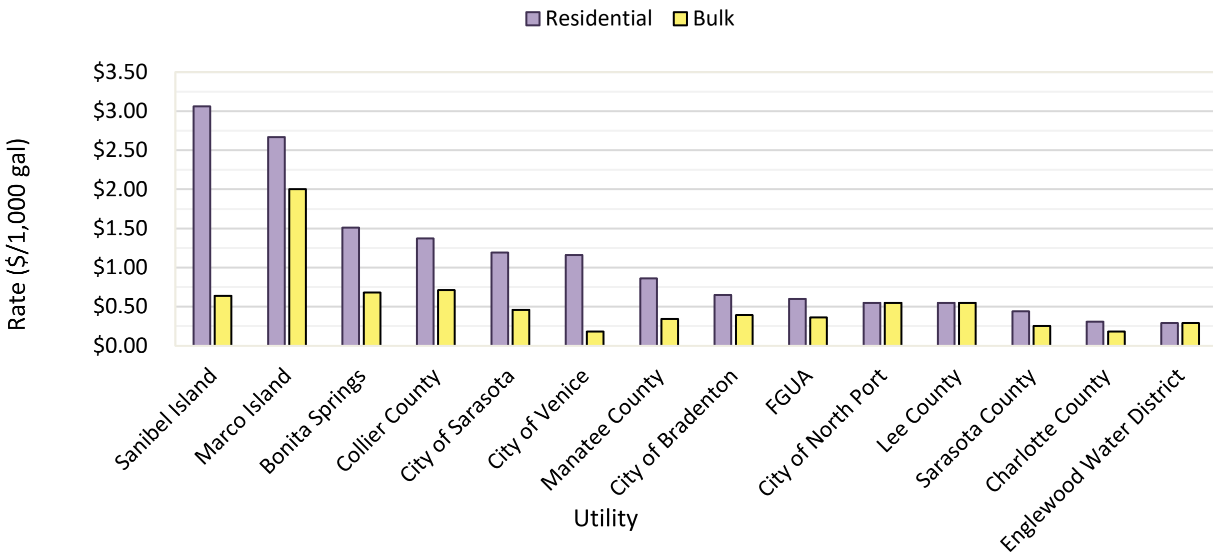
Utilities have generally been experiencing increased pressure and incentives from local, state, and federal government agencies to maximize the use of reclaimed water as an alternative water supply. The reclaimed water applications presented in Chapter 5 have many benefits that are not easily quantifiable from a cost perspective. For instance, the impact of conveying reclaimed water to wetlands or recharging depleted aquifers have O&M costs but no direct revenue from reclaimed water sales. On the other hand, potable reuse would allow CCU to sell water at a much higher rate, which would generate significant revenue, but the O&M costs for treatment are substantial. At a minimum, reclaimed water rates should be set at a level that supports system O&M costs to be economically and financially feasible. In the case for expansion of the reuse systems, the rates must be comparable to other irrigation alternatives so that potential customers may choose the less-expensive reclaimed water over purchasing higher-cost potable water or paying to drill, operate, and maintain a private well.

On March 27, 2012, the BCC approved Resolution No. 2012-019, establishing a schedule for fixing water, sewer, and reuse rates, fees, and charges for the utility services furnished by CCU to present and future customers. Charlotte County's customer reclaimed water rates were last reviewed and approved in 2019, establishing an effective rate schedule for 2019, 2020, and 2021, with rates increasing after April 1 each year. CCU's reclaimed water rates are charged monthly. Cost ranges from $0.13 to $0.36 per 1,000 gallons of reclaimed water, depending on delivery method (pond delivery versus direct feed) and usage rate tier, plus a recurring base facility charge of $3.07.

Utilities typically implement a tiered rate structure for reclaimed water service, similar to water or wastewater services. However, rather than implementing an increasing block rate structure as with potable water, CCU's reclaimed water is charged on a decreasing block rate structure to offer additional incentive for large, reclaimed water users. Figure 8-1 shows that utilities' reclaimed water rates typically differentiate charges for bulk users versus individual residential users, with bulk users receiving lower rates. As the data show, reclaimed water rates vary considerably throughout Florida, but Charlotte County remains one of the lowest in the area.

At the time of the last rate approval, CCU collaborated with a private rate consultant and SWFWMD to determine the rates that would be fair to customers. These approved rates were based on the alternative cost for reclaimed water disposal using local deep injection wells, but CCU should conduct a present-day evaluation of current reclaimed water customer charge rates and adjust accordingly based on the requirements of SB 64 and the State's new *One Water Florida* initiative.

Figure 8-1 Reclaimed Water Rate Comparison



Note: Source data collected from FDEP *2019 Reuse Inventory Report*, *2020 Reuse Inventory Report*, and available information found on respective utility websites.

8.4 Funding Sources

Funding for reclaimed water projects includes two distinct elements:

- Funding of infrastructure improvements (including associated planning, design, project management, and construction) by CCU or through potential partnerships with local developers. These include loans, grants, bonds, or some combination thereof.
- Methods by which any borrowed funds for such infrastructure are repaid by the utility, property owners, end users, and/or other future revenue streams. These may include local assessments, customer rates, impact fees, and taxes that support the repayment of debt obligations.

This section discusses several funding sources available to CCU for reclaimed water CIPs.

8.4.1 Developer Partnerships

CCU provides utility service assistance during various permitting processes and works with developers on a case-by-case basis to expand the reuse system and extend transmission systems to future customers. Historically this has been a successful method for expanding the reuse systems. However, recently some large users have applied to SWFWMD for irrigation well permits instead of connecting to the reclaimed water system to bypass the requirement of installing the County's standard backflow-prevention devices on the potable water meter connections. This is unfortunate since additional groundwater withdrawals for lawn irrigation increases the potential for saltwater intrusion and directly conflicts with state and local water conservation efforts. Legislation efforts may be needed to find a reasonable compromise to address this occurrence.

8.4.2 State-Appropriated Funds

The State Legislature and Governor's Office have had significant interest in water quality improvements and reducing surface water discharges. Significant action in support of reclaimed water was taken during the 2021 Legislative Session with the passing of Senate Bill 64, which was subsequently approved by the Governor in June 2021. This reclaimed water bill:

- Requires certain domestic wastewater utilities to submit a plan to FDEP for eliminating nonbeneficial surface water discharge within a specified timeframe.
- Requires domestic wastewater utilities applying for permits for new or expanded surface water discharges to prepare a specified plan for eliminating nonbeneficial discharges as part of its permit application.
- Provides that potable reuse is an alternative water supply and that projects relating to such reuse are eligible for alternative water supply funding.
- Requires counties, municipalities, and special districts to authorize graywater technologies under certain circumstances and to provide certain incentives for the implementation of such technologies.
- Provides for the applicability of specific reclaimed water aquifer storage and recovery well requirements and a declaration of important state interest.

This historic move away from nonbeneficial surface water discharge and toward reclaimed water and potable reuse opportunities highlights the State's commitment toward alternative water supply technologies. Legislative appropriations will continue to be an important source of funding for reclaimed water expansion projects and should be considered annually when CCU is planning to move forward with CIPs. Legislative appropriation requests must be submitted to the House and the Senate for consideration. New forms are released each year and are typically due at least 30 days before the start of session; early submission is strongly recommended.

8.4.3 Grants

State and federal agencies such as FDEP, EPA, US Department of Agriculture (USDA), and other agencies will often sponsor programs that include grants or loan forgiveness elements that do not require repayment. Although repayment is not required with grant programs, the County may experience a certain level of administrative and other costs pursuing and executing grants; projects are also often considered more competitive if the County can provide a cash match or in-kind services.

At the local level, SWFWMD and the South Florida Water Management District (SFWMD) offer grant programs. The SWFWMD Cooperative Funding Initiative covers up to 50 percent of the cost of projects that help create sustainable water resources, enhance conservation efforts, restore natural systems, and provide flood protection. SWFWMD Fiscal Year 2023 (FY23) applications are due by 5 pm on the first Friday in October. The SWFWMD Cooperative Funding Program is intended to assist local governments, public and private water providers, and other entities with construction and/or implementation of alternative water supply and water conservation projects that support or complement SWFWMD's mission. The SWFWMD FY23 grant funding application deadline has not yet been announced, but grant applications are typically due in the Fall.

Part of Charlotte County is in SWFWMD's SWUCA, an area designated in 1992 to address declines in aquifer levels primarily due to groundwater withdrawals; SWFWMD has provided financial incentives for conservation and development of alternative supplies in this area including funding projects with CCU.

At the state level, FDEP administers multiple grant programs. Wastewater and Water Quality Grants are available intermittently throughout the calendar year. The County should sign up for the FDEP e-mail listserv; new grants programs and deadlines are announced throughout the year. Alternative water supply funding is also available, and applications are submitted through local water management districts. County reclaimed water projects may also be eligible for a FDEP State Water-quality Assistance Grant (SWAG), a program which combines both the Federal Clean Water Act Section 319(h) grants and the former Total Maximum Daily Load (TMDL) grant program into one unit that provides financial assistance to Florida's local governments, including county and municipal governments, for control of water pollution from nonpoint sources. Portions of Charlotte County are within the Caloosahatchee Estuary Basin Management Action Plan (BMAP) area, and if nonpoint source pollution reduction can be tied to a reclaimed water project, that element of the project may qualify for funding.

At the federal level, Charlotte County was allocated $36,693,553 through the American Rescue Plan Act (ARPA). The State and Local Coronavirus Fiscal Recovery Fund established in ARPA is intended *to support urgent COVID-19 response efforts to control the spread of the virus, replace lost public sector revenue, support economic stabilization for the county, and to address necessary investments in water, sewer, stormwater and broadband infrastructure*. All funds must be incurred and obligated by December 31, 2024, and expended by December 31, 2026. The County has developed a 4-year ARPA spending plan, focusing on investments in water infrastructure, wastewater infrastructure, stormwater treatment, and broadband, as well as facilitating water reuse. The Year 1 draft spending plan includes $300,000 for AWT design at the East Port WRF. Years 2 through 4 focus on infrastructure that includes AWT at the East Port WRF, AWT at the Burnt Store WRF, and a sewer expansion program. The County could also elect to include additional focus on reclaimed water system expansion in Years 2 through 4 of their ARPA spending plan.

8.4.4 Low-Interest Loans

FDEP administers the Clean Water State Revolving Fund (CWSRF) loan program for financing public sewer utility infrastructure projects, which includes reclaimed water projects. The CWSRF 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 2017, this

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[1] FDEP. 2017. *State Revolving Fund, What is the State Revolving Fund (SRF)?* Accessed at: www.dep.state.fl.us/water/wff/. 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.

rate for many communities was less than 0.5 percent, depending on census tract and other SRF affordability indices. This current level of interest is almost cost free. One drawback is that SRF loan repayment terms are typically limited to 20 years or less. The principal and interest payments cannot be tailored around the issuer's existing debt service structure to level overall debt payments. SRF loan agreements also require that rates be sufficient to provide for at least 1.15 annual debt service coverage. Additionally, the federal government has approved a significant increase in SRF funding through the 2022 Bipartisan Infrastructure Law, which may improve the County's chances of receiving a CWSRF loan.

EPA has developed the Water Infrastructure Finance and Innovation Act (WIFIA) program to provide a subsidized loan program for water- and sewer-related infrastructure projects. Based on early information provided by EPA, 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 derive 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. However, a substantial application fee is associated with this program. The County should monitor the WIFIA program as EPA unveils it to pursue advantageous funding opportunities as they become available.

Overall, the CWSRF loan program appears to better suit the County's reclaimed water master plan because the interest rate is much lower than other loan options and the program is firmly established for Florida utilities. Segment caps are established for SRF funding each year; however, additional incoming federal funding may increase the segment cap over previous years and/or increase the availability of principal forgiveness. To apply for CWSRF funding, the County must first submit a Request for Inclusion (RFI) to be considered at a Public Listing Meeting (PLM) for funding selection; PLMs are held quarterly each year (subject to funding availability), starting in August. The RFI must be submitted at least 45 days before the PLM. To receive planning funding only, an RFI needs to be submitted. To receive design funding, an RFI and a completed and approved planning document (a Facility Plan) must be submitted. To receive construction funding, an RFI, accepted Facility Plan, plans and specifications, certification that sites have been or will be obtained, and all required permits must be submitted. For design and construction funding, the environmental review (part of the Facility Plan) should be submitted earlier than the requisite 45 days due to additional multiple agency review. This report has been structured to complement the CWSRF funding process and includes information required in the RFI and facility plan.

8.4.5 Bonds

The 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 4.0- 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 the repayment structure can be tailored to meet the utilities' short- and long-term needs and existing debt repayment structure.

8.4.6 Sales Tax

Pursuant to Section 212.055 of the Florida Statute (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, design and engineering costs, and all other professional and related costs required to bring the public facilities into service.[2] As an example, discretionary sales tax revenue has been used toward utility infrastructure in Sarasota, Hillsborough, Monroe County and Brevard County. 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.[3] A voter referendum would be required to extend the discretionary sales tax to account for projects identified past 2020. Historically no funds originating from sales taxes have been used for reclaimed water projects.

8.4.7 MSBU and Utility Extension

Another option for funding reclaimed water projects is to use Municipal Service Benefit Units (MSBUs) or utility extensions. Counties typically will establish MSBUs if special assessments apply to only portions of the county area. Because of the localized nature of the costs and benefits of utility infrastructure installation, local governing bodies often impose special assessments on the property and typically collect such assessments through the annual tax bill administered through the tax collector's office. The procedure for imposing special assessments in Florida are set forth in Chapter 197, FS. In addition to public hearing, notification, and other procedural matters, special assessments imposed on a property must meet a two-pronged test: 1) the property must receive a special benefit from the improvement, and 2) the costs of such improvements must be fairly and reasonably apportioned among benefitting properties.

The MSBU/assessment approach is the traditional method of recovering costs for infrastructure projects. The advantage to this approach is that it involves an established collection procedure through the local tax collector. Since taxes have the highest priority of payment relative to liens and other claims, the collection rate is significantly high. Offsetting these benefits are the administrative costs of administering the program, developing assessment resolutions, public hearings, etc. Statutory early pay discounts of up to

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[2] Florida Legislature. 2016. Section 212.055(2)(d)1a, FS. (http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0200-0299/0212/Sections/0212.055.html).

[3] Office of Economic and Demographic Research. 2016. *Local Government Financial Information Handbook*. p. 152.

4 percent to property owners are available and need to be built into the assessment calculation so that revenues adequately fund the extension program.

The utility extension/lien program does not require the same level of administrative burden compared to the MSBU/assessment approach. However, the administrative and collection burden under the extension shifts to CCU. The collection enforcement of a separate monthly bill to the property owner is not as sure as the tax bill. CCU may be able to enforce payment through a combination of a lien and cutoff of the water service. However, the ability to disconnect service for non-payment of financed connection fee is a legal question beyond the scope of this study.

Charlotte County has developed MSBUs for a variety of municipal services such as streets/drainage as well as certain sewer areas but none for reclaimed water service.

8.5 Reclaimed Water Agreements

In the best interest of public health and safety, successful reclaimed sales are best facilitated through User Agreements that clearly establish regulatory obligations, quantity and schedule of delivery, location and method of delivery, supply reliability, and usage rates. Furthermore, execution of User Agreement(s) *prior to reclaimed water delivery* is in Charlotte County's best interest and is standard practice for every reclaimed supplier.

The AWWA *Manual M24 Planning for the Distribution of Reclaimed Water* specifies that the minimal requirements for reclaimed water customer agreements include:

- Location of reclaimed water use.
- The reclaimed water available.
- Site use(s).
- Anticipated delivery volumes and/or restriction, defining maximum, minimum, and average use expectations.
- Conditions and procedures under which service disruptions may occur and alternate supply sources.
- Commodity rates.
- User plans for potable and reclaimed water systems.
- Anticipated frequency and type of site inspections.
- Fees for any regulatory oversight.
- Backflow-prevention and cross-contamination control requirements.
- Information about lease and/or property transfer.
- Information about adequate notice and termination of service.

As mentioned previously, operating reclaimed water systems can be challenging since supply and demands do not coincide seasonally. Reclaimed water customers often want more reclaimed water during the dry season and less to no water in the wet season, whereas CCU's reclaimed water flows are the opposite typically dropping in the dry season and peaking in the wet season. CCU has limited control over the total volume of reclaimed water production because flows are driven by wastewater flows, which in turn are largely a function of residential water usage and I&I during the wet season. The primary tool CCU uses to manage reclaimed water availability is to provide excess storage in the system and to convey reclaimed water throughout its regional system. This allows CCU to typically meet its current customer demands. However, where excess reclaimed water users are connected, large deficiencies and surplus may exist due to seasonal trends that will create further operational challenges. As such, reclaimed water agreements must be structured and phrased to use the resource when available, while not being able to guarantee the resource to its constituents. In addition to the recommendations provided by AWWA, other best practices include providing some public outreach material to educate the users on reclaimed water use and water conservation, standard clauses referencing state regulations on water quality and operations standards, no resale clauses, reduction of groundwater withdrawal clauses, and responsibility of infrastructure clauses. Appendix C provides an example standard reclaimed water agreement showing that CCU has adopted many of these recommendations.

Appendices

Appendix A

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Appendix B

Capital Improvement Project Sheets

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **M-RM-1 - El Jobean 1 - New 16-inch RCW Main**

Related CIP: **M-RM-2, M-RM-3** | **Project Area Served:** **West County**

Description: Install new 16-inch main approximately 12,000 linear feet along El Jobean Road between Enterprise Drive and ending after Charlotte Sports Park. This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2031
End: 2035

PROJECT DETAILS

Project Location
Murdock

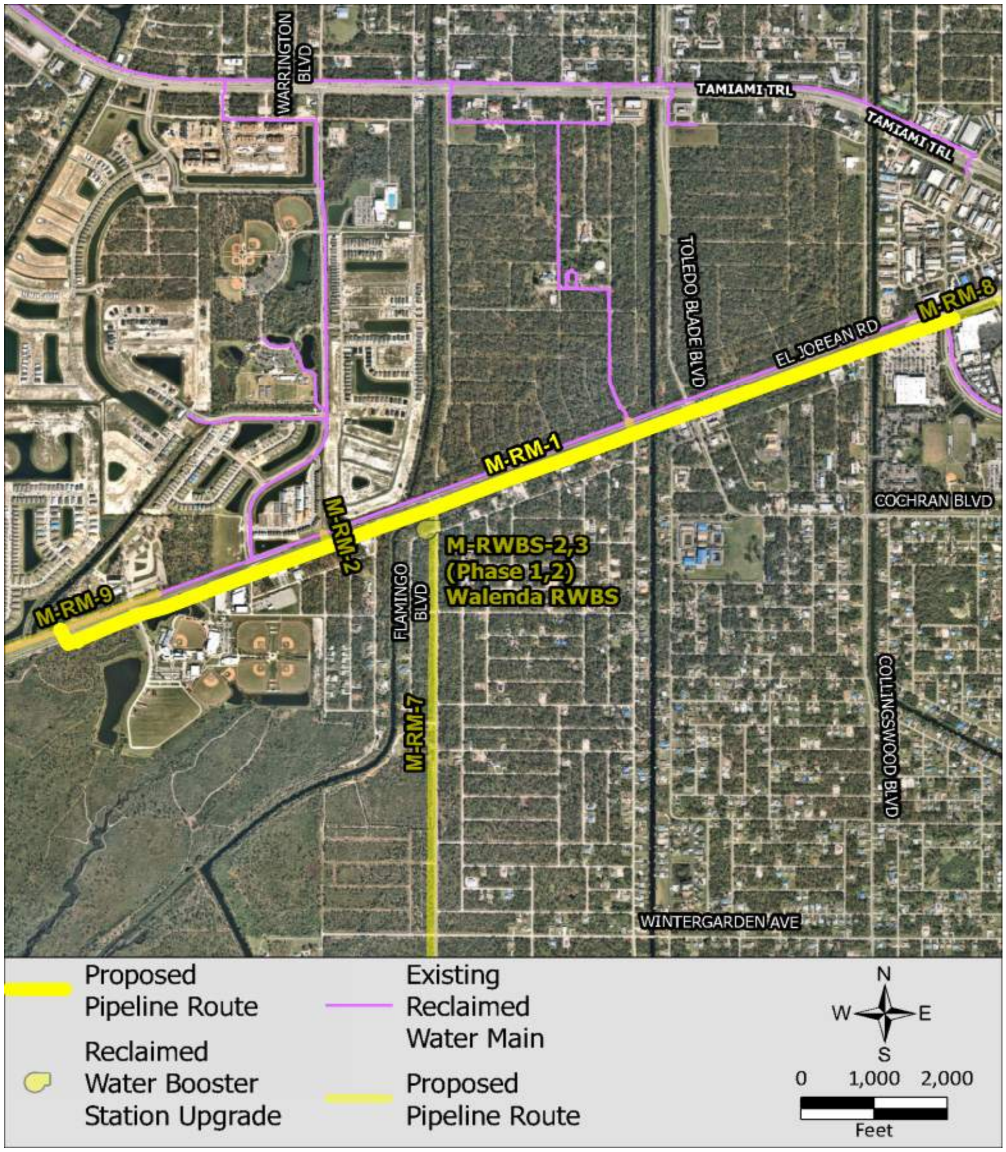
Project Type
Reuse Expansion

Pipe Length
12000 feet

Pipe Diamter
16 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	200	200	200			600
Internal Costs						
Construction Cost			1,800	1,800	1,800	5,400
Other Fees and Costs						
Total Project Cost	**200**	**200**	**2,000**	**1,800**	**1,800**	**6,000**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **M-RM-2 - El Jobean 2 - Connect New 16-inch RCW main to existing 12-inch main**

Related CIP: **M-RM-1, M-RM-3** **Project Area Served:** **West County**

Description: Install new 16-inch mains approximately 500 linear feet to connect the existing 12-inch main along El Jobean Road with the proposed 16-inch main and the Walenda Inline Booster Station. This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2031
End: 2035

PROJECT DETAILS

Project Location
Murdock

Project Type
Reuse Expansion

Pipe Length
500 feet

Pipe Diamter
16 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	8	8	8			25
Internal Costs						
Construction Cost			75	75	75	225
Other Fees and Costs						
Total Project Cost	**8**	**8**	**83**	**75**	**75**	**250**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **M-RM-3 - MRS Expansion for Sonoma Preserve Connection**

Related CIP: **W-WP WRF-1** | **Project Area Served:** **Lake Suzy**

Description: Install new 8-inch main approximately 3,000 linear feet along Southwest Country Road to connect the future Sonoma Preserve development to the Master Reuse System.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
No

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2041
End: 2045

PROJECT DETAILS

Project Location
Mid County

Project Type
Reuse Expansion

Pipe Length
3000 feet

Pipe Diamter
8 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	30	30	30			90
Internal Costs						
Construction Cost			270	270	270	810
Other Fees and Costs						
Total Project Cost	**30**	**30**	**300**	**270**	**270**	**900**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: M-RM-4 - East Port WRF Discharge - New 20-inch RCW main

Related CIP: None

Project Area Served: Port Charlotte/West County

Description: Upsize 12-inch main to 20-inch main approximately 15,000 linear feet from the East Port WRF and along Loveland Blvd north to Midway Blvd. This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2036

End: 2040

PROJECT DETAILS

Project Location
Mid County

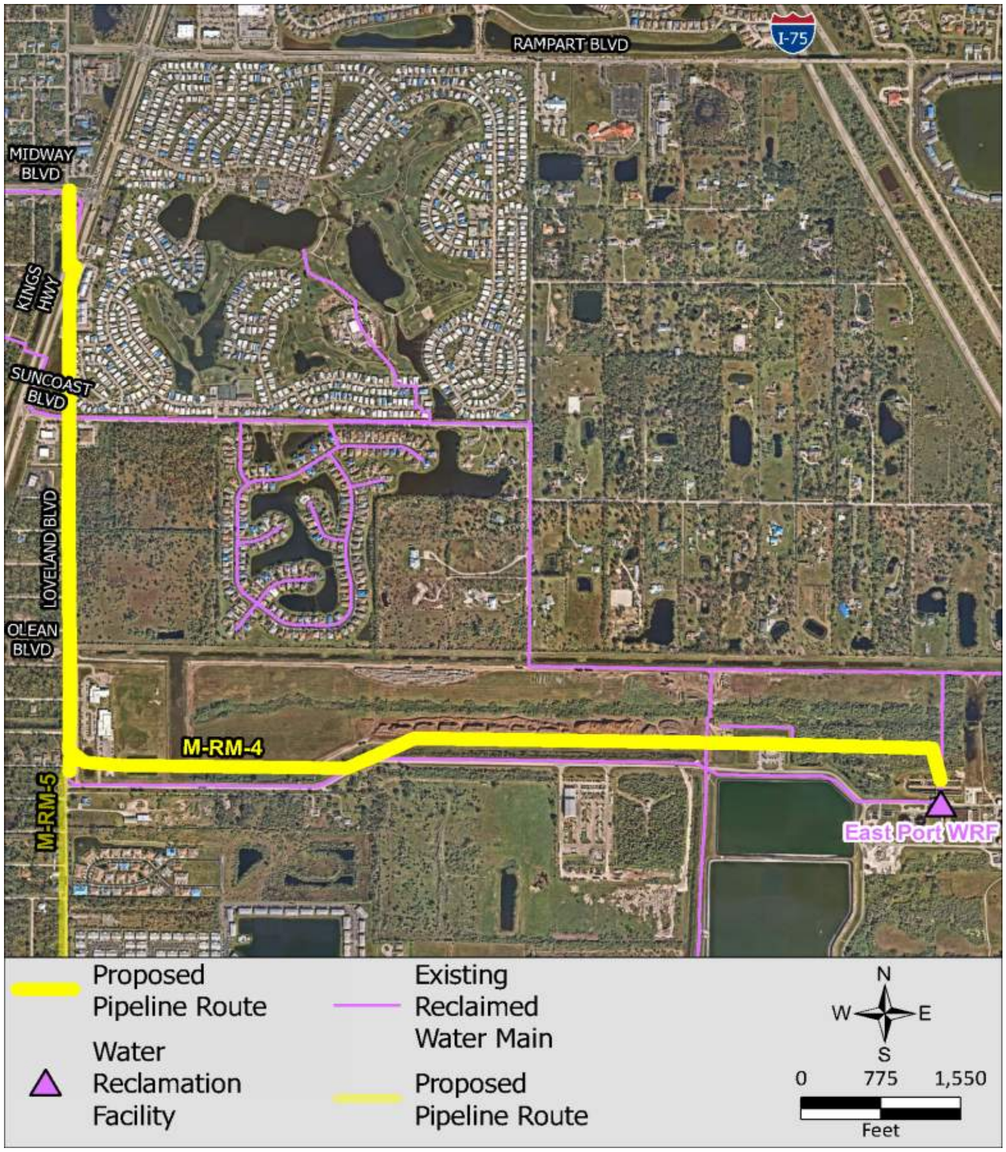
Project Type
Reuse Expansion

Pipe Length
15000 feet

Pipe Diamter
20 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	300	300	300			900
Internal Costs						
Construction Cost			2,700	2,700	2,700	8,100
Other Fees and Costs						
Total Project Cost	**300**	**300**	**3,000**	**2,700**	**2,700**	**9,000**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: M-RM-5 - Loveland and Westchester Blvd - New 16-inch RCW main

Related CIP: M-RM-4 | **Project Area Served: Port Charlotte/West County**

Description: Install new 16-inch main approximately 13,000 linear feet along Loveland Blvd and Westchester Blvd. This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2041
End: 2045

PROJECT DETAILS

Project Location
Mid County

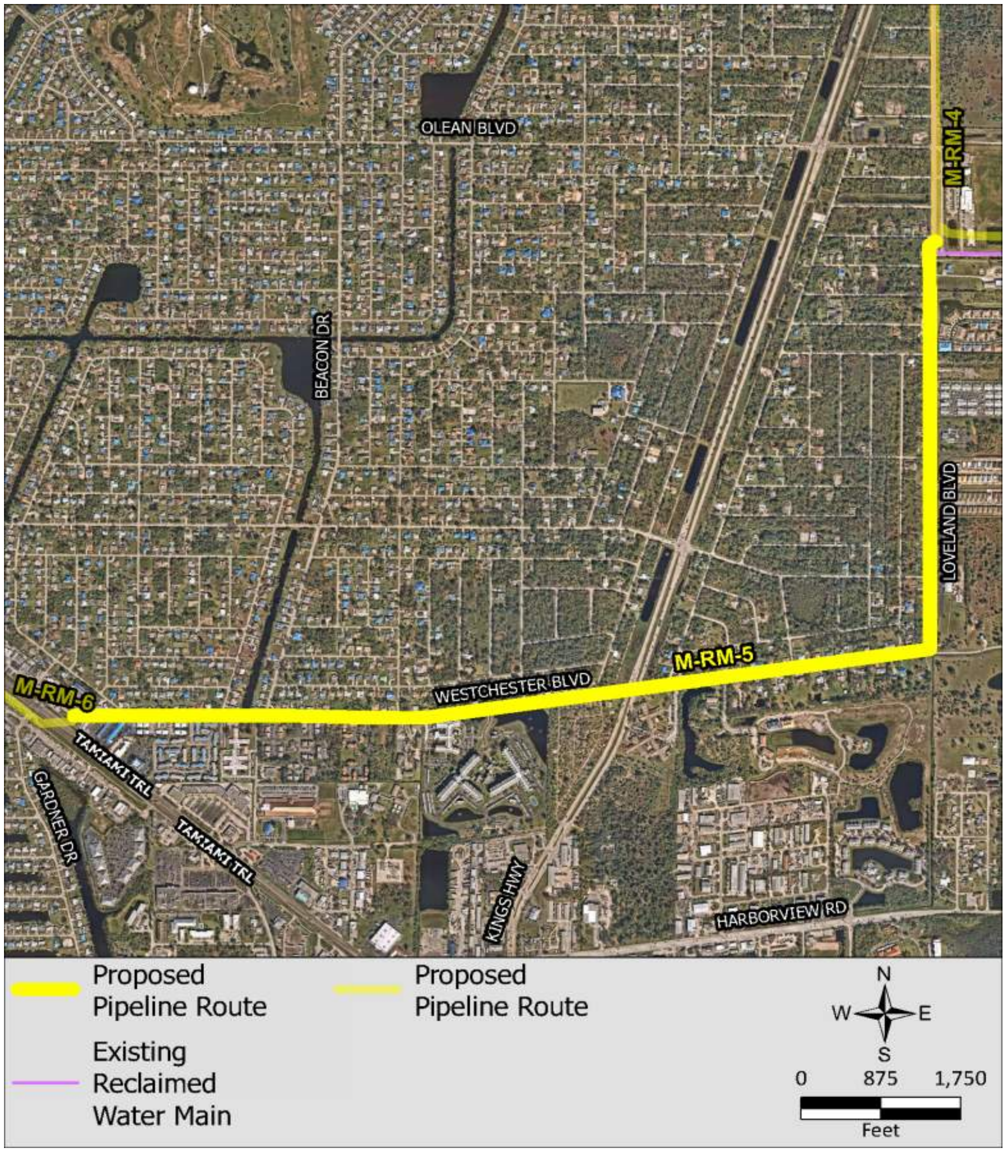
Project Type
Reuse Expansion

Pipe Length
13000 feet

Pipe Diamter
16 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	217	217	217			650
Internal Costs						
Construction Cost			1,950	1,950	1,950	5,850
Other Fees and Costs						
Total Project Cost	**217**	**217**	**2,167**	**1,950**	**1,950**	**6,500**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **M-RM-6 - Tamiami Trail - New 16-inch RCW main**

Related CIP: M-RM-5 **Project Area Served:** Port Charlotte/West County

Description: Install new 16-inch main approximately 9,000 linear feet along Tamiami Trail. This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2041
End: 2045

PROJECT DETAILS

Project Location
Mid County

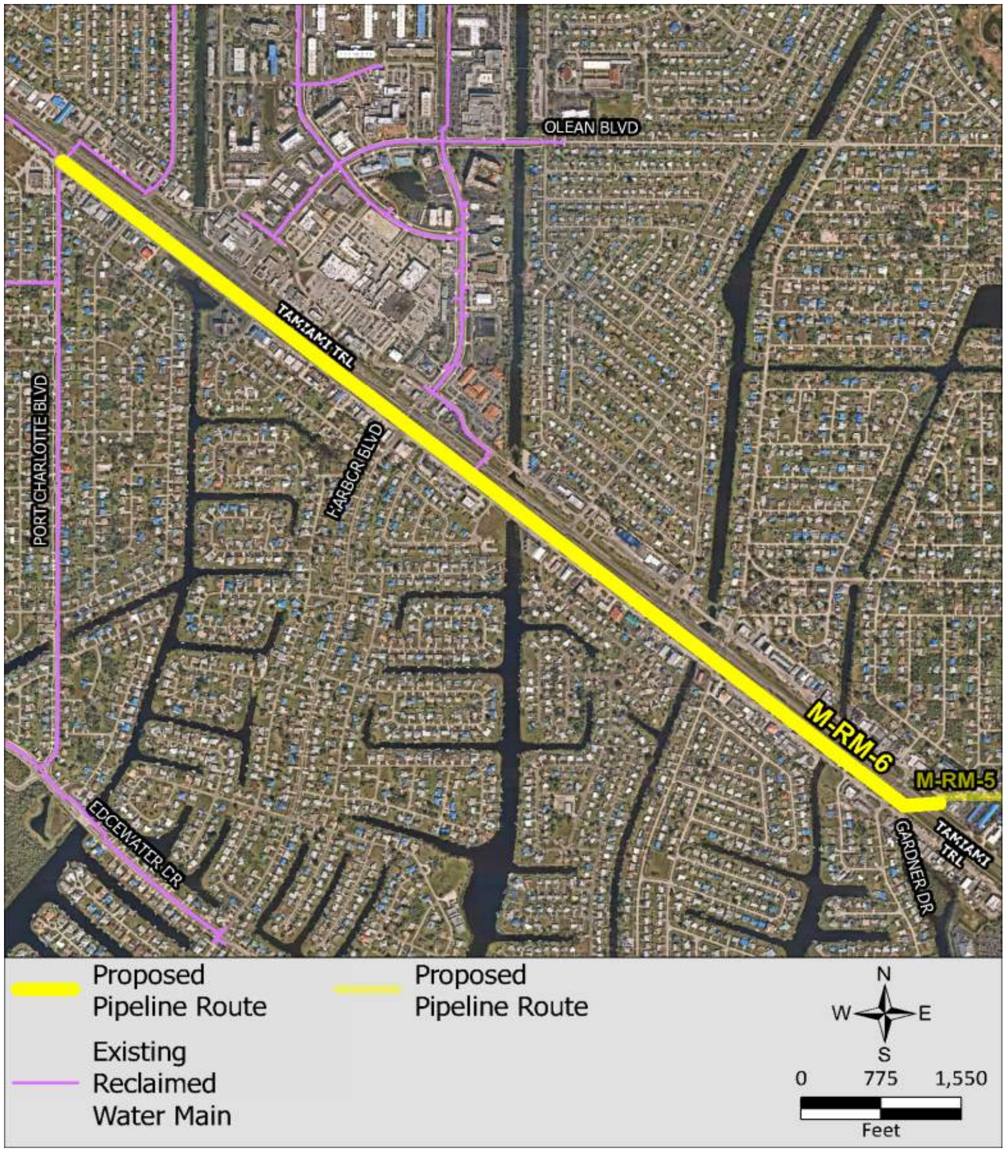
Project Type
Reuse Expansion

Pipe Length
9000 feet

Pipe Diamter
16 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	150	150	150			450
Internal Costs						
Construction Cost			1,350	1,350	1,350	4,050
Other Fees and Costs						
Total Project Cost	**150**	**150**	**1,500**	**1,350**	**1,350**	**4,500**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: W-RM-7 - Flamingo Blvd - New 16-inch RCW main

Related CIP: M-RM-6 | **Project Area Served: Ackerman/El Jobean**

Description: Install new 16-inch main approximately 25,000 linear feet along Flamingo Blvd. and Edgewater Drive. This project supplements the current roadway project along this route and presents an opportunity for cost savings if installed during construction, or if included in the roadway project. This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2026
End: 2030

PROJECT DETAILS

Project Location
Mid County

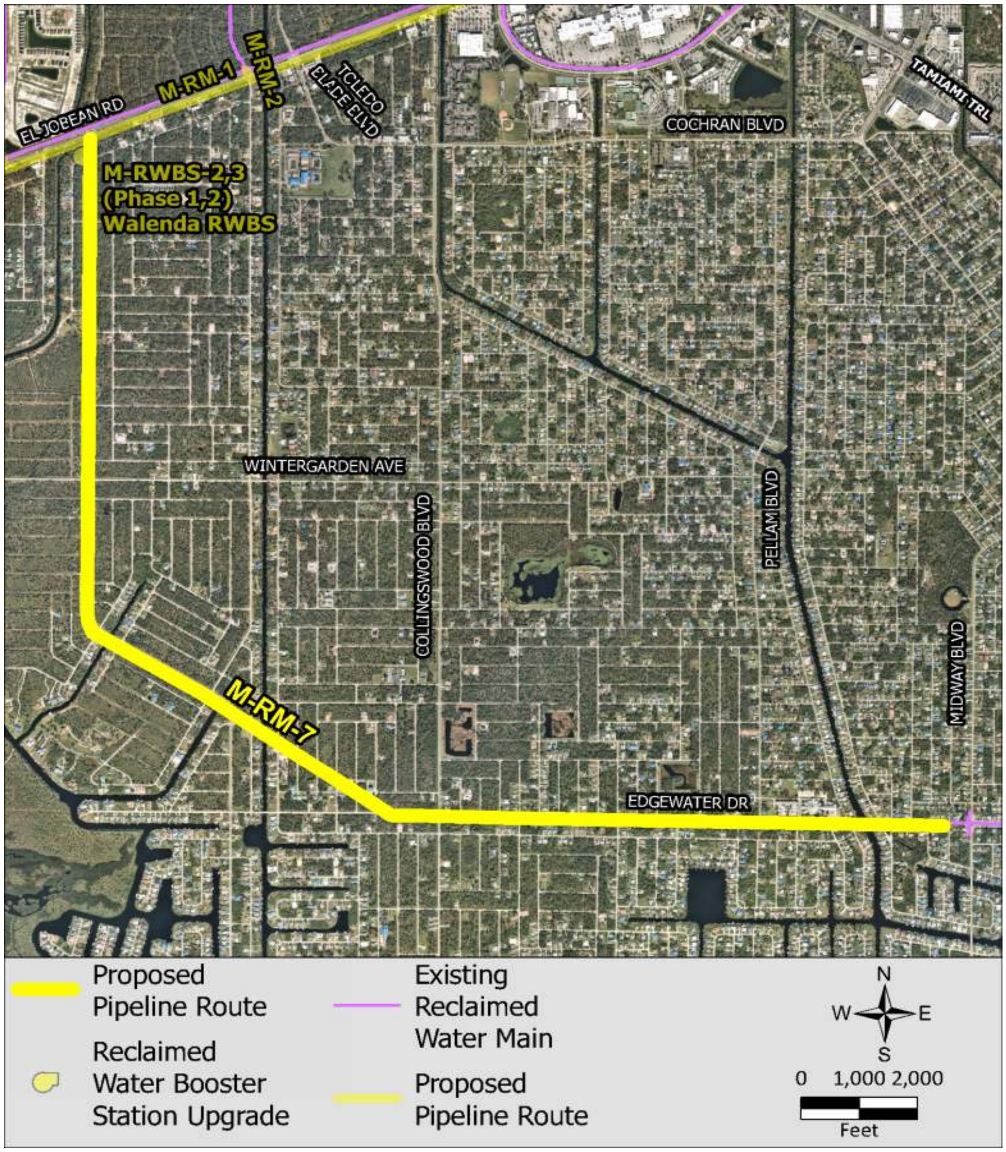
Project Type
Reuse Expansion

Pipe Length
25000 feet

Pipe Diamter
16 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	417	417	417			1,250
Internal Costs						
Construction Cost			3,750	3,750	3,750	11,250
Other Fees and Costs						
Total Project Cost	**417**	**417**	**4,167**	**3,750**	**3,750**	**12,500**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: M-RM-8 - Eagle Street - New 16-inch RCW main

Related CIP: M-RM-4 | **Project Area Served: Port Charlotte/West County**

Description: Install new 16-inch main approximately 17,000 linear feet along Eagle Street and Quesada Ave (parallel to existing main). This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2041
End: 2045

PROJECT DETAILS

Project Location
Mid County

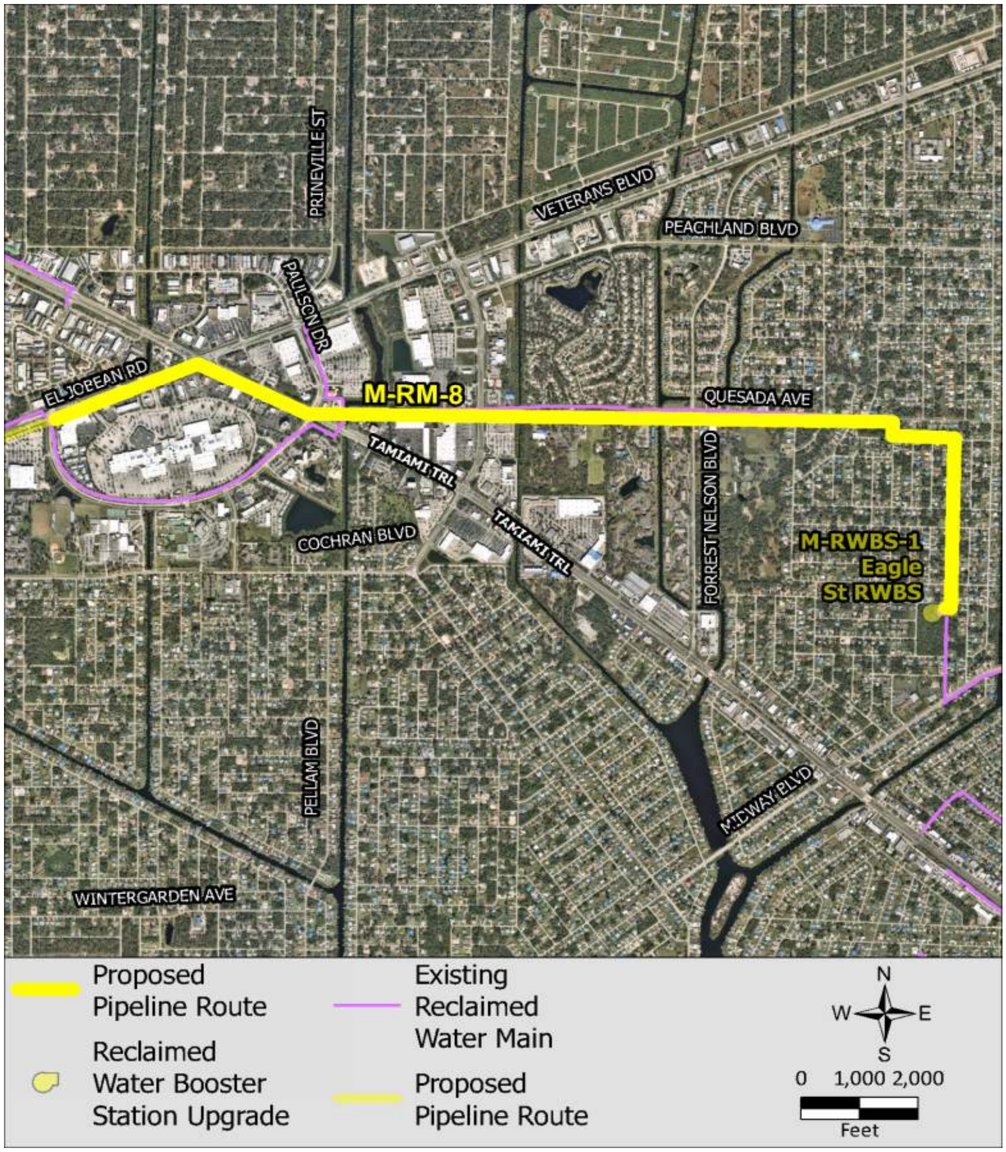
Project Type
Reuse Expansion

Pipe Length
17000 feet

Pipe Diamter
16 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	283	283	283			850
Internal Costs						
Construction Cost			2,550	2,550	2,550	7,650
Other Fees and Costs						
Total Project Cost	**283**	**283**	**2,833**	**2,550**	**2,550**	**8,500**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **M-RM-9 - El Jobean 3 - New 16-inch RCW main**

Related CIP: **M-RM-1, M-RM-2** **Project Area Served:** **West County**

Description: Install new 16-inch main approximately 23,500 linear feet along El Jobean Rd and S. McCall Rd (Option to convert 23,400 ft existing 16-inch Potable main). This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2031
End: 2035

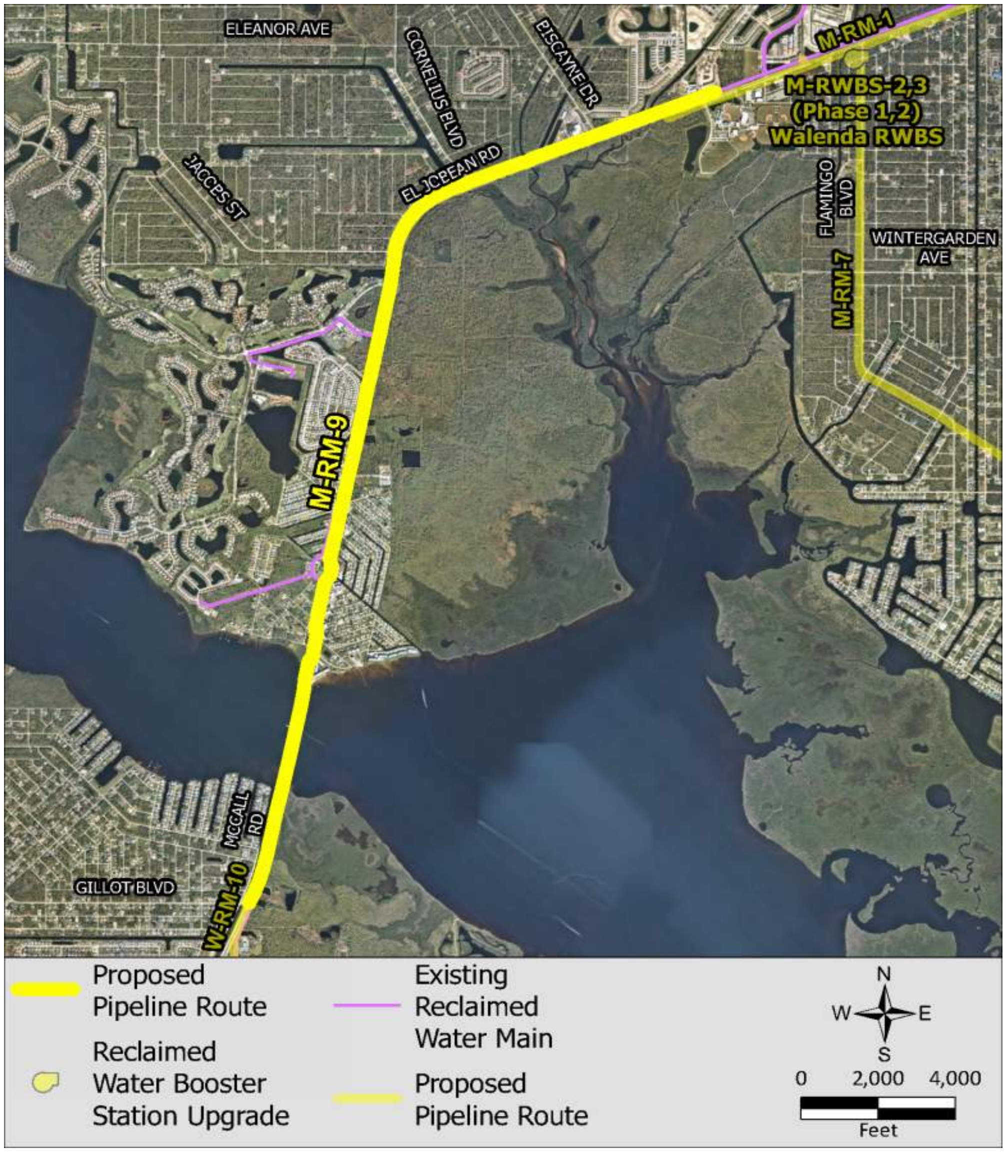
PROJECT DETAILS

Project Location
Mid County

Project Type
Reuse Expansion

Pipe Length
23500 feet

Pipe Diamter
16 inches



PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	392	392	392			1,175
Internal Costs						
Construction Cost			3,525	3,525	3,525	10,575
Other Fees and Costs						
Total Project Cost	**392**	**392**	**3,917**	**3,525**	**3,525**	**11,750**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **W-RM-10 - McCall Road - New 16-inch RCW main**

Related CIP: M-RM-9 **Project Area Served:** West County

Description: Install new 16-inch main approximately 3,600 linear feet along S McCall Road. This is one of many main upsizing recommendations to increase transfer capacity of the excess reclaimed water produced at East Port WRF to West County and Rotonda area where there is a deficit of supply and demand is high.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2036
End: 2040

PROJECT DETAILS

Project Location
West County

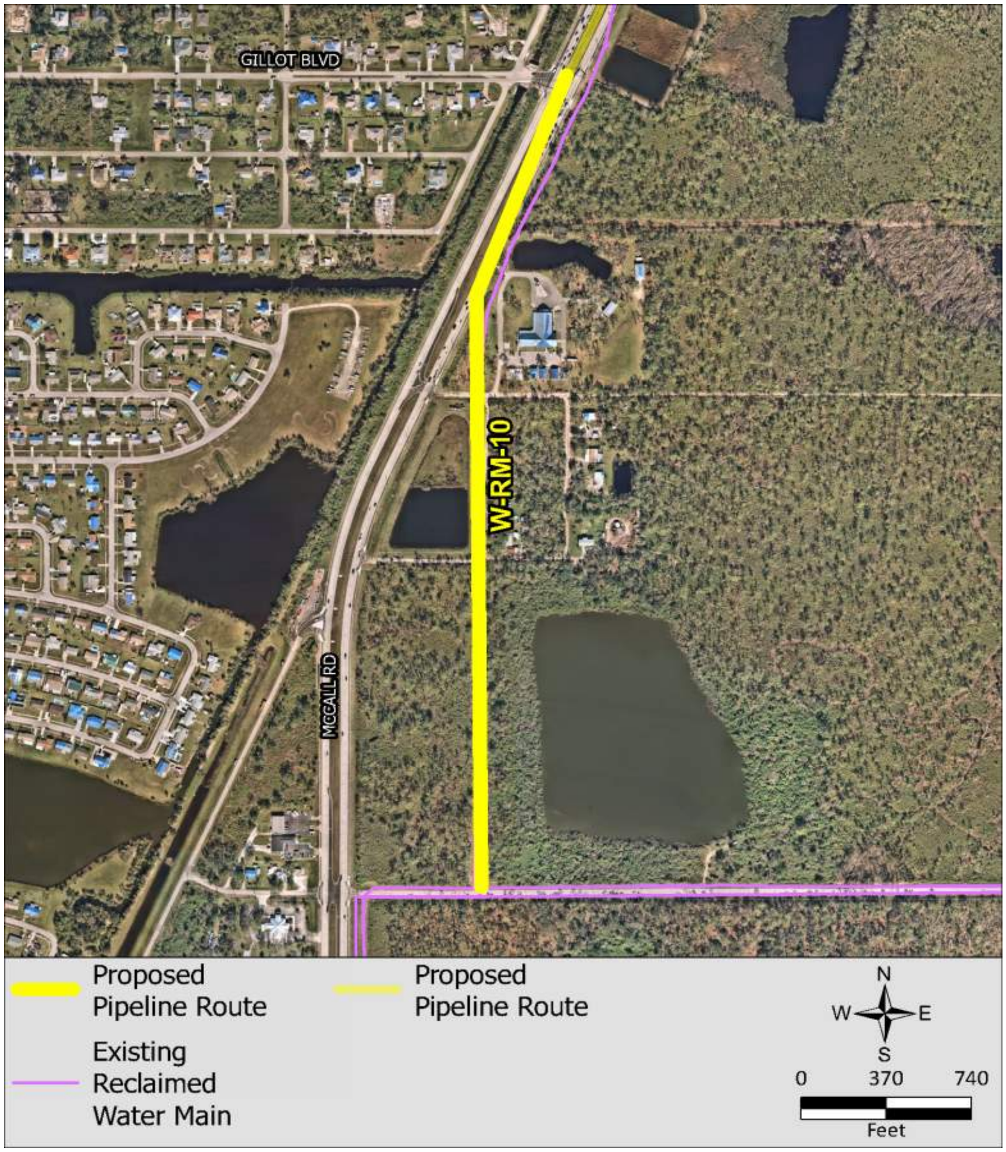
Project Type
Reuse Expansion

Pipe Length
3600 feet

Pipe Diamter
16 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	60	60	60			180
Internal Costs						
Construction Cost			540	540	540	1,620
Other Fees and Costs						
Total Project Cost	**60**	**60**	**600**	**540**	**540**	**1,800**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **W-RM-11 - MRS Expansion for Rotonda Sands Connection**

Related CIP: **W-WP WRF-2** **Project Area Served:** **Rotonda Sands**

Description: Install new 12-inch main approximately 5,000 linear feet along Boundary Blvd. to connect the future Rotonda Sands development to the Master Reuse System.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
No

PROJECT NEED CRITERIA

☐ Safety

☐ Mandate

☐ Replace

☑ Growth

PROJECT PHASING/TIMING

Start: 2041

End: 2045

PROJECT DETAILS

Project Location
West County

Project Type
Reuse Expansion

Pipe Length
5000 feet

Pipe Diamter
12 inches

PROJECT COMPONENTS

☐ Water Reclamation Facility

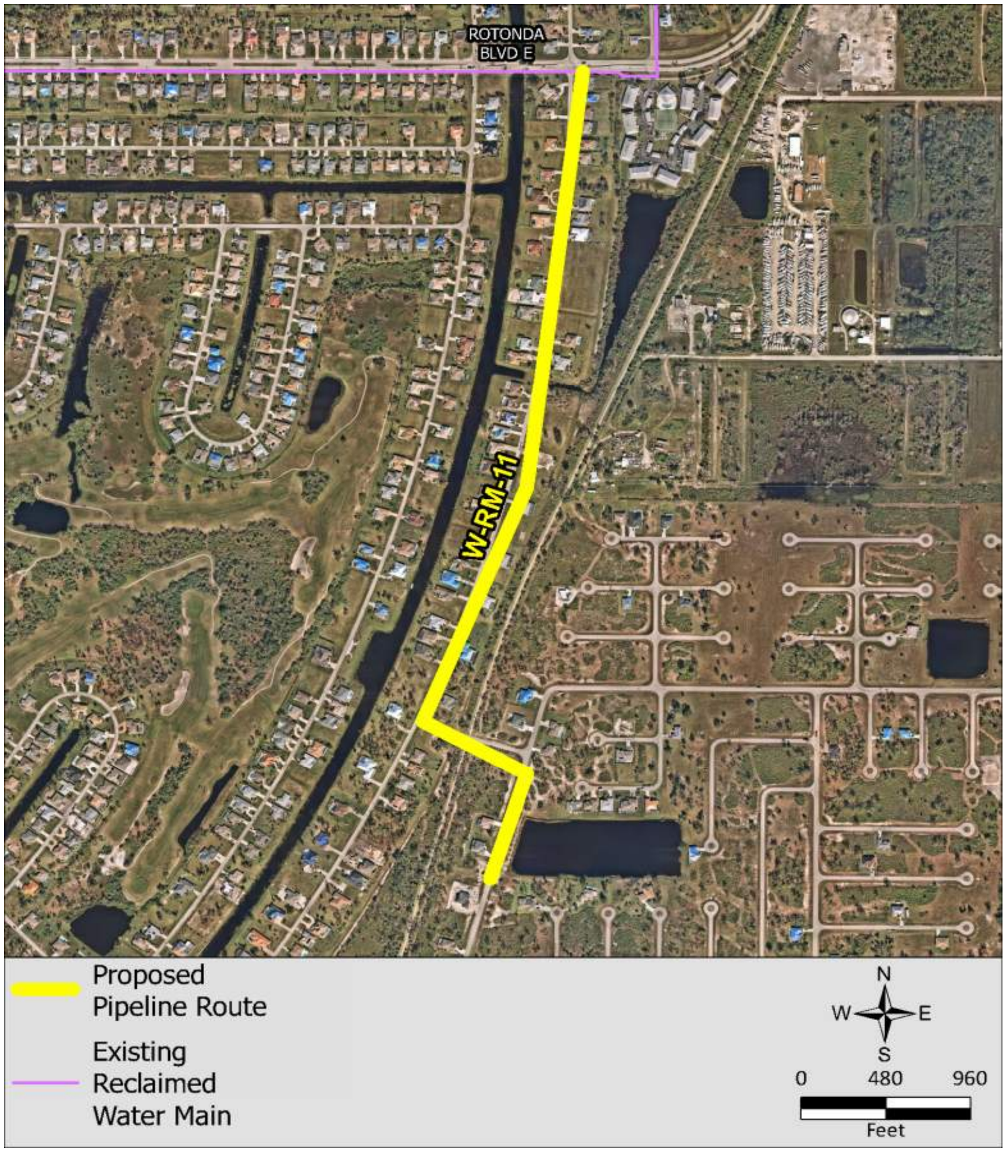
☐ Reclaimed Booster Station

☑ Reclaimed Water Main

☐ Disposal Wells

☐ Reclaimed Storage

☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	67	67	67			200
Internal Costs						
Construction Cost			600	600	600	1,800
Other Fees and Costs						
Total Project Cost	**67**	**67**	**667**	**600**	**600**	**2,000**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: W-RM-12 - SR-776 - New 16-inch RCW main

Related CIP: None | **Project Area Served: Englewood East**

Description: Install new 16-inch main approximately 8,000 linear feet along SR-776 from Gasparilla Road west to David Blvd. This main will function to serve the proposed residential and commercial developments along the north side of SR-776 between Thorman Road and David Blvd. This main will also have potential to serve additional water to the Cove of Rotonda to the south, which is being redeveloped from its current use as a golf course to residential.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
No

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2026

End: 2030

PROJECT DETAILS

Project Location
West County

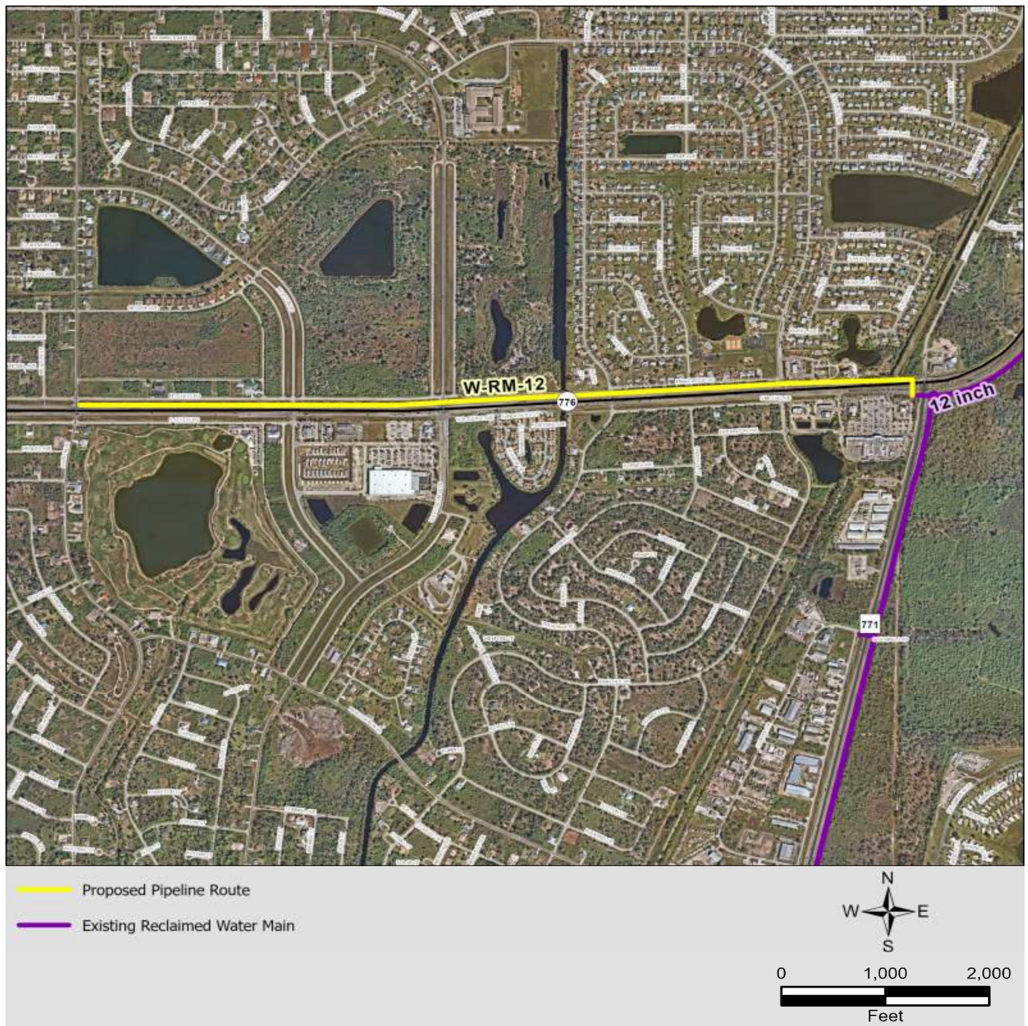
Project Type
Reuse Expansion

Pipe Length
8000 feet

Pipe Diamter
16 inches

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	133	133	133			400
Internal Costs						
Construction Cost			1,200	1,200	1,200	3,600
Other Fees and Costs						
Total Project Cost	**133**	**133**	**1,333**	**1,200**	**1,200**	**4,000**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **W-WP WRF-1 - West Port Pond Valve**

Related CIP: **M-RM-2** | **Project Area Served:** **West County**

Description: Install pressure sustaining valve on the West Port WRF pond fill pipeline. Hydraulic modeling indicated that the pressure-sustaining valve is required to prevent pump cavitation at the Boulevard East RWBS under Threshold Capacity 1 Demands (see Table 6-14 of this report).

PROJECT IMPACTS

Does it add new capacity?
No

Is it required to maintain LOS?
Yes

Does it increase resilience?
No

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☐ Growth

PROJECT PHASING/TIMING

Start: 2031
End: 2035

PROJECT DETAILS

Project Location

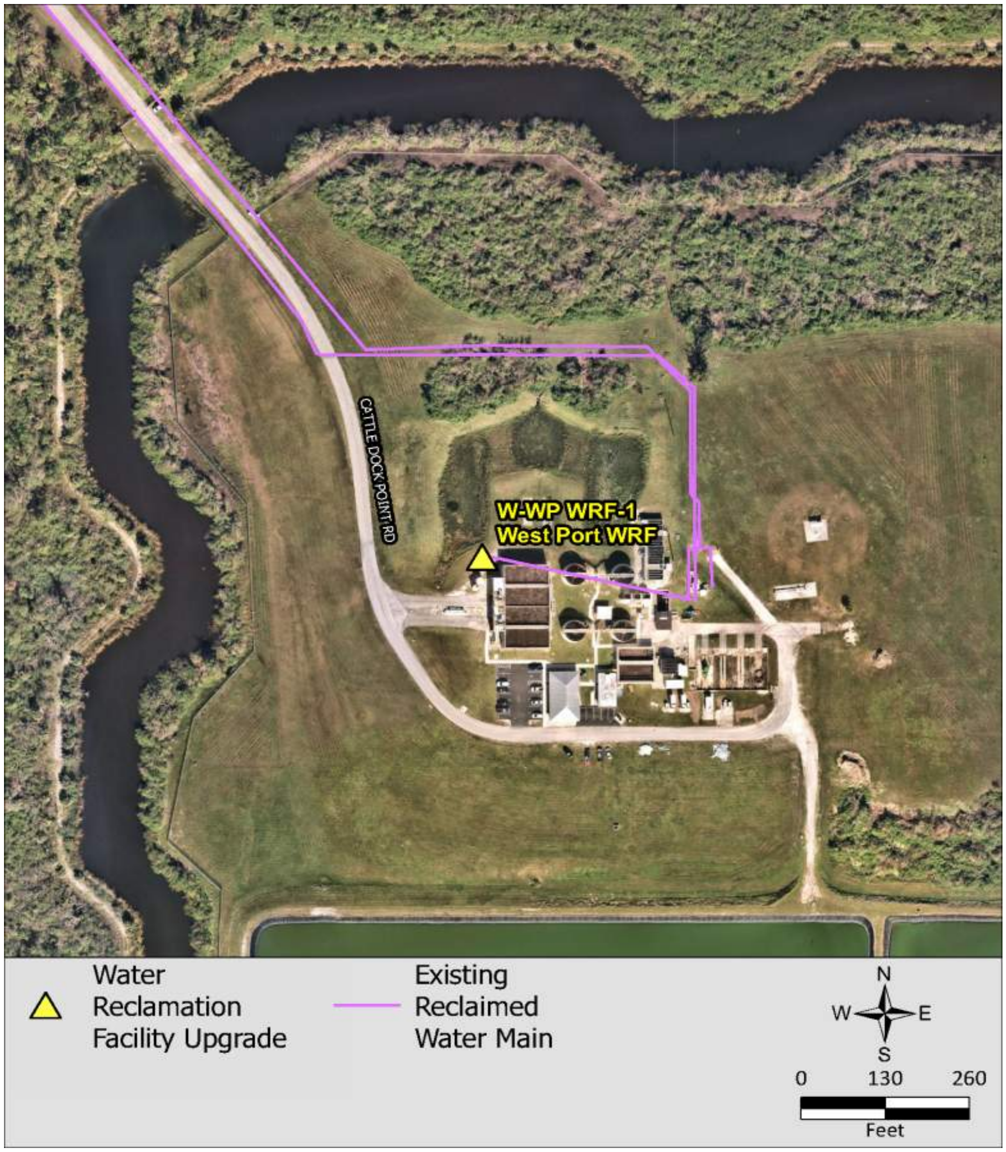
Project Type
Capital Maintenance

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

- ☑ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	2	2	2			5
Internal Costs						
Construction Cost			15	15	15	45
Other Fees and Costs						
Total Project Cost	**2**	**2**	**17**	**15**	**15**	**50**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **M-RWBS-1 - Eagle Street RWBS Upgrades**

Related CIP: None **Project Area Served:** El Jobean/West County

Description: Upsize Eagle Street RWBS pumps and piping.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☑ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2036

End: 2035

PROJECT DETAILS

Project Location
Mid County

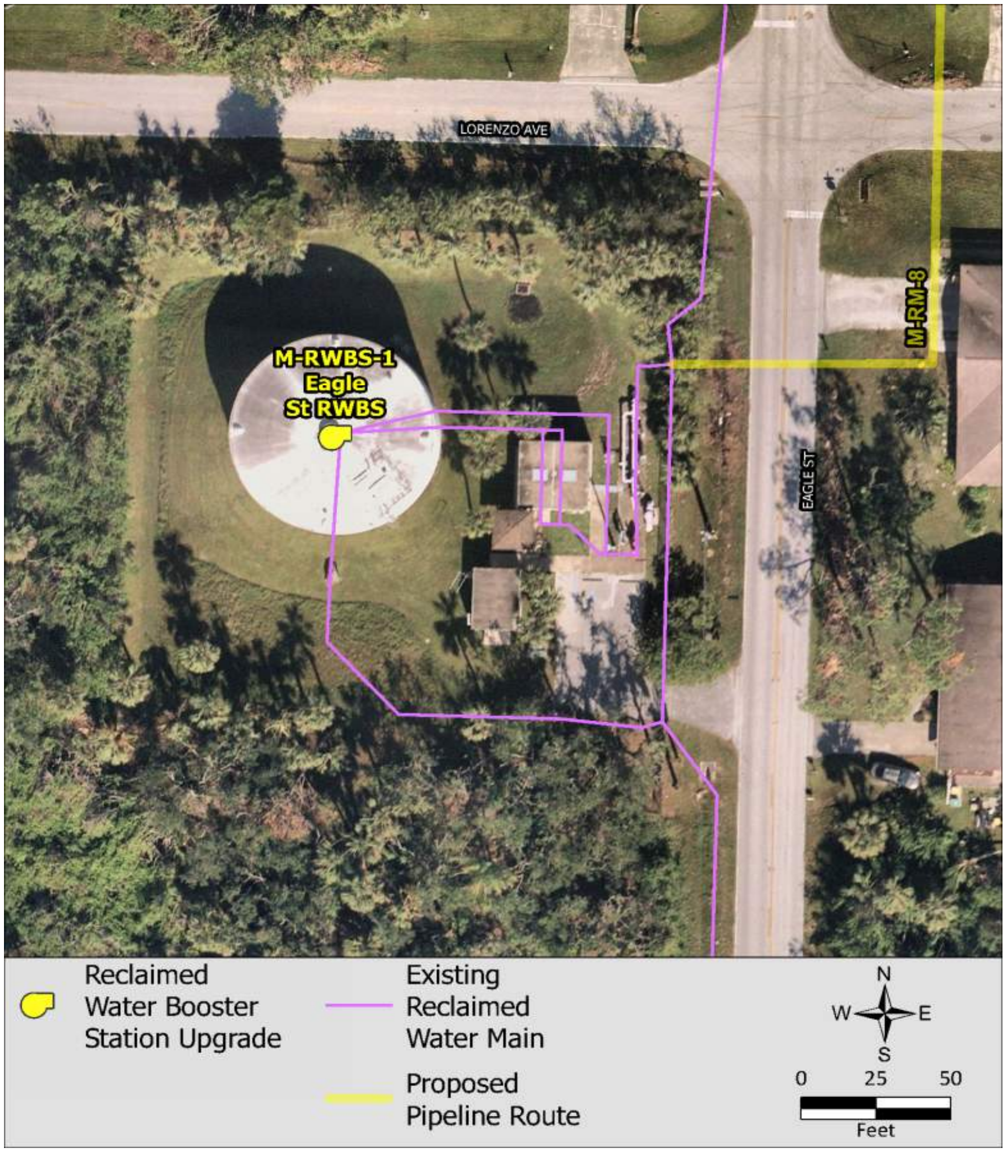
Project Type
Reuse Expansion

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☑ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	50	50	50			150
Internal Costs						
Construction Cost			450	450	450	1,350
Other Fees and Costs						
Total Project Cost	**50**	**50**	**500**	**450**	**450**	**1,500**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: M-RWBS-2 - Walenda RWBS Upgrades - Phase 1

Related CIP: M-RWBS-1 | **Project Area Served: West County**

Description: Convert Walenda RWBS to an inline RWBS near El Jobean Road. The County-owned parcel at the southwest corner of Flamingo Boulevard and El Jobean Road (SR-776) has been identified as a potential parcel to be shared with Charlotte County Public Works. It was recommended that CCU reserve approximately 1/4 to 1/3 acre footprint for this reclaimed water boosting facility.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☑ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2036
End: 2035

PROJECT DETAILS

Project Location
Mid County

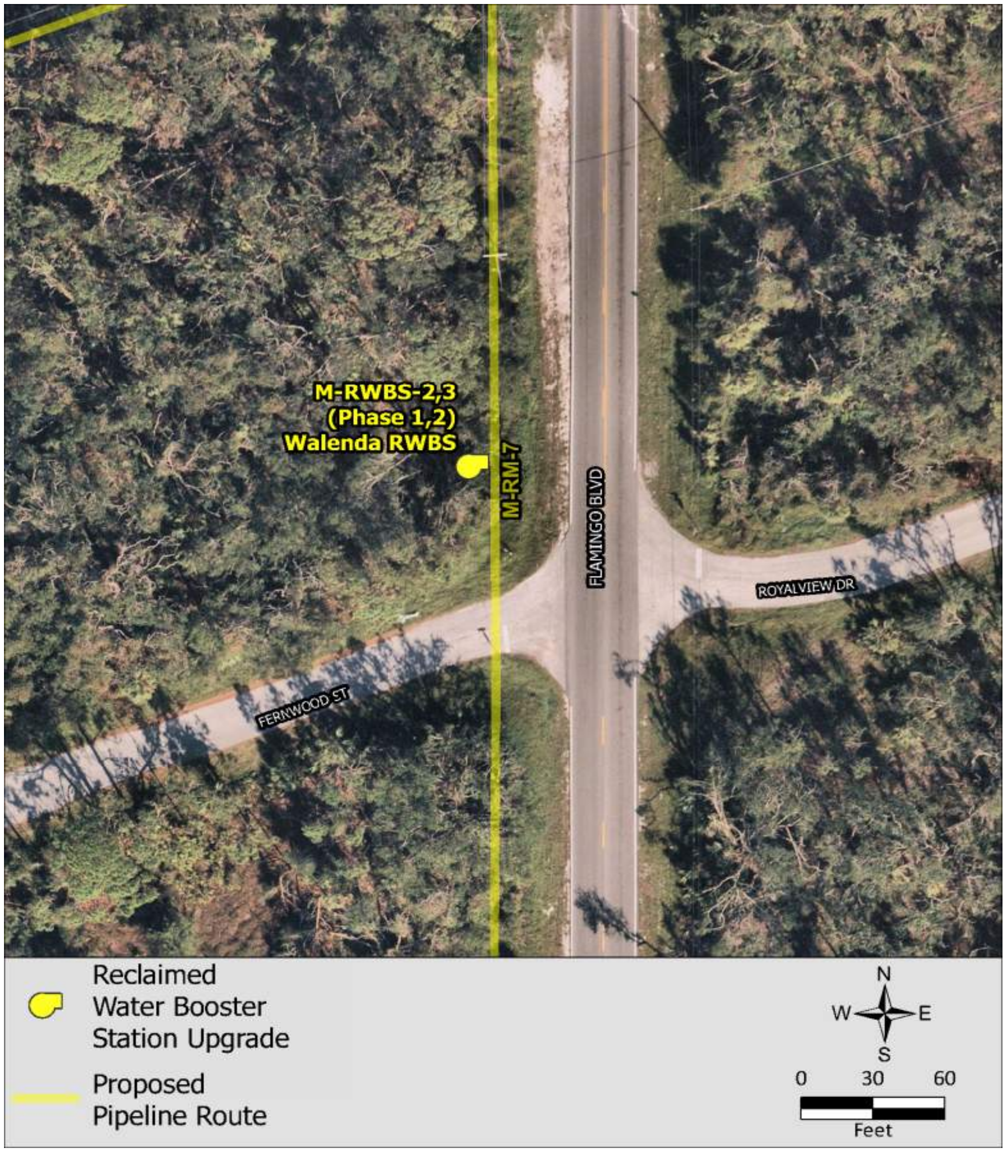
Project Type
Reuse Expansion

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☑ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	117	117	117			350
Internal Costs						
Construction Cost			1,050	1,050	1,050	3,150
Other Fees and Costs						
Total Project Cost	**117**	**117**	**1,167**	**1,050**	**1,050**	**3,500**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: W-WP WRF-2 - West Port WRF HSPS Upgrades

Related CIP: W-RM-10 **Project Area Served:** West County

Description: Increase West Port WRF HSPS capacity to approximately 3 MGD. The existing pumps at West Port WRF cannot operate due to excess head conditions. The new pumps must be able to operate at approximately 80-90 psi in order to pump reclaimed water into the Master Reuse System.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☑ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2026
End: 2030

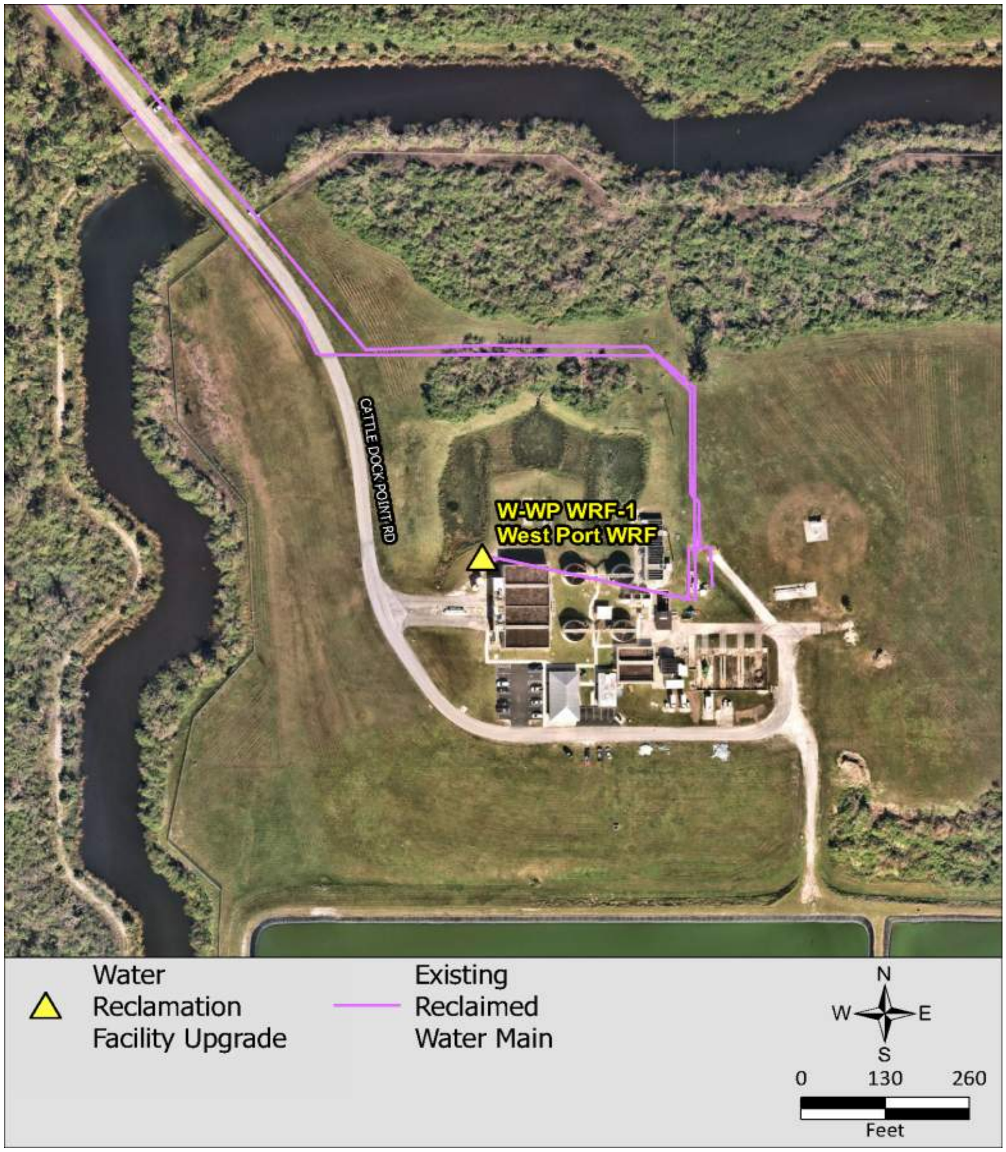
PROJECT DETAILS

Project Location

Project Type
Reuse Expansion

Pipe Length
N/a

Pipe Diamter
N/a



PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☑ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services						
Internal Costs						
Construction Cost						
Other Fees and Costs						
Total Project Cost						

This project is included in the West Port WRF Expansion from 1.2MGD AADF to 5.0 MGD AADF. Thus, cost is not included herein.

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **M-RWBS-3 - Walenda RWBS Upgrades - Phase 2**

Related CIP: **M-RM-8** **Project Area Served:** **West County**

Description: Upsize inline Walenda RWBS to approximately 8 MGD.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2041
End: 2045

PROJECT DETAILS

Project Location
Mid County

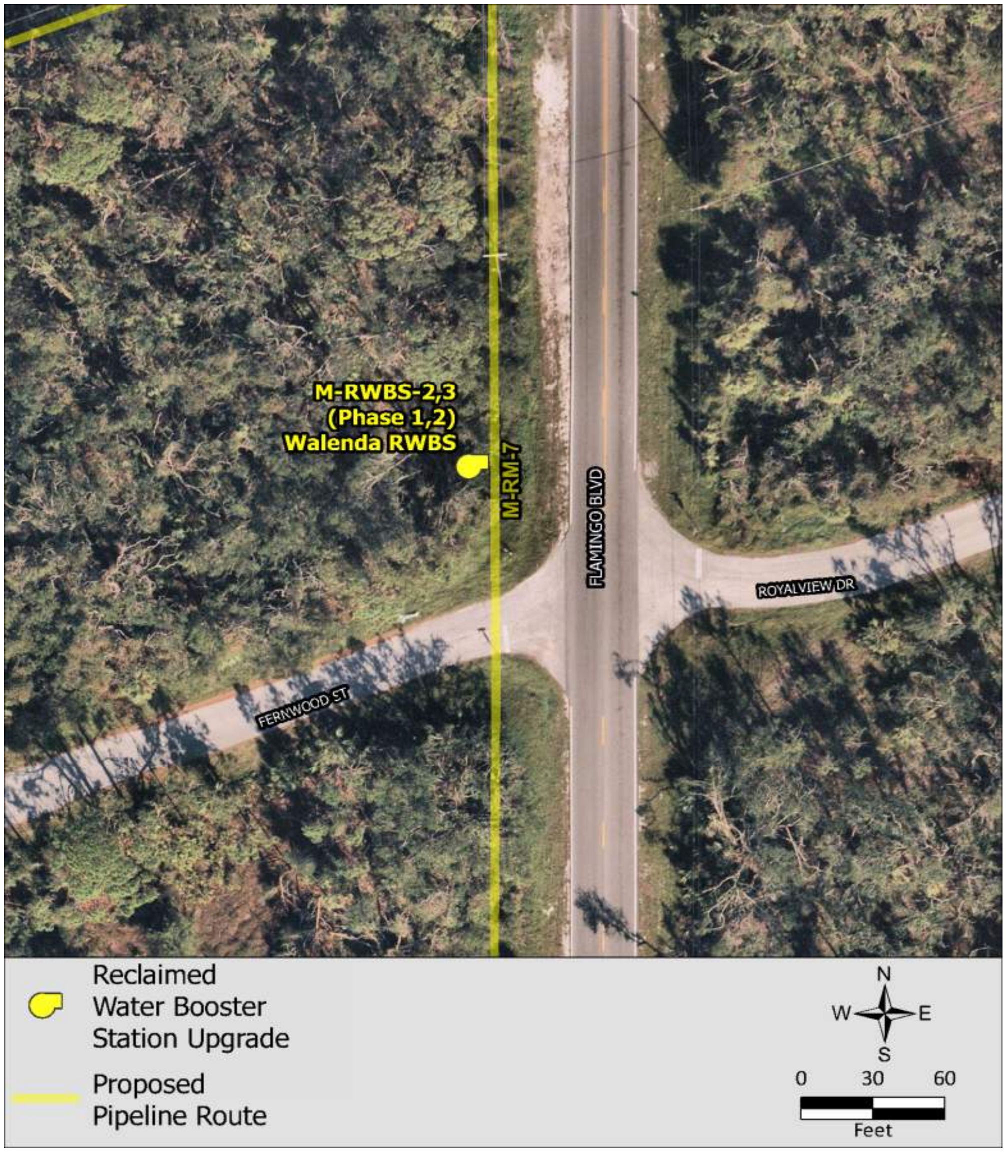
Project Type
Reuse Expansion

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☑ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	83	83	83			250
Internal Costs						
Construction Cost			750	750	750	2,250
Other Fees and Costs						
Total Project Cost	**83**	**83**	**833**	**750**	**750**	**2,500**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **M-Ro WRF-2 - Potable Reuse Feasibility Study**

Related CIP: M-BS WRF-1 **Project Area Served:** TBD

Description: Conduct Potable Reuse Feasibility Study. The Rotonda WRF and the East Port WRF received the highest relative rankings out of CCU's four WRFs based on the screening criteria presented in Chapter 5.8. The study is recommended to focus on the Rotonda WRF and the East Port WRF and should generally include water quantity balancing, water quality assessment, review of potable reuse regulations, treatment technology review, cost estimation, and funding/grant opportunities.

PROJECT IMPACTS

Does it add new capacity?
No

Is it required to maintain LOS?
No

Does it increase resilience?
No

PROJECT NEED CRITERIA

- ☐ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2026

End: 2030

PROJECT DETAILS

Project Location
Mid County

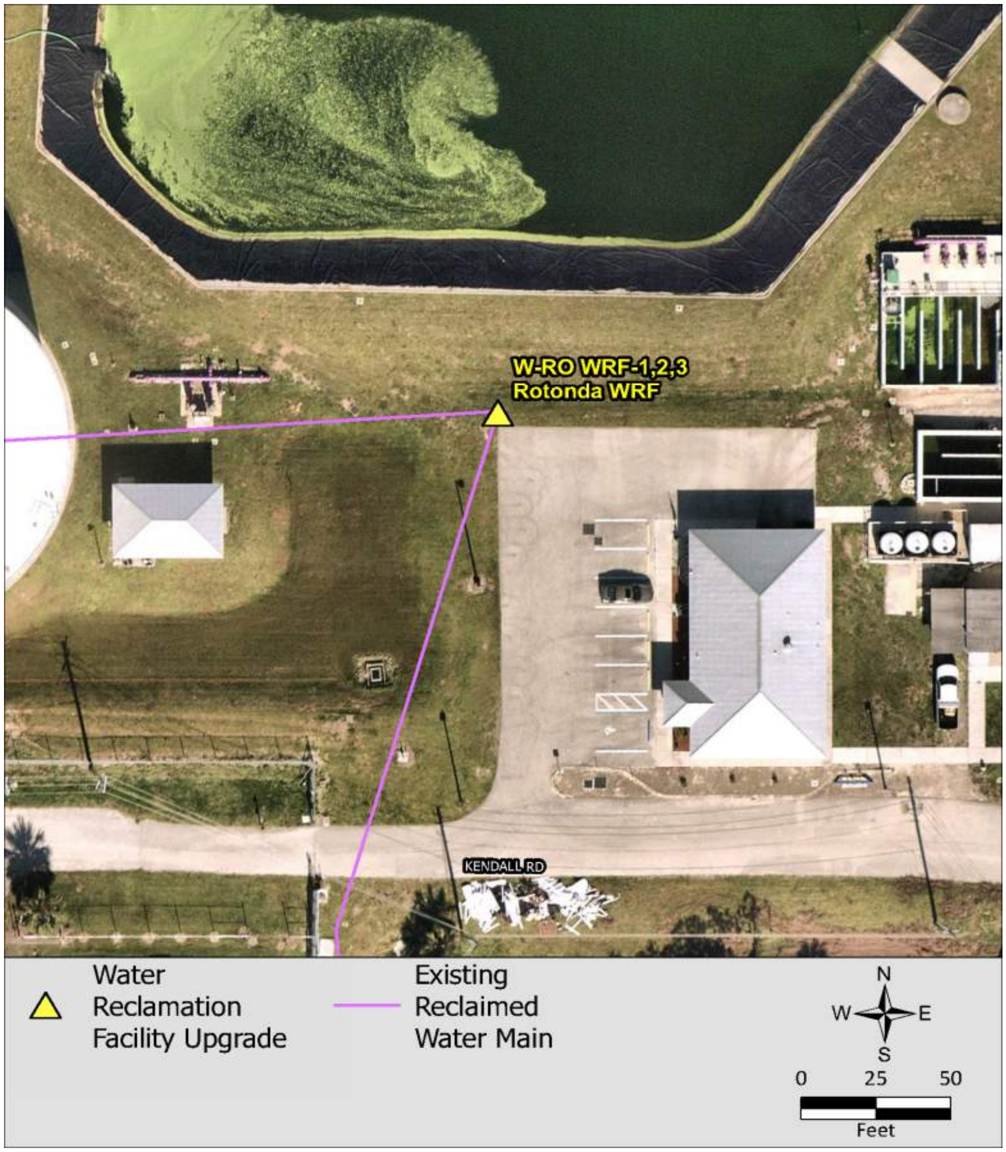
Project Type
Reclaimed Water Study

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☐ Disposal Wells
- ☑ Reclaimed Storage
- ☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	10	10	10			30
Internal Costs						
Construction Cost			90	90	90	270
Other Fees and Costs						
Total Project Cost	**10**	**10**	**100**	**90**	**90**	**300**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **W-Ro WRF-3 - Rotonda Conversion Feasibility Study**

Related CIP: **None** | **Project Area Served:** **West County**

Description: Study conversion of Rotonda WRF to RWBS or master lift station.

PROJECT IMPACTS

Does it add new capacity?
No

Is it required to maintain LOS?
No

Does it increase resilience?
No

PROJECT NEED CRITERIA

☐ Safety
☐ Mandate
☐ Replace
☑ Growth

PROJECT PHASING/TIMING

Start: 2023
End: 2024

PROJECT DETAILS

Project Location

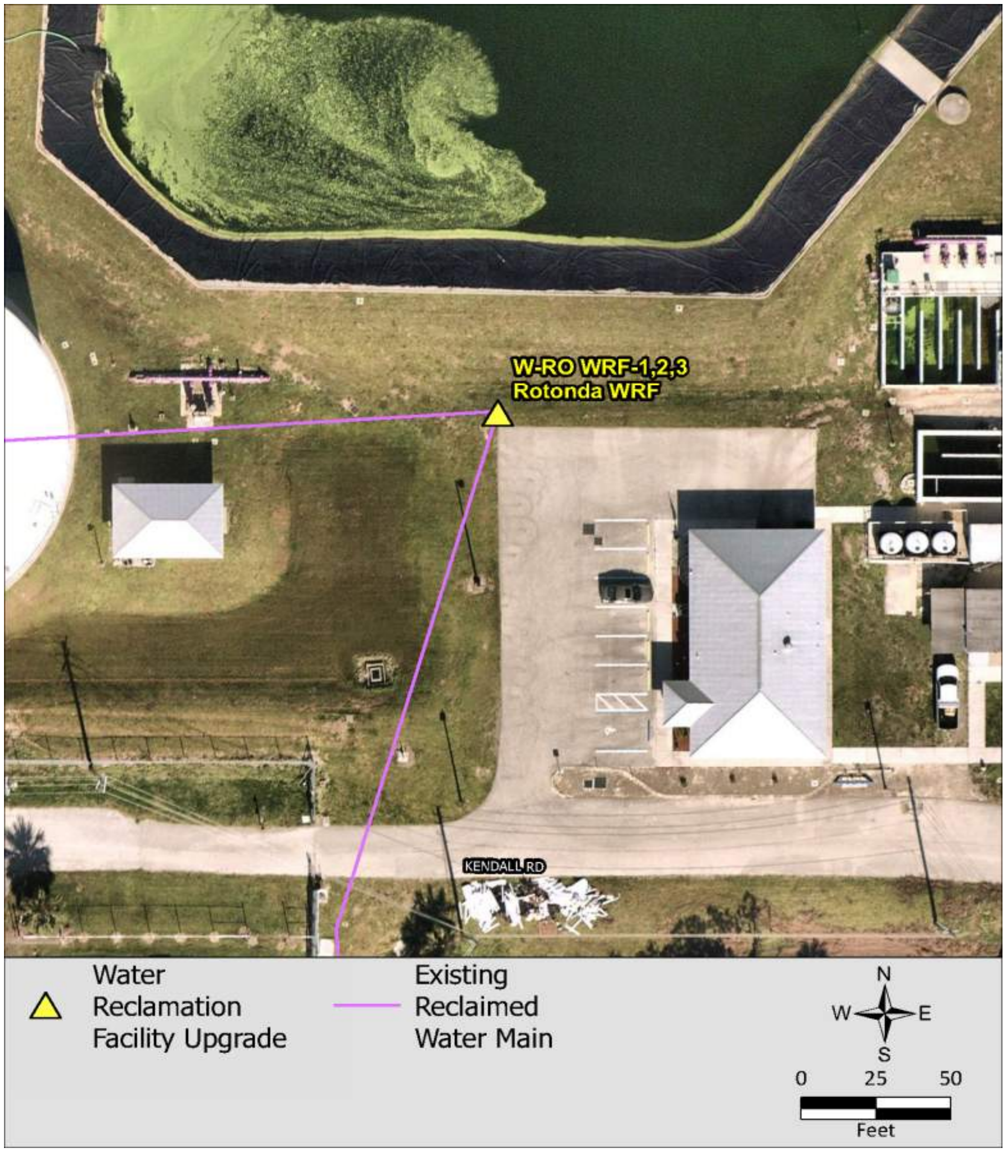
Project Type
Reclaimed Water Study

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

☐ Water Reclamation Facility
☐ Reclaimed Booster Station
☐ Reclaimed Water Main
☐ Disposal Wells
☑ Reclaimed Storage
☐ Report / Study



Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services						
Internal Costs						
Construction Cost						
Other Fees and Costs						
Total Project Cost						

This project is included in the West Port WRF Expansion from 1.2MGD AADF to 5.0 MGD AADF. Thus, cost is not included herein.

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: W-Ro WRF-1 - Convert Rotonda WRF Unlined Pond to GST

Related CIP: None **Project Area Served:** West County

Description: Replace unlined pond with GST.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

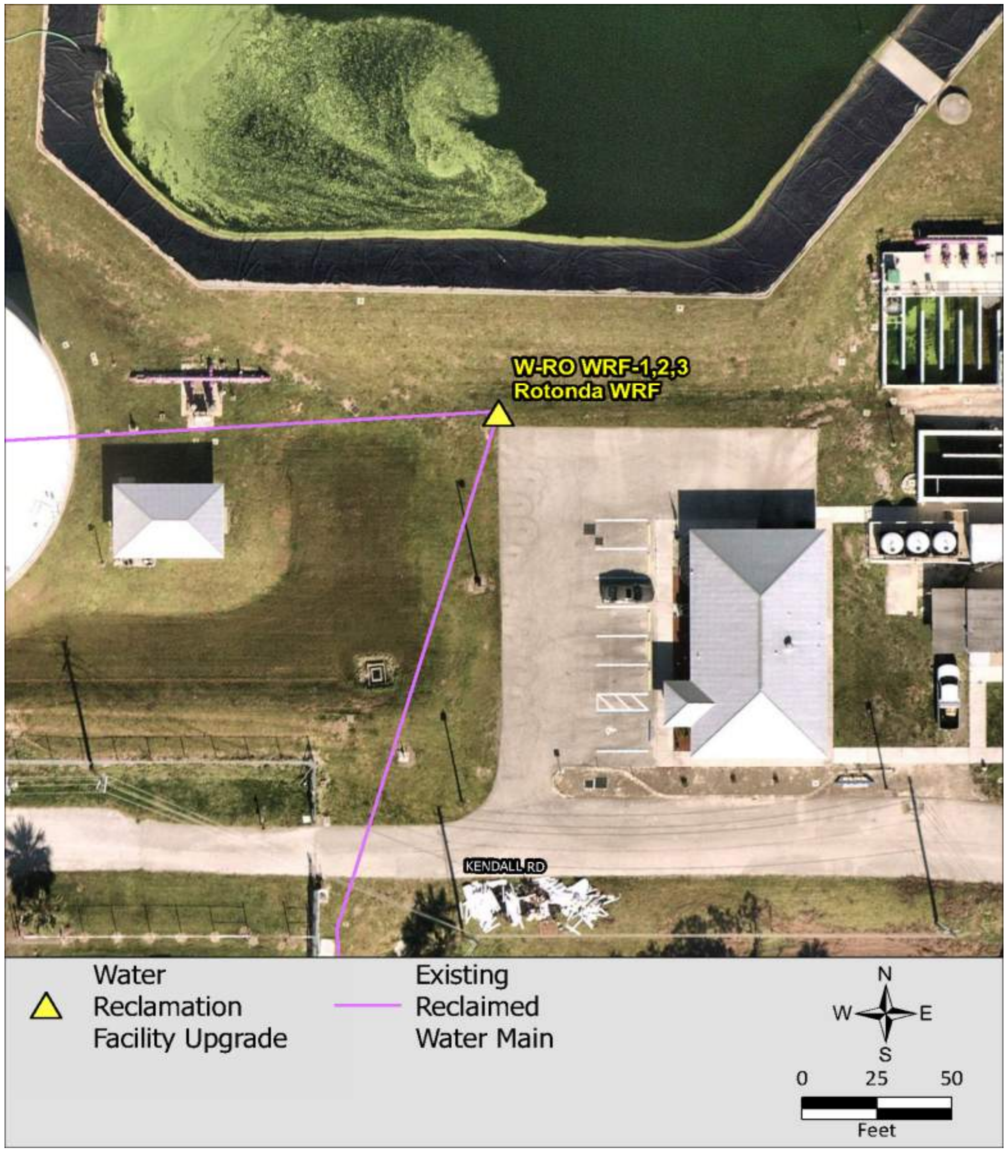
- ☑ Safety
- ☐ Mandate
- ☑ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2031
End: 2035

PROJECT DETAILS

Project Location



Project Type
Reuse and Disposal Capacity

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☑ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☐ Disposal Wells
- ☑ Reclaimed Storage
- ☐ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	100	100	100			300
Internal Costs						
Construction Cost			900	900	900	2,700
Other Fees and Costs						
Total Project Cost	**100**	**100**	**1,000**	**900**	**900**	**3,000**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: M-EP WRF-1 - East Port WRF Deep Injection Well FM Upsizing

Related CIP: M-EP WRF-2 **Project Area Served: Mid County**

Description: Upsize the reclaimed water disposal force main at the East Port WRF to 36-inch diameter (approximately 4,000 linear feet) from the onsite 45-MG reject pond south to the deep injection wells. Includes $2M budgeting under construction costs for replacement of HSPs.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☑ Safety
- ☐ Mandate
- ☑ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2026

End: 2030

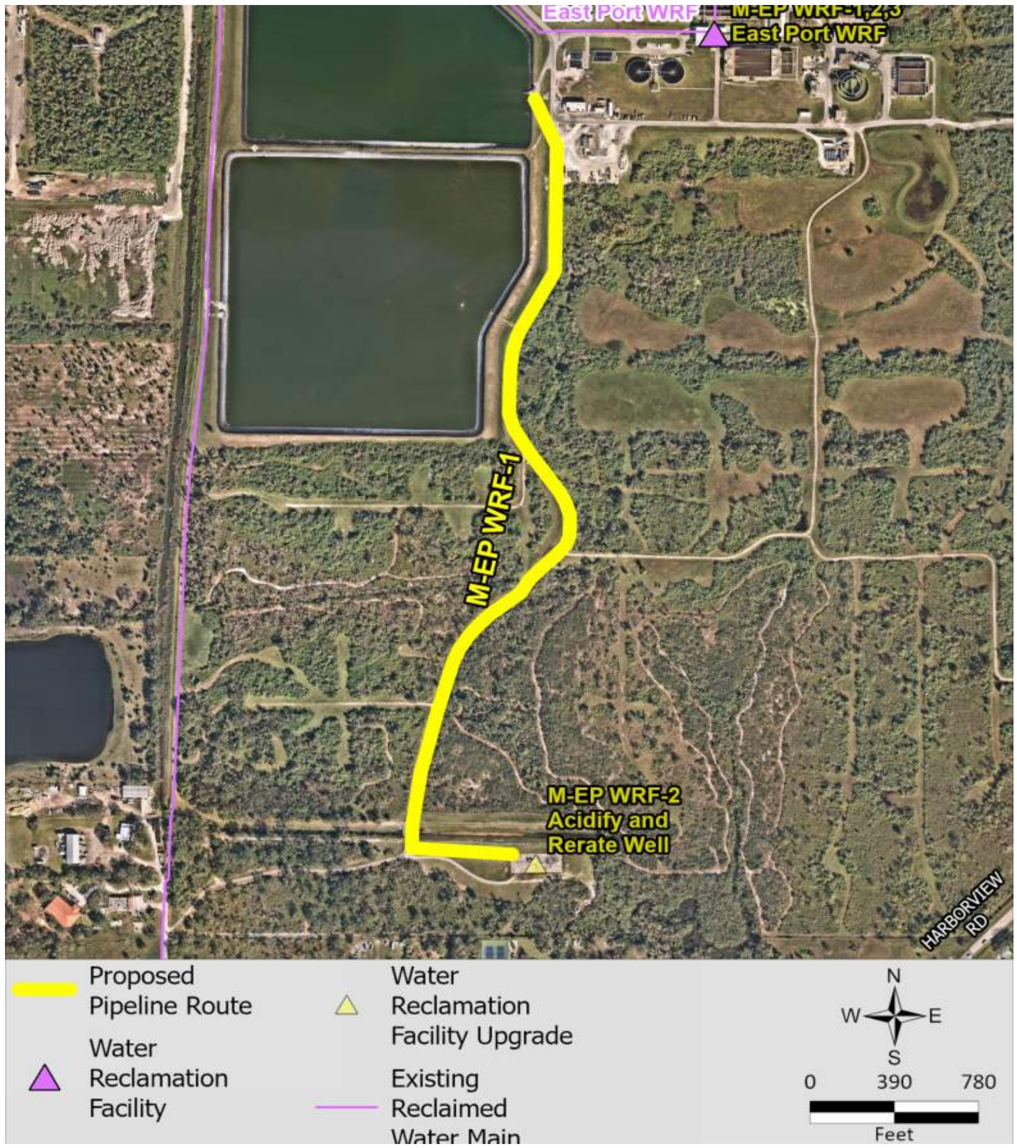
PROJECT DETAILS

Project Location
Mid County

Project Type
Reuse and Disposal Capacity

Pipe Length
4000 feet

Pipe Diamter
36 inches



PROJECT COMPONENTS

- ☑ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☑ Reclaimed Water Main
- ☑ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	107	107	107			320
Internal Costs						
Construction Cost			1,627	1,627	1,627	4,880
Other Fees and Costs						
Total Project Cost	**107**	**107**	**1,733**	**1,627**	**1,627**	**5,200**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: M-EP WRF-2 - East Port WRF Deep Injection Well No. 2 Rerating and Permitting

Related CIP: M-EP WRF-1 **Project Area Served:** Mid County

Description: Acidify and rerate the deep injection well (IW-2). The rerate will require a minor permit modification and FDEP approval through the UIC Division.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☑ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2026
End: 2030

PROJECT DETAILS

Project Location
Mid County

Project Type
Reuse and Disposal Capacity

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

- ☑ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☑ Disposal Wells
- ☐ Reclaimed Storage
- ☐ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	5	5	5			15
Internal Costs						
Construction Cost			45	45	45	135
Other Fees and Costs						
Total Project Cost	**5**	**5**	**50**	**45**	**45**	**150**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: S-BS-WRF-2 - Burnt Store WRF Deep Injection Well No. 2 Rerating and Permitting

Related CIP: None **Project Area Served:** Burnt Store

Description: Acidify and rerate the deep injection well (IW-2). The rerate will require a minor permit modification and FDEP approval through the UIC Division.

PROJECT IMPACTS

Does it add new capacity?
Yes

Is it required to maintain LOS?
Yes

Does it increase resilience?
Yes

PROJECT NEED CRITERIA

- ☑ Safety
- ☐ Mandate
- ☐ Replace
- ☑ Growth

PROJECT PHASING/TIMING

Start: 2036
End: 2040

PROJECT DETAILS

Project Location
South County

Project Type
Reuse and Disposal Capacity

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

- ☐ Water Reclamation Facility
- ☐ Reclaimed Booster Station
- ☐ Reclaimed Water Main
- ☐ Disposal Wells
- ☐ Reclaimed Storage
- ☑ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	5	5	5			15
Internal Costs						
Construction Cost			45	45	45	135
Other Fees and Costs						
Total Project Cost	**5**	**5**	**50**	**45**	**45**	**150**

(Costs expressed in 2024 dollars)

CAPITAL IMPROVEMENTS PROJECT INFORMATION SHEET

Project Name: **S-BS WRF-1 - Aquifer Recharge and ASR Feasibility Study**

Related CIP: **M-Ro WRF-2** **Project Area Served:** **Countywide**

Description: Conduct Aquifer Recharge and ASR Feasibility Study countywide.

PROJECT IMPACTS

Does it add new capacity?
No

Is it required to maintain LOS?
No

Does it increase resilience?
No

PROJECT NEED CRITERIA

☑ Safety
☐ Mandate
☐ Replace
☑ Growth

PROJECT PHASING/TIMING

Start: 2026
End: 2030

PROJECT DETAILS

Project Location
Countywide

Project Type
Reclaimed Water Study

Pipe Length
N/a

Pipe Diamter
N/a

PROJECT COMPONENTS

☐ Water Reclamation Facility
☐ Reclaimed Booster Station
☐ Reclaimed Water Main
☐ Disposal Wells
☐ Reclaimed Storage
☑ Report / Study

Expenditure Plan ($1000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Professional Services	8	8	8			25
Internal Costs						
Construction Cost			75	75	75	225
Other Fees and Costs						
Total Project Cost	**8**	**8**	**83**	**75**	**75**	**250**

(Costs expressed in 2024 dollars)

Appendix C

Reclaimed Water Agreement Example

City of Tarpon Springs Reclaimed Water User Agreement

Please CAREFULLY read the following:
Reclaimed water is the highly treated, filtered, and disinfected effluent from the City's advanced wastewater treatment facility that may be safely used for irrigation of residential lawns, medians, common areas, etc., and other specific non-drinking water uses as allowed by state rules and City codes. Because of its nature and origin, reclaimed water may **NOT** be used for drinking.

The City of Tarpon Springs (the City) processes reclaimed water that is available in your area for certain non-potable (non-drinking) purposes. Water reuse utilizing reclaimed water for irrigation is a major component of the City's commitment to water conservation and is strongly encouraged by the Florida Department of Environmental Protection (FDEP) and the Southwest Florida Water Management District (SWFWMD).

FDEP rules and regulations outlined in Rule 62-610, Part III, Florida Administrative Code (FAC) require the City of Tarpon Springs, as a reclaimed water provider to:

- Inform reclaimed water customers about the origin, nature, and characteristics of reclaimed water, the manner in which reclaimed water can be safely used, and limitations on the use of reclaimed water;
- Minimize the risk of possible contamination of the potable water supply as a result of cross-connections; and
- Govern the customer's use of reclaimed water through agreement with the property owner/lessee.

Reuse of reclaimed water is stringently regulated by the FDEP and the City of Tarpon Springs monitors its reclaimed water facility continuously to ensure that its reclaimed water meets strict public access reclaimed water quality standards.

In accordance with Rule 62-610, Part III, FAC the following conditions, limitations, and requirement apply to all users of reclaimed water:

1. Use of reclaimed water shall be in compliance with all applicable laws and regulations, which may be amended from time to time, and shall be limited to uses specifically authorized by the FDEP and the City. Such authorized uses include: irrigation of residential lawns, golf courses, cemeteries, parks, and landscaped areas; and specifically allowed commercial toilet flushing and fire protection systems when required criteria are met.
2. Reclaimed water shall not be used for drinking (by humans or animals), bathing, or any other sanitary purpose without written authorization from the FDEP and the City.
3. Reclaimed water shall not be piped inside of any residential dwelling.
4. Reclaimed water shall not be used to fill swimming pools, wading pools, hot tubs, spas, or any other body of water where human immersion may occur.
5. Reclaimed water shall not be used to irrigate edible crops, except those that are washed, peeled, skinned, cooked, or thermally processed before consumption.
6. Reclaimed water shall not be applied to areas within one hundred feet (100') of any public eating, drinking, or bathing facility, unless special approval is obtained from the FDEP
7. Above ground hose bibs, spigots, or other hand operated connections shall not be present on any piping system utilized for reclaimed water. All other approved below grade connections must be properly secured and identified.
8. Reclaimed water shall not be applied to impervious surfaces that allow drainage to surface waters and irrigation practices shall be designed to prevent incidental ponding or standing water.
9. Reclaimed water may not be transported beyond the property lines of a customer and cannot be given or sold to any third party.

10. Cross-connection between drinking water and reclaimed water systems is positively prohibited. The reclaimed water user agrees that in order to verify proper connections, monitor proper use of reclaimed water, and minimize the potential for cross-connections, the City of Tarpon Springs shall have the right to enter upon the property where reclaimed water is used for the purposes of inspecting and/or testing. Inspections will be conducted at the time the irrigation system is first connected to the City's system and periodically thereafter.
11. The City of Tarpon Springs shall make a reasonable effort to inspect and maintain the reclaimed water distribution system, but assumes no liability for any damage caused by the system that is beyond the control of normal maintenance or for any damage caused by or resulting from customer use or misuse of reclaimed water.
12. The City of Tarpon Springs does not guarantee continuous availability of reclaimed water and will not allow water that does not meet public access reclaimed water quality standards to enter the reclaimed water distribution system. The City of Tarpon Springs reserves the right to restrict supply of reclaimed water as deemed necessary. Reclaimed water may not be available during certain hours, certain days, and may be temporarily shut off for repairs, maintenance, or other reasons, and quantities may be limited.
13. The City of Tarpon Springs is not liable for damages to landscaping or private property as a result of interruptions in reclaimed water service or reclaimed water quality.
14. Customers shall follow all reclaimed water usage restrictions currently in effect.
15. The City of Tarpon Springs shall own and maintain the reclaimed water system up to and including the flow meter and backflow prevention device within the public right-of-way and other public easements. The owner/lessee of the property where reclaimed water will be applied shall be responsible for maintenance of the irrigation system downstream from the master control valve at the property line.
16. Advisory signs are required to be installed and maintained per current FDEP rules to notify the public of the use of reclaimed water whenever reclaimed water is used for irrigation within residential neighborhoods (subdivisions), for storage in lakes or ponds, for decorative water features, or other applicable uses involving the potential for public access. The signs shall be in a format, number, and location prescribed by state rules and City requirements.
17. No person shall tamper with, alter, connect to, or operate valves or hydrants of the system prior to approval by the City of Tarpon Springs.
18. Any violation of these conditions may be considered a criminal offense and the City of Tarpon Springs has the right to discontinue service for any violation of law or regulation in the installation, operation, or maintenance of the reclaimed water irrigation system.

I acknowledge the limitations, requirements, and conditions of use of reclaimed water and hereby AGREE to comply with the foregoing. I also agree to abide by any changes in these conditions as a result of changes in law or revisions to City requirements.

Customer Signature:	______________________	Date:	____________
Customer Printed Name:	______________________	Relation to property owner:	____________
Service Address:	______________________	Telephone Number:	____________
Meter Size	______________________	Account Number	____________

Attachment 1

Technical Memorandum - Increasing of Injection Well Capacity for the Charlotte County East Port WRF, ASRus, LLC , August 2021

TECHNICAL MEMORANDUM

Increasing of Injection Well Capacity for the Charlotte County East Port WRF

From: Pete Larkin, P.G., ASRus
Joe Haberfeld, P.G., ASRus

TO: Jeff Crowley, P.E., Jones Edmunds and Associates
David Yonge, PhD, P.E., Jones Edmunds and Associates

Date: August 4, 2021

Purpose of Memorandum

The Charlotte County East Port Water Reclamation Facility (WRF) uses two deep Class I injection wells for the disposal of secondary treated domestic wastewater. The capacity of the wells has decreased based on pressure observations during recent testing and past operational information. This has resulted in greater injection wellhead pressures to inject the same volume of water and presents a risk of exceeding the permitted pressures and/or decreasing the volume injected. ASRus, LLC, conducted a site visit to assess the performance of the wells and has been asked to provide a brief evaluation and discussion of options for improving injection capacity and re-rating the maximum permitted injection rate.

General Injection Well Information

Injection well IW-1 was constructed in approximately 1990. It is a low capacity well due to a narrow casing diameter of 8 inches allowing a maximum injection volume of 2.04 million gallons per day (MGD). Injection well IW-2 was installed in 1996 to provide additional disposal capacity. IW-2 has a 20-inch diameter final (inner most) casing and is permitted to inject 7.56 MGD. The injection zone is at depths of 2,965 to 3,246 feet below land surface. Monitoring required by DEP includes injection pressure and flow, monitor well pressures and water quality, and injection water quality.

Injection Testing During Site Visit

Injection testing was conducted on September 10, 2020 to investigate the change in injection pressures at varying injection rates. The wellhead pressure at each injection wells was monitored while injecting into both wells. Injection started with one pump in operation, then a second pump was added, and then three pumps, which was the maximum attainable pumping capacity from the pump station. Pump station pressure and specific injectivity (gpm/psi) were also recorded during the test.

Testing Results

Attachment 1 provides the tabular and graphical results of the testing. Injection using one pump (46 psi) did not result in a head loss between the pump station and the wellheads. At pump station pressures of 79 (two pumps) and 99 psi (three pumps) each well recorded head losses of approximately 13 and 21 psi, respectively. This is indicative of a restriction in the conveyance between the pump station and the wellheads, assuming water is not being lost through an undetected leak. If head losses are removed and 95 psi could be achieved at the injection wells, a combined injection capacity of approximately 10.8 MGD may be achievable (Attachment 1).

A decrease in the injection zones capacity to accept water can also be attributed to the lower injection rates at the well. A decrease in well specific injectivity (SI) with increasing flow rates is expected and does not indicate a problem by itself. However, the most recent permit renewal applications for IW-1 (2016) and IW-2 (2019) show a multiyear trend of decreasing specific injectivity. Since these tests are performed at approximately the same flow rates in a given well, these trends are likely attributable to a reduction in the ability of the wells to accept treated wastewater without increased pressures.

Increasing Well Capacity

The restoration of injection well capacity will likely require a rehabilitation of the inside of the injection well casings, and the injection zone permeability. This will require acidization of the well with Hydrochloric Acid (HCl). This should be followed by a rerating injection test of IW-2 as it is currently not permitted at the maximum capacity allowed by DEP which is a velocity of 10 feet per second (fps) in the final casing (IW-1 is permitted at its maximum capacity). The following are the recommended steps to restore capacity to the injection wells and increase the permitted capacity.

1. Acidize the interior of the injection casings and the injection open hole intervals. Conduct well specific injectivity tests after acidization.
2. Conduct a rerating test on IW-2 up to its maximum 10 fps injection velocity which is 12.73 MGD. As part of this step, perform additional injection testing on well IW-1 if necessary.
3. Submit results of the acidization and rerating to DEP along with a minor permit modification application to operate the well at the higher injection rate.

Recommendations

The above steps should be carried out and need DEP approval prior to implementation. Restrictions in the conveyance to the injection wells should be investigated and corrected to reduce head losses observed at higher injection rates. Increases in maximum injection capacity will result with reduction of head losses and are estimated in Attachment 1. However, the increase in injection capacity at IW-2 from these improvements will not approach the allowable 10 fps in the 20-inch diameter casing (12.73 MGD). The capacity of IW-2 will need to be increased through acidization to achieve the maximum allowable injection rate. The degree of improvement from acidization is variable but is commonly on the order of 50-percent improvement in specific injectivity. Well acidization, along with higher wellhead pressures resulting from conveyance system improvements, are anticipated to achieve the allowable 10 fps (12.73 MGD) at IW-2. Note that the maximum permitted injection capacity of injection well IW-1 cannot be increased any further, and at a maximum permitted flow of 2.04 MGD it does not serve as redundant back-up to well IW-2.

If current disposal options do not provide adequate disposal capacity to meet WRF treatment capacity upgrades planned in the future, other injection options could be considered including; ASR, aquifer recharge, or another Class I injection well. The addition of an additional Class I deep injection well with a 24-inch diameter casing could have a maximum permitted capacity of 18.65 MGD. It is important to note that new injection wells for effluent disposal must inject only treated wastewater which meets high level disinfection treatment criteria. Various injection well options are discussed in more detail in the Technical Memorandum *Underground Injection Control Options for Domestic Wastewater Management, ASRus, LLC* currently under development and to be incorporated into the appendices of the Reuse System Master Plan.

ATTACHMENT 1

East Port Injection Well Maximum Injection Test (September 10, 2020)

	IW-1					IW-2					Pump Station pressure	Δ pressure between pump station and wellhead
	Flow Rate (gpm)	Flow Rate (MGD)	Wellhead pressure	Δ Wellhead pressure	SI (gpm/Δ psi)	Flow Rate (gpm)	Flow Rate (MGD)	Wellhead pressure	Δ Wellhead pressure	SI (gpm/Δ psi)	psi	psi
1 pump	325	0.47	48	16	20.3	3036	4.4	49	17	179	46	0
2 pump	470	0.68	66	34	13.8	4450	6.4	66	34	131	79	13
3 pump	550	0.79	78	46	12.0	5400	7.8	78	46	117	99	21
	682.2	0.98	**95**	63		6798.6	9.8	**95**	63			
Static WH pressure			32					32				

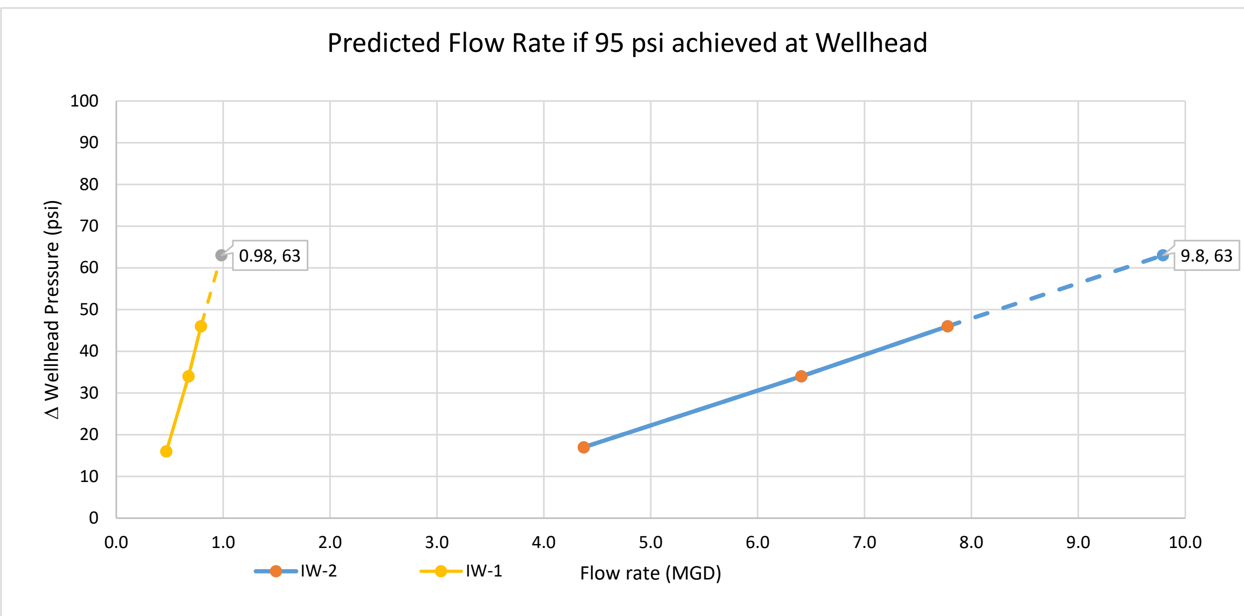
9.8 MGD theoretical flow rate if 95 psi achieved at IW-2

0.98 MGD theoretical flow rate if 95 psi achieved at IW-1

10.8 MGD total theoretical flow at 95 psi with no well rehabilitation

Notes:

Assumes that if pipe head losses are removed, approximately 95 psi could be achieved at the wellhead by making improvements in the conveyance system from the pump station to the injection wells.



Attachment 2

Technical Memorandum - Underground Injection Control Options for Domestic Wastewater Management, Charlotte County Utilities, ASRus, LLC, January 2023

TECHNICAL MEMORANDUM

Underground Injection Control Options for Domestic Wastewater Management, Charlotte County Utilities

From: Pete Larkin, PG, ASRus
Joe Haberfeld, PG, ASRus

To: Jeffrey Crowley, PE, CCM, PMP, LEED AP, DBIA
David T. Yonge, PhD, PE

Date: January 13, 2023

INTRODUCTION

ASRus, LLC, was retained by Jones Edmunds & Associates, Inc. to provide professional hydrogeological services for domestic wastewater disposal alternatives as part of Jones Edmunds' Master Reuse Plan for Charlotte County Utilities. This memorandum reviews the potential use of injection wells in Charlotte County, regulatory considerations, and feasibility of different injection well options that may be incorporated to manage domestic wastewater.

OVERVIEW OF INJECTION OPTIONS

Three types of injection wells are used in Florida to manage treated domestic wastewater:

- *Class I Disposal Wells:* Typically, these are relatively deep wells used to dispose of wastewater below the Underground Source of Drinking Water (USDW), with a confining zone present between the injection zone and the overlying USDW. The USDW is groundwater with a total dissolved solids (TDS) concentration of less than 10,000 milligrams per liter (mg/L). Class I wells are commonly used in areas of favorable hydrogeology when disposal capacity is the primary need. Drinking water standards do not need to be met in wastewater discharged to Class I wells, but high-level disinfection criteria must be met for disposal into Class I wells permitted after 2005 in 24 Florida counties, including Charlotte County.

  Charlotte County Utilities operates Class I injection wells at three of its water reclamation facilities (WRFs). The East Port and Burnt Store WRFs each have two wells, and the West Port WRF has one well. The East Port and West Port WRF injection wells are used for disposal of treated domestic wastewater, and the Burnt Store WRF injection wells receive a blend of treated domestic wastewater and reverse osmosis (RO) concentrate.

- *Class V Aquifer Storage and Recovery (ASR) Wells:* ASR wells are used to store water in an aquifer during times of excess water and recover it when water demand is high. Summer and fall are typical recharge months when rainfall amounts are high, and the drier winter and spring seasons are when recovery from ASR wells occurs. In addition to providing underground storage, ASR is a method of providing local recharge to an aquifer that has been impacted by saltwater intrusion or a decrease in water level. ASR wells are used in Florida for potable water, partially treated water, and reclaimed water. Water recovered from reclaimed water ASR wells is used to supplement the reclaimed water system.

  Operational ASR wells storing reclaimed water are owned by the Englewood Water District, the City of Naples, Manatee County, the City of Palmetto, the City of St. Petersburg, and the City of Oldsmar. Treated wastewater injected into a USDW aquifer for ASR purposes must, at a minimum, meet the primary drinking water standards of Chapter 62-550, Florida Administrative Code (FAC). Other water quality criteria of Chapter 62-610, FAC, may apply. Some of these ASR systems inject below the base of the USDW, and therefore primary drinking water standards need not be met before recharge.

- *Class V Aquifer Recharge Wells:* Aquifer recharge wells are used to recharge an aquifer that has been or may be negatively impacted by excessive use and/or saltwater intrusion. Since the water is not recovered, larger volumes are recharged, providing a beneficial effect over a larger area than an ASR operation.

  Aquifer recharge projects using reclaimed water are operational in Hillsborough and Manatee Counties, with more systems planned. Similar to ASR projects, treated wastewater injected into a USDW receiving zone for recharge purposes must, at a minimum, meet the primary drinking water standards of Chapter 62-550, FAC. Other water quality criteria of Chapter 62-610, FAC, may apply.

REVIEW OF APPLICABLE PORTIONS OF CHAPTER 62-610, FAC

In addition to the Underground Injection Control (UIC) rule, Chapter 62-528, FAC, the Reuse of Reclaimed Water rule, Chapter 62-610, FAC, also contains regulations for the use of ASR and aquifer recharge. Parts III and V of Chapter 62-610, FAC, apply to these projects. Below are important considerations contained in Parts III and V if injection is to take place in a USDW.

Part III, Rule 62-610.466 for ASR

Section (9): Reclaimed water injected for ASR into a USDW with a concentration of 3,000 mg/L or less TDS must meet full treatment and disinfection criteria of Rule 62-610.563, FAC, which is considerably more stringent than principal treatment. Full treatment includes requirements for Total Organic Carbon (3 mg/L average and 5 mg/L maximum) and Total Organic Halogens (TOX, 0.2 mg/L average and 0.4 mg/L maximum), which require advanced treatment such as membranes. Primary and secondary drinking water standards must also be met. If the aquifer has a TDS concentration between 1,000 and 3,000 mg/L TDS and the receiving groundwater is not currently and is not reasonably expected to be used in the future for public water supply, less stringent principal treatment and disinfection requirements will apply (Rule 62-610.563, FAC).

The cost to upgrade a wastewater treatment plant (WWTP) or WRF to meet full treatment and disinfection criteria is significant, whereas permitted reclaimed water plants in Florida will typically meet principal treatment and disinfection criteria.

ASR within a USDW with greater than 3,000-mg/L TDS concentration requires principal treatment and disinfection. Water injected into a USDW must meet the primary and secondary drinking water standards of Chapter 62-550, FAC. For reclaimed water projects, secondary drinking water standards and sodium are afforded a zone of discharge for injection into a USDW with greater than 3,000 mg/L TDS, or greater than 1,000 mg/L if the receiving groundwater is not currently and is not reasonably expected to be used in the future for public water supply. A zone of discharge for federal primary drinking water standards is not available for injection into any USDW. Reclaimed water injection into a non-USDW aquifer is not subject to the above, but general treatment requirements of Chapters 62-600 and 62-610, FAC, must be met and are generally met by most wastewater treatment facilities.

Part V, Rule 62-610.560 for Aquifer Recharge

The rules applicable to ASR above are generally applicable to aquifer recharge projects. One significant difference is that injection into groundwater with a TDS concentration of 3,000 mg/L or less must meet the full treatment and disinfection criteria regardless of the lack of present or future potable water use in the recharge zone. The zone of discharge criteria are the same as for ASR projects except it cannot be used for any aquifer with a TDS concentration of 3,000 mg/L or less.

GENERAL HYDROGEOLOGY OF CHARLOTTE COUNTY INJECTION SITES

Exhibit 1 shows the East Port, Burnt Store, and West Port WRFs in Charlotte County near Charlotte Harbor and its two major tributaries, the Peace and Myakka Rivers. Exhibits 3 and Exhibit 4 are northeast-southwest and north-south cross-sections, respectively, showing the regional hydrogeology including the depth to the base of the USDW. The hydrogeologic areas of interest in this investigation include the Intermediate and Floridan aquifers containing permeable units within the Arcadia Formation, Suwannee Limestone, Avon Park Formation, and Oldsmar Formation.

The deep hydrogeology is variable in the Charlotte Harbor area. Although the Avon Park high permeability zone (APHPZ) is consistently encountered in the study area, it can be within or below the USDW. This influences its potential use as an injection zone (see the site descriptions below). A second important factor is that this region is a transition area between the southwestern-most Florida Counties (Lee, Collier, Monroe) where the *Boulder Zone* of the Oldsmar Formation is consistently encountered and is commonly used for Class I well injection and counties north of Charlotte where the *Boulder Zone* has not been found or is not transmissive enough to allow Class I well injection. The Avon Park Formation is used instead of the Oldsmar Formation north of Charlotte County and has a transmissivity sufficient for large-volume injection wells.

The *Boulder Zone*, where found, has a TDS approximating that of seawater, consistent with its occurrence throughout South and Central Florida. Formations that are shallower than the Avon Park Formation are consistently within the USDW at Charlotte County’s injection facilities.

SITE-SPECIFIC HYDROGEOLOGY AND INJECTION WELL DETAILS

East Port WRF

The East Port WRF has two Class I injection wells for disposal of secondary treated domestic wastewater. Injection well IW-1 was constructed in 1988. It is a low-capacity well due to a narrow final casing diameter of 8 inches, allowing a maximum injection volume of 2.04 million gallons per day (MGD). Injection well IW-2 was installed in 1996 to provide additional disposal capacity. IW-2 has a 20-inch diameter final casing and is permitted to inject 7.56 MGD. The injection zone at the East Port WRF is at depths of 2,965 to 3,246 feet below land surface (bls) and is in the *Boulder Zone* of the Oldsmar Formation. The APHPZ is transmissive enough to be used for high-volume injection, but it has been defined to be partially in the USDW at this location, making it not suitable for Class I injection.

Burnt Store WRF and WTP

The Burnt Store WRF/WTP facility has two Class I injection wells – IW-1 and IW-2. Injection well IW-1 was constructed in 1995 with a 3.5-inch-diameter final tubing, later replaced with a 4.5-inch-diameter tubing, and has a permitted capacity of 0.564 MGD. Injection well IW-2 has an 18-inch-diameter final tubing (16.6-inch inner diameter) and is permitted to inject 2.88 MGD. The wells are used for injecting secondary treated domestic wastewater and RO concentrate. The injection zone is at depths of 2,503 to 3,268 feet bls and is in the *Boulder Zone* of the Oldsmar Formation. The APHPZ is transmissive enough to be used for high-volume injection, but it is partially in the USDW at this location, making it not suitable for Class I injection. Since the injection wells are Class I industrial wells with injection of RO concentrate, fluid movement into a USDW is prohibited. However, reject or *off-spec* water can be injected in these wells, whereas Class I municipal injection wells must meet high-level disinfection requirements as noted previously.

West Port WRF

The West Port WRF has one Class I injection well, IW-1, constructed in 1996 for disposal of secondary treated domestic wastewater. It is completed with a 12-inch-diameter casing and has a permitted capacity of 4.75 MGD. The injection zone was encountered at a depth of 1,274 to 1,650 feet bls and is in the APHPZ. The well was drilled through the *Boulder Zone* interval, but it did not exist at this site. The APHPZ was selected as the injection zone because it is highly transmissive and is completely below the base of the USDW, with confinement present between the injection zone and the base of the USDW.

SITE-SPECIFIC INJECTION AND STORAGE CAPACITY

East Port WRF

Class I Injection Well Disposal: Injection capacity is determined by the capacity of the formation, allowable wellhead pressure, pumping capacity, and size of the final casing. The maximum permitted flow rate allowed by the Florida Department of Environmental Protection (FDEP) is 10 feet per second (fps) inside the final casing of the injection well. To obtain the maximum allowable permitted injection rate, the well must be able to accept the maximum flow at the permitted maximum pressure. The maximum permitted pressure is established during pressure testing of the casing and is based on two-thirds of the pressure at which the casing was tested. Injection well IW-1 is permitted for the maximum capacity (2.04 MGD) allowed by FDEP. Injection well IW-2 is currently permitted to accept up to 7.56 MGD, although the 20 inch-diameter casing (19-inch inside diameter) will allow an increase in the well capacity up to 12.73 MGD (10 fps). By conducting an FDEP-approved rerating injection test, the well permit can be modified to the injection rate that can be demonstrated at the well (up to 10 fps). Modifications to the injection piping to the wells and possibly well rehabilitation will be needed to increase the permitted flow rate at IW-2. This will help the County deal with short-term high-flow periods or plan for higher flows on a regular basis. Wells IW-1 and IW-2 could be rehabilitated by acidizing the wells with hydrochloric acid to increase the well capacities. If further disposal capacity is needed at the East Port WRF, constructing a third Class I well is viable; a single 24-inch-diameter well is expected to have a capacity at or near the maximum permitted rate allowed by FDEP, which would be 18.65 MGD (10 fps in 23-inch-inside-diameter pipe). The hydrogeology is well known, upward fluid movement into the USDW has not occurred from the operation of IW-1 and IW-2, and therefore permitting a third deep well should not encounter obstacles with FDEP.

Aquifer Storage and Recovery: The Suwannee Limestone is a potential ASR zone occurring at depths between 740 and 1,115 feet bls at the East Port WRF. It is moderately brackish. No measurement of TDS concentrations appears to have been made in the Suwannee Limestone during the construction of IW-1, IW-2, or the dual zone monitor well. From the limited on-site data, the TDS concentration is estimated at 2,000 mg/L. The Suwannee Limestone may serve as an ASR zone because confining zones are above and below it and limited data indicate that it is not highly fractured. These features will lead to a higher percentage of recovery of reclaimed water. The Suwannee Limestone has the advantage of being above the Avon Park Formation, which is used as a monitor interval for the Class I well operation and is likely too highly fractured and saline to serve as an efficient ASR zone. Since the groundwater in the Suwannee Limestone at this location likely has a TDS concentration that is less than 3,000 mg/L, water recharged in the well will have to meet primary drinking water standards and a demonstration will have to be made that the permeable unit is not currently used and is not reasonably expected to be used in the future as a drinking water supply by the County or others.

Aquifer Recharge: Aquifer recharge potential is likely highest in the APHPZ since it can accept high flow rates and is part of the Upper Floridan Aquifer (UFA). Recharge into the UFA is better characterized as beneficial reuse since it mitigates over-pumping from this extensively used aquifer. Net benefits, or *groundwater credits,* could be negotiated with the water management district to allow recovery for consumptive use of a percentage of the water invested. The recovery can potentially be at a different location and from a shallow zone and could be used to supplement the reclaimed water system during the dry season. At the East Port WRF, the APHPZ occurs at depths between 1,380 and 1,760 feet bls. The portion above approximately 1,580 feet bls is in the USDW, and the portion below 1,580 feet bls is below the base of the USDW. Transmissivity is very high in the APHPZ and will allow aquifer recharge. The formation is used as a monitor interval for the Class I well operation. FDEP may have concerns about this, but if the recharge well can be sited close to the WRF approximately 0.75 mile north of the Class I well project, an aquifer recharge project may be feasible. The recharge interval needs to be in groundwater with greater than 3,000 mg/L TDS to meet Chapter 62-610, FAC, regulations for principal treatment, since full treatment is considered cost prohibitive for this site. A well completed at the depth of the existing upper monitor well (1,422 to 1,494 feet bls) should encounter a TDS concentration of approximately 4,000 mg/L, and if completed deeper in the

APHPZ the TDS will be more saline. A completion below the upper monitor zone would likely be preferable to FDEP.

Burnt Store WWTP/WTP

Class I Injection Well Disposal: Injection well IW-1 is permitted for 0.564 MGD; the maximum capacity allowed by FDEP is 1.55 MGD based on an injection velocity of 10 fps in the final casing. Injection well IW-2 is currently permitted to accept up to 2.88 MGD; the maximum capacity allowed by FDEP is 9.71 MGD based on an injection velocity of 10 fps in the final casing. By conducting an FDEP-approved rerating injection test, either or both well permits can be modified to allow up to the stated maximum flow daily rates if the capacity of the formation will allow while staying within the maximum permitted injection pressures. This will help the County deal with short-term high-flow periods or plan for higher flows on a regular basis. If even further disposal capacity is needed at the Burnt Store WRF, constructing a third Class I well is viable; a single 24-inch-diameter well is expected to have a capacity at or near the maximum permitted rate allowed by FDEP, which would be 18.65 MGD (10 fps in 23-inch inside-diameter pipe). The hydrogeology is well known, upward fluid movement into the USDW has not occurred from the operation of IW-1 and IW-2, and therefore the permitting of a third deep well should not encounter obstacles from FDEP.

Aquifer Storage and Recovery: The potential for ASR development is present in the Ocala Group, directly underlying the Suwannee Limestone. The long-term data from the existing upper monitor well and the water quality tests and geophysical logs conducted during the construction of injection well IW-2 indicate that the TDS concentration is 2,000 mg/L in the Suwannee Limestone between 1,207 and 1,287 feet bls, making it a challenge to permit at this location. However, the TDS concentration is greater than 3,000 mg/L below 1,300 feet bls in the Ocala Group. The base of the USDW is at approximately 1,380 feet bls in the Ocala Group. Permeability between 1,300 and 1,400 feet bls appears favorable for ASR, although this would need to be confirmed with a test well. A potential constraining factor is the use of the 1,207 to 1,287-foot bls zone for monitoring the Class I well operation.

Aquifer Recharge: The Avon Park Formation has two highly permeable zones at 1,550 to 1,565 and 1,695 to 1,730 feet bls, below the base of the USDW previously defined at 1,380 feet bls at this site. The two intervals are much thinner than the equivalent formation at the East Port WRF, limiting the capacity of an aquifer recharge well. The lower monitor zone for the Class I injection well operation is completed from 1,832 and 1,868 feet bls and, similar to the 1,207 to 1,287 feet bls zone, may be viewed as a constraining factor in permitting. This well could be characterized as an aquifer recharge/salinity barrier well that provides protection to the UFA from further saltwater intrusion inland.

Burnt Store WRF Potable Water Development

A technical memorandum dated April 21, 2017, by RMA GeoLogic Consultants, *Task 7 – Potential Options For Well RO-15*, discussed the performance of supply well RO-15 approximately 1,000 feet from dual zone monitor well. RO-15 is completed in the Suwannee Limestone between 800 and 1,050 feet bls. It had a background chloride concentration of 960 mg/L in August 2010, but concentrations increased to 1,290 mg/L by November 2011 after 15 months of pumping at approximately 125,000 gallons per month. Due to the relatively sharp salinity gradients beneath the Suwannee Limestone exacerbated by and the increased head gradients created from pumping of the RO wellfield, upconing of more saline water underlying the wells is a common problem with the development of brackish groundwater for RO treatment in Florida. Aquifer recharge beneath the RO wellfield could be explored at this location to mitigate the effects of upconing that has been observed. Freshening the groundwater beneath the RO wellfield with reclaimed water will reduce the salinity increases resulting from upconing and make the wellfield more sustainable. The treatment level of the existing plant would need to be evaluated with the consideration that some of the reclaimed water would most likely be eventually captured in the RO wells. This aquifer recharge system would be considered an indirect potable reuse project, and potential grant funding options may be available.

West Port WRF Injection and Storage Capacity

Class I Injection Well Disposal: Injection well IW-1 is permitted for the maximum capacity (4.75 MGD) allowed by FDEP based on an injection velocity of 10 fps in the final casing. If additional disposal capacity is needed at the West Port WRF, constructing a second Class I injection well is viable, and a single 24-inch-diameter well is expected to have a capacity at or near the maximum permitted rate allowed by FDEP, which would be 18.65 MGD (10 fps in 23-inch inside-diameter pipe). Unlike the East Port and Burnt Store WRF sites, the injection zone is in the APHPZ. The hydrogeology is well known, upward fluid movement into the USDW has not occurred from the operation of IW-1, and permitting of a second deep well should not encounter major obstacles with FDEP. The two Suwannee Limestone zones of the dual zone monitor well have shown slow increases in salinity since IW-1 was constructed in 1996, but past permit renewal applications have attributed this to regional saltwater intrusion.

Aquifer Storage and Recovery and Aquifer Recharge: Due to the Avon Park Formation already being used for Class I well injection, the potential for ASR development at the West Port WRF site is more limited than the other two injection sites; however, an argument can be made that injection into this permeable unit provides a regional net benefit to the UFA, and therefore classification as an aquifer recharge well could be considered. The Suwannee Limestone is used for two monitor zones associated with the injection system at the site; however, this permeable unit may have potential for ASR or aquifer recharge if primary drinking water standards can be met. The overlying Hawthorn Group has formations with lower permeability and potentially more competing use and therefore is not likely to be considered feasible for ASR or aquifer recharge.

Rotonda WRF Injection Options

Class I Injection Well Disposal: A Class I injection well does not exist at the Rotonda WRF; however, if the need to dispose of excess reclaimed water arises at this location, the APHPZ would be the appropriate injection zone since it provides a high injection capacity and is below the base of the USDW.

Aquifer Storage and Recovery and Aquifer Recharge: A test well was completed at the Rotonda WRF site to evaluate reclaimed water ASR. Data evaluation by Johnson Engineering suggested that the base of the USDW was approximately 580 feet bls and that the main permeable zone of the Suwannee Limestone was below this depth. It was concluded that additional testing would be needed to determine the hydraulic separation of this zone from the overlying USDW and whether this zone could be used for ASR applications. The assumption was that an ASR well could only be successful if completed below the base of the USDW, like the Englewood Water District reclaimed water ASR well to the west, so that meeting primary drinking water standards would not be required. However, an ASR well or a recharge well could be considered in this zone, which would provide an opportunity for reclaimed water supplementation during the dry season. If the targeted zone within the Suwannee Limestone is not below the base of the USDW but is greater than 3,000 mg/L TDS, ASR and aquifer recharge are still viable within the Suwannee Limestone permeable zone. However, modifications to the disinfection treatment may be needed to meet total coliform and disinfection by-product requirements (e.g., switch to chloramine disinfection). Several other utilities in Florida have made this disinfection transition to accommodate ASR or aquifer recharge into a USDW.

An aquifer recharge Class V classification in the form of a salinity barrier system could also be explored within the APHPZ. This would be below the base of the USDW and not required to meet primary drinking water standards.

ASR AND AQUIFER RECHARGE CONSIDERATIONS

The siting of an ASR and aquifer recharge well location is important in the cost of the project and in meeting regulatory requirements. The factors below need to be considered.

Salinity and Type of Permeability: ASR often does not work well if the storage zone is saline (is not a USDW) or is highly fractured. Water can be recharged, but recovery efficiency is generally low. This is not a controlling factor for aquifer recharge or deep well disposal since they are not designed to recover water.

Location: The farther the wells are from the WRF, the greater the cost related to conveyance. Wells located away from the WRF can pose water quality issues if primary drinking water standards have to be met. FDEP normally requires reclaimed water going to wells to be sampled near the wellhead before injection. Water quality of reclaimed water is less likely to be out of compliance if samples are taken soon after exiting the WRF rather than at remote well locations. Total coliform bacteria and disinfection byproducts have a greater opportunity to form the farther the water needs to be conveyed from the plant. Locating ASR wells near the WRF, and specifically near the end of the chlorine contact chamber, also provides the benefit of blending capacity with water generated from the plant so that a consistent water quality can be maintained in the distribution system.

Water Quality: Reclaimed water has been found to exceed the FDEP maximum contaminant levels for the disinfection byproducts total trihalomethanes (80 micrograms per liter [μg/L]) and/or total haloacetic acids (HAA5; 60 μg/L). They form after the chlorination process since the water must meet disinfection requirements. Injection of water into a USDW is not permitted to exceed these concentrations. Replacement of free chlorine with chloramine disinfection is a viable solution to reducing disinfection byproduct formation while still meeting the disinfection criteria.

High dissolved oxygen concentrations in the recharge water and the natural reducing environment of the groundwater can result in the mobilization of arsenic in the recharge zone, potentially at concentrations greater than the drinking water standard of 10 μg/L. This geochemical interaction typically does not extend far from the well and can be mitigated by having institutional control of the water injected. As a result, locations that have significant property under the owner's control is best suited for ASR; otherwise, removal of dissolved oxygen from the recharged water may be necessary to limit the mobilization of arsenic in the formation.

WELL CAPACITIES

Class I disposal, ASR, and aquifer recharge wells can differ regarding the volume of water that can be discharged to them. The transmissivity of the receiving aquifer and the use of the well are the primary factors in the volume of water that can be injected. The viability of potential receiving zones for Class I injection, ASR, and aquifer recharge are as follows:

- A Class I injection well into the *Boulder Zone* is a high-capacity well. If a 24-inch-diameter final casing is used, up to 18.65 MGD can be permitted by FDEP, which is the maximum allowable injection velocity of 10 fps in the 23-inch inside diameter of the final casing. The *Boulder Zone* is a fractured dolomitized limestone; as a result, common distribution pressure (or lower) is usually adequate to achieve high flow rates into this injection zone.

- ASR potential in Charlotte County is highest in the Suwannee Limestone. The transmissivity of this permeable zone is not as high as a typical disposal injection well in the *Boulder Zone* or APHPZ and therefore allows a storage zone to be established while providing moderate recovery rates from the well. The injection capacity of an ASR well in this zone is typically limited to approximately 1 to 2 MGD. Recovery efficiency (in terms of acceptable water quality) of ASR wells can vary and depends on a number of factors including the water quality of the receiving zone, the amount of water committed to storage, and the blending capacity of the reclaimed water system. However, for high-level planning purposes, approximately 50 percent of recharged water can be expected to be recovered if sufficient storage volumes are invested to build an effective storage zone. FDEP does not regulate withdrawal quantities or rates; however, to maintain its ASR classification, FDEP would expect to see a reasonable minimal amount (e.g., 40 to 70 percent) of long-term recovery from the well.

- An aquifer recharge project would likely target the APHPZ. It is likely transmissive enough to accept 5 to 15 MGD, but FDEP may limit the rate at the East Port WRF site due to the use of the zone for Class I injection well monitoring. The APHPZ is within the UFA, and recharge to this zone should be considered a regional environmental benefit. Conceptually, a portion of the water invested could be permitted by the water management district to be withdrawn as a potable or non-potable groundwater supply at a location that is beneficial for supplementation of the reclaimed system or for a brackish supply wellfield.

GENERAL COST, PERMITTING, CONSTRUCTION TIME

Class I *Boulder Zone* injection wells, including monitor wells, are expected to cost \$6 to \$10 million for the subsurface construction in today's current drilling market, depending on the well depth/diameter. If a monitor well is not required due to the existence of one, it may reduce the cost by approximately \$0.5 to \$1 million.

ASR wells completed within the Suwannee Limestone permeable units, including monitor wells, can vary from $2 to $3 million for the subsurface construction cost. depending on the well depth/diameter and number of monitor wells.

Aquifer recharge wells or Class I injection wells completed into the APHPZ, including monitor wells, are likely to be between $4 to $5 million for the subsurface construction cost, depending on the well depth/diameter and number of monitor wells.

In all cases, the cost of the conveyance pipe from the WRF, related surface facilities additions, and ongoing operating and monitoring expenses are not included. Each type of UIC well takes a minimum of 12 months to be permitted by FDEP, with recent permits taking even longer. The time needed to construct the wells depends on the number, depth, diameter, complexity of the wells required; the ability to work extended hours; and the drilling firm selected. Monitor wells are permitted with the injection wells, and the more that are needed the longer the well construction period required. The estimated schedule to complete permitting, design, bidding, and construction is 24 to 36 months.

SUMMARY

Three UIC options for domestic wastewater management were evaluated for Charlotte County Utilities to address wastewater disposal alternatives or enhancements to managing excess reclaimed water. The treatment plant desired for adding additional disposal capacity, the site-specific hydrogeology, and the financial resources needed will determine which option(s) will be feasible for the County to pursue. In most instances, siting injection systems at a WRF is beneficial. Each WRF site within the County presents different opportunities and challenges for using or increasing underground injection capacity to better manage wastewater generated from the facilities. In all cases, the minimum treatment for injecting reclaimed water in any new well is principal treatment with high-level disinfection as defined in Chapter 62-610, FAC. The following summarizes the considerations for each location.

<u>East Port WRF</u>

- The *Boulder Zone* is the viable Class I injection zone far below the base of the USDW at this site. This should result in straight forward permitting for future Class I wells at this location.
- The APHPZ is very transmissive, and groundwater in this zone is greater than 3,000 mg/L TDS with some portions greater than 10,000 mg/L TDS, regulatory thresholds that make this zone optimal for aquifer recharge opportunities.
- The Suwannee Limestone provides ASR potential, although the TDS concentration is likely approximately 2,000 mg/L, which makes permitting ASR within this zone more challenging than a zone containing 3,000 mg/L or greater.
- For the ASR and aquifer recharge options, locating the wells closer to the WRF and approximately 0.75 mile from the existing Class I wells and their dual-zone monitor well is possible. This scenario is more likely to be permitted by FDEP since Class V well operation will have less impact on the dual zone monitor well currently in place for the Class I injection well system.

Burnt Store WRF

- This location provides an opportunity to expand the injection disposal. Adding wells or potentially re-rating the existing wells could be explored if more disposal capacity is needed. The injection zone at this location is the *Boulder Zone* in the Oldsmar Formation.
- Aquifer recharge in the APHPZ is viable at this site. An indirect potable reuse option could be evaluated to determine if injection of excess reclaimed water beneath the existing RO supply wellfield could mitigate upconing of saltwater at the wellfield. Aquifer recharge directly into the Suwannee Limestone would be more challenging since this zone is currently used for RO supply. However, if the lower-producing zone of the Suwannee Limestone (expected to be below the USDW) is adequately isolated from the upper RO-producing zone, this could be further explored.
- ASR within the upper portion of the Suwannee Limestone permeable interval or shallower aquifers would be challenging since TDS concentrations are expected to be less than 3,000 mg/L and the Suwannee Limestone is used for RO supply.

West Port WRF

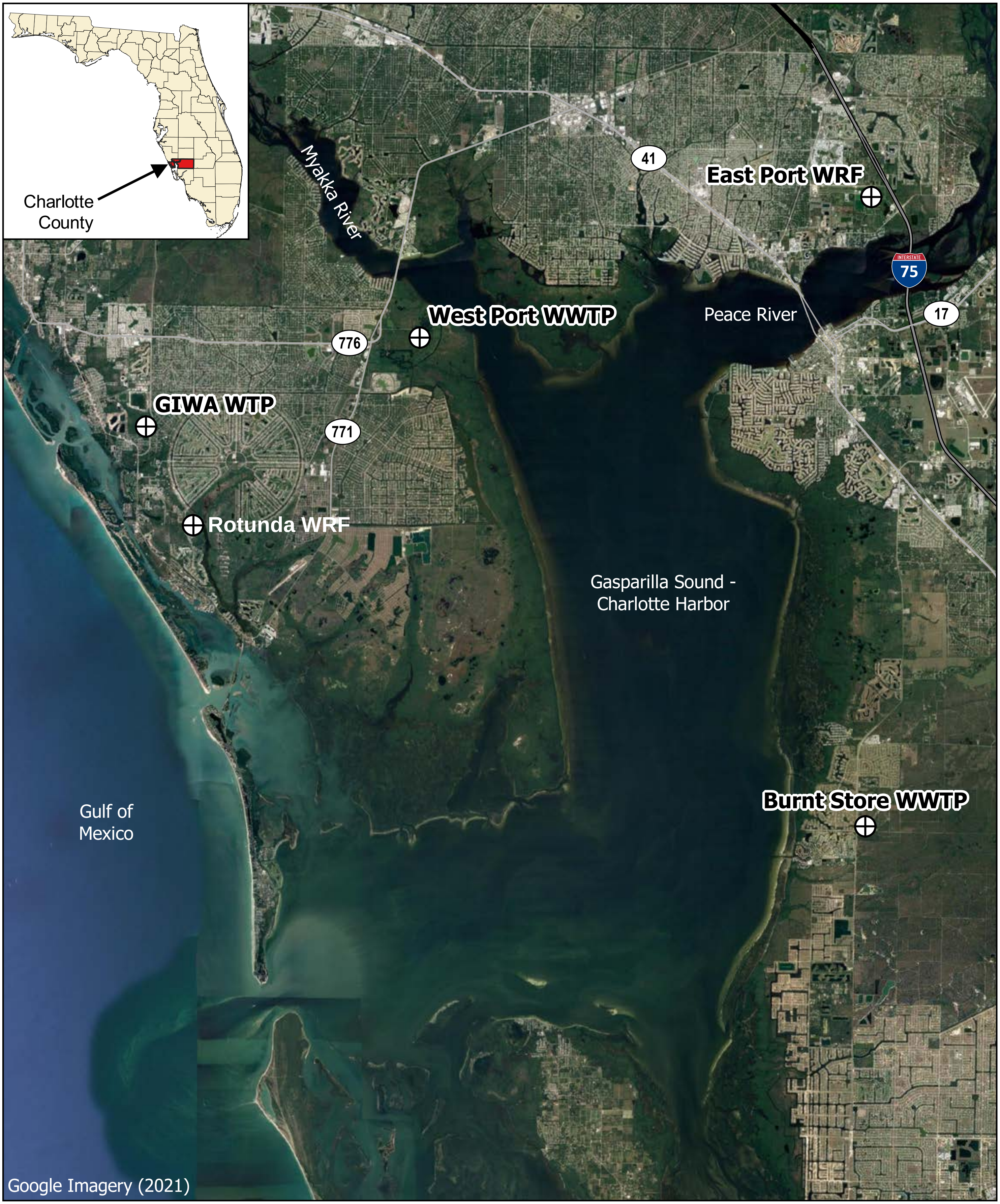
- This location provides an opportunity to expand injection disposal capacity within the APHPZ. Adding Class I injection wells in this zone could be explored if more disposal capacity is needed.
- Aquifer recharge and ASR could be considered within the Suwannee Limestone, which historically was a zone with TDS concentration less than 10,000 mg/L but has increased to greater than 10,000 mg/L due to saltwater intrusion. This zone should be classified as a non-USDW, but this may be disputed by FDEP. If it is not characterized as a non-USDW, primary drinking water and groundwater discharge standards for total coliform would have to be met in the water discharged into a well in this zone.

Rotonda WRF

- This location provides an opportunity to add injection disposal capacity within the APHPZ. Adding Class I injection wells in this zone could be explored if disposal capacity is needed at this location. Classification as an aquifer recharge salinity barrier well (Class V versus Class I) within this zone could also be explored.
- An ASR well or an aquifer recharge well could be considered in the Suwannee Limestone permeable unit, both of which would provide an opportunity for reclaimed water supplementation during the dry season. If the targeted zone within the Suwannee Limestone cannot be characterized as a non-USDW but is greater than 3,000 mg/L TDS, injected water would have to meet primary drinking water and groundwater discharge standards including total coliform (4 colony-forming units per 100 milliliters).

EXHIBIT 1

SITE LOCATION



N

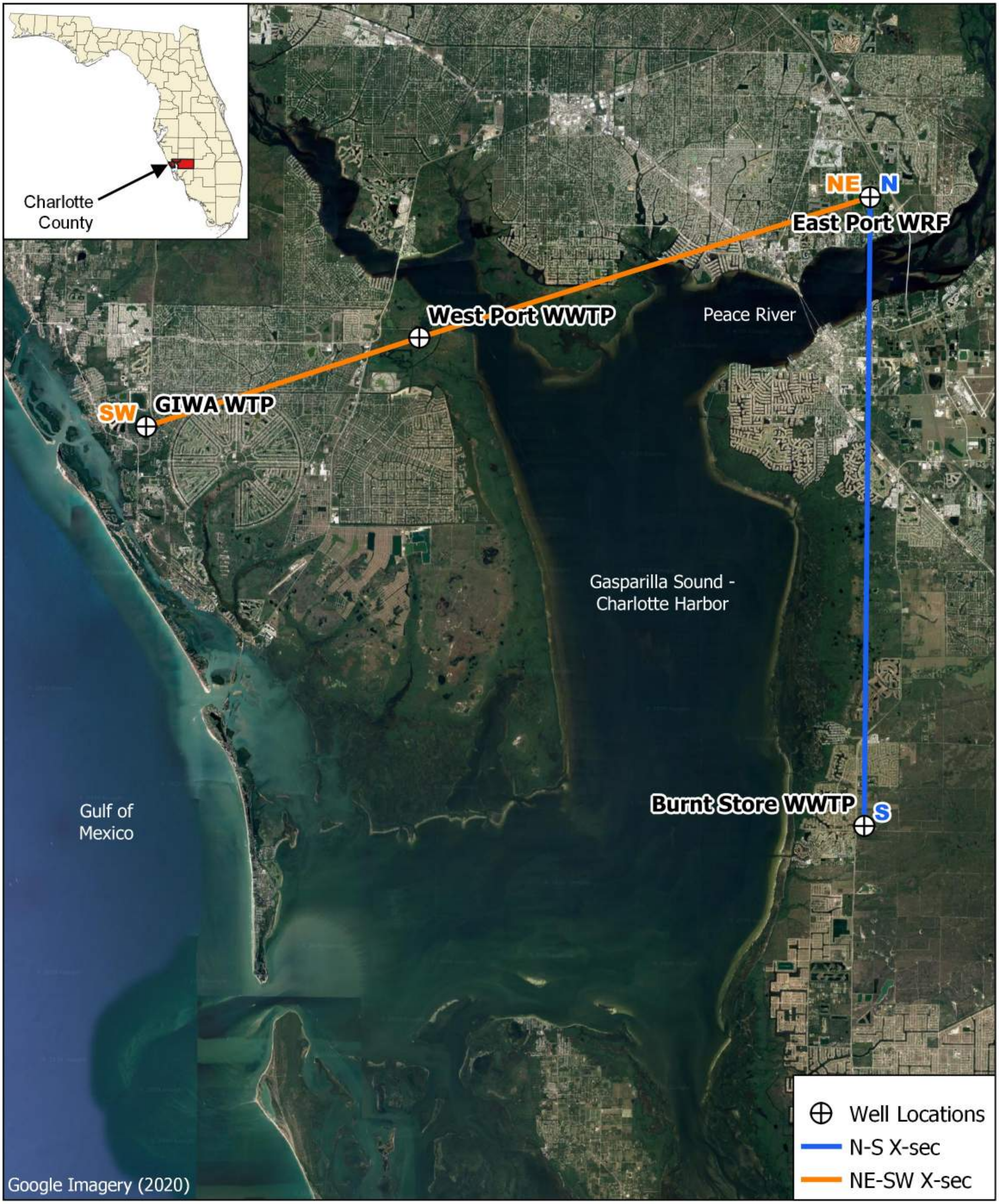
0 3 mi

Exhibit 1
Location Map

Charlotte County
ASRUS, LLC
JonesEdmunds

EXHIBIT 2

MAP OF CROSS SECTIONS



Revised 12/2/2020

Exhibit 2
Cross Section Map

N 0 3 mi

CHARLOTTE COUNTY

ASRUS, LLC

EXHIBIT 3

CROSS SECTION NORTHEAST-SOUTHWEST

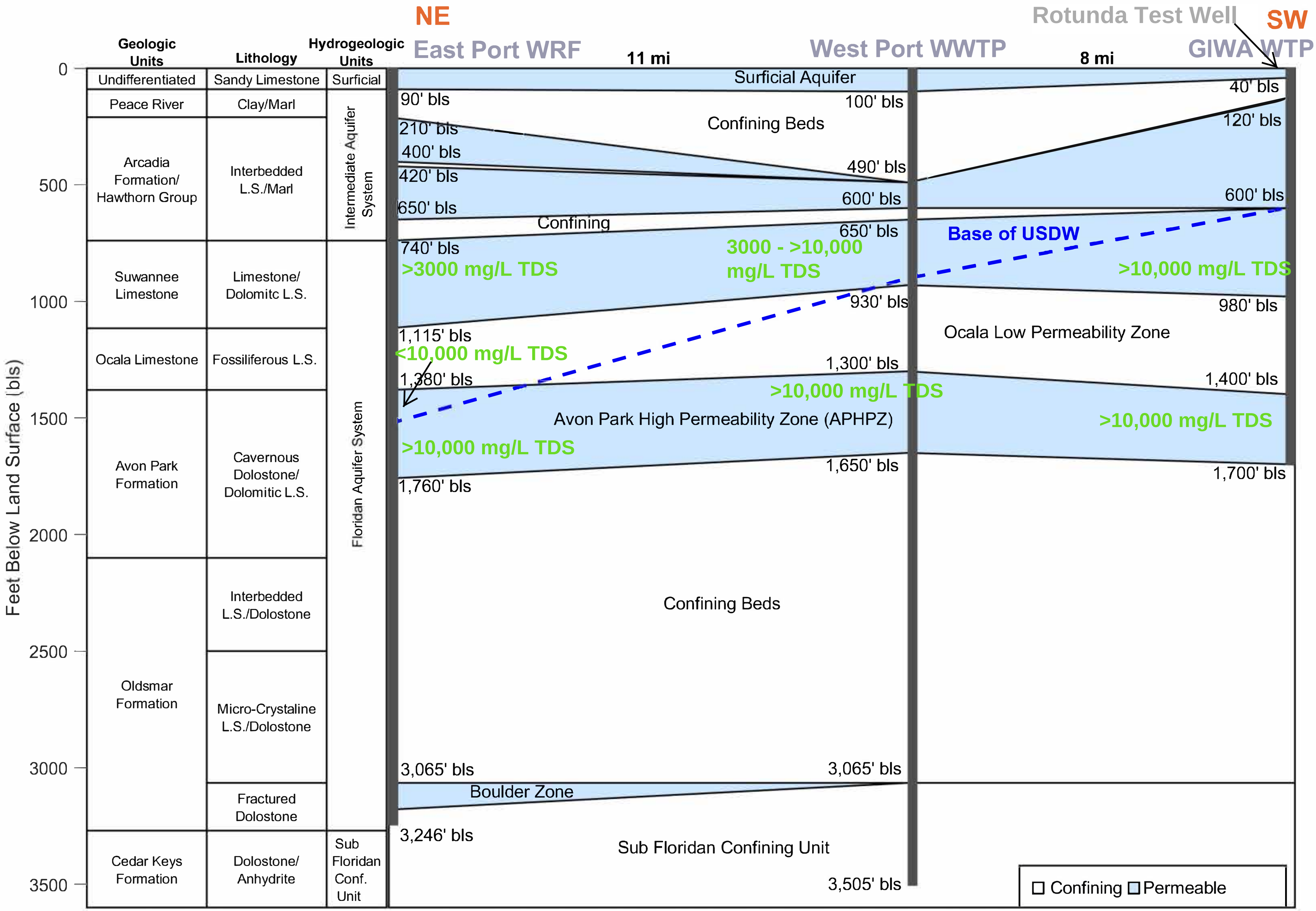


Figure adopted from information presented in: Hutchinson, USGW WSP 2371, 1992 and RMA GeoLogic Consultants, Inc. Projects 19-942, 19-959, 19-945, and 15-804.

Exhibit 3
Cross Section NE-SW

ASRUS, LLC JonesEdmunds Charlotte County

EXHIBIT 4

CROSS SECTION NORTH-SOUTH

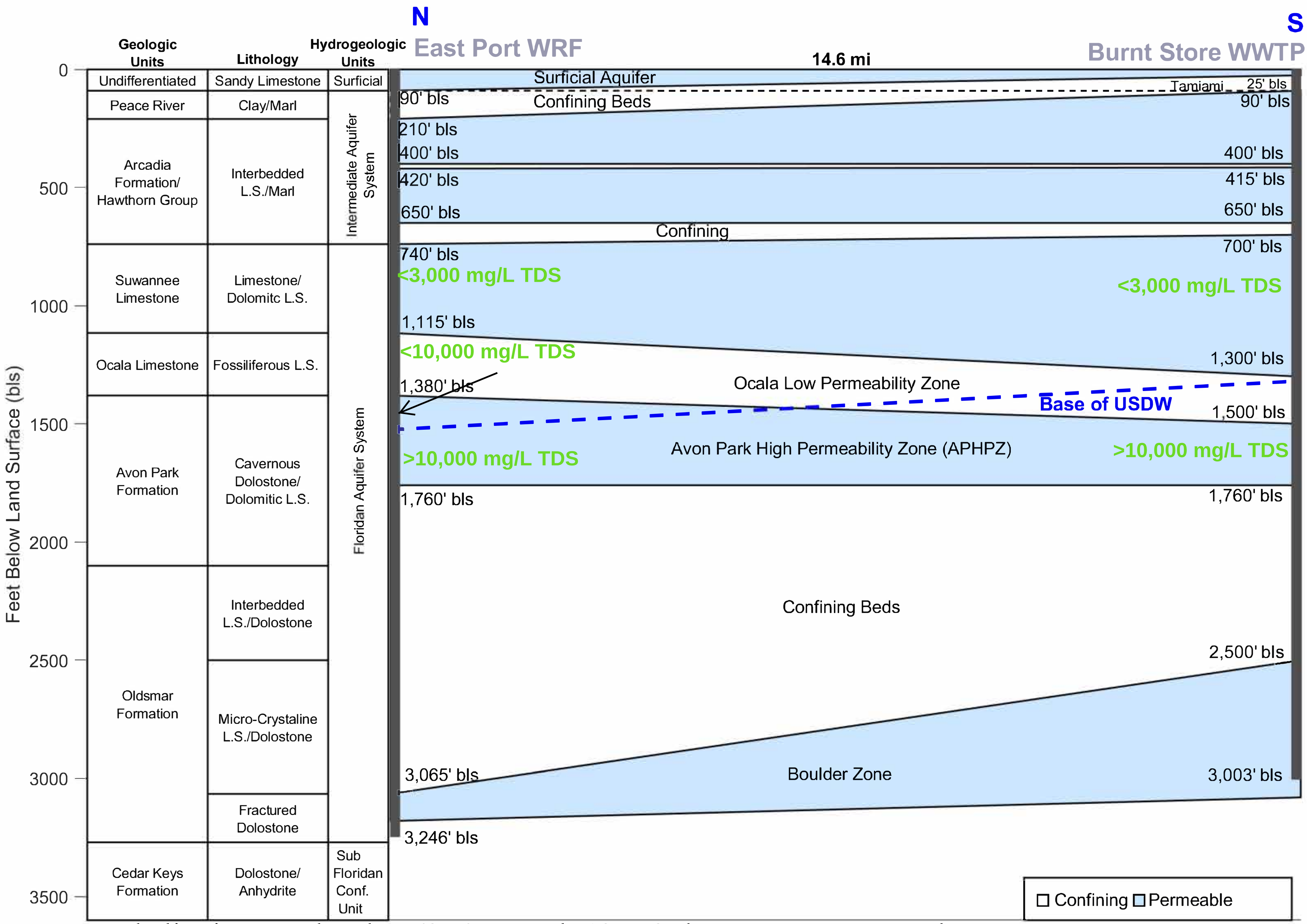


Figure adopted from information presented in: Hutchinson, USGW WSP 2371, 1992 and RMA GeoLogic Consultants, Inc. Projects 19-942, 19-959, 19-945, and 15-804.

ASRUS, LLC JonesEdmunds

Exhibit 4
Cross Section N-S

CHARLOTTE COUNTY

Attachment 3 – Technical Memorandum – RCW Hydraulic Modeling Assistance and Maintenance, Jones Edmunds, January 2020

TECHNICAL MEMORANDUM NO. 1

RCW Hydraulic Modeling Assistance and Maintenance

TO:	Bruce Bullert, PE; Tom Dunn, PE; Johnny Chamberlain; Dave Watson; Steve Bozman
FROM:	Tom Friedrich, PE, BCEE; Peter Simms, PE
DATE:	January 16, 2020
SUBJECT:	RCW Model Update Jones Edmunds Project No. 03405-025-01

1 SUMMARY

This Technical Memorandum (TM) documents the updates to the Charlotte County Utilities (CCU) reclaimed water (RCW) hydraulic model, model verification, current operations, and analyses and recommendations for RCW system improvements to maximize conveyance of RCW to existing and future customers.

This TM includes the following sections:

- Background.
- Model Updates.
- Model Conversion and Verification.
- RCW System Operation.
- Model Analyses and Results.
- Recommendations.

2 BACKGROUND

CCU requested that Jones Edmunds incorporate RCW transmission Phase 3 and East Port Water Reclamation Facility (WRF) Phase 5 improvements into the existing RCW hydraulic model to represent the future system. Additionally, CCU requested that Jones Edmunds model existing and future conditions under new operational conditions to explore maximizing conveyance of the RCW flows produced to existing and future customers.

Jones Edmunds updated the model based on provided data, incorporated future RCW user demands, performed model simulations, and developed improvement alternatives. This TM summarizes the model update and verification process, current system operation, and analyses and recommendations.

3 MODEL UPDATES

Pump station (PS) representations were updated for the East Rotonda Boulevard Booster Pump Station (BPS), Rotonda PS #1, Walenda BPS, and Eagle Street BPS. The Rotonda PS #2 was added to the model, and the East Port WRF RCW HSPS No. 2 9-million-gallons-per-day (MGD) RCW High-Service Pumping Station (HSPS) was reintroduced to the model. The East Port WRF RCW HSPS No. 2 and associated 95-million-gallon (MG) RCW pond construction is complete and ready to be placed into operation. Pressure and flow data from the ongoing RCW HSPS testing at East Port WRF will be used for comparison with the model predictions.

The model representation of the RCW system network was updated to include the constructed and designed portions of the system based on available design and record drawings. Table 3-1 lists the drawings incorporated during the update of the model and used to develop improved representation of existing model pump stations.

Table 3-1 Drawings List

Description	Date (Month-Year)
Rotonda WRF Expansion	Dec-06
Eagle Street Booster Station	Mar-09
Walenda Booster Station	Mar-09
Cattle Dock Point Road 16-inch RCW Main	May-14
Rotonda East Booster Station	Sep-14
US 41 RCW	Apr-15
Lemon Bay Golf Course Design	Sep-15
Cape Haze RCW	Sep-15
Harbor Boulevard Enhancement Project	Apr-16
East Port Stage 5 (HSPS No. 2)	Dec-16
Walenda Booster Reclaimed Water Extension	Apr-18
Placida Road RCW Main	Oct-18
Gasparilla Road RCW	Oct-18
Olean Boulevard Utilities Improvement	Oct-18
Parkside Improvements	Dec-18

In the existing conditions modeling, pond discharges to large users were represented using a throttling control valve. The valve flow/closure characteristics were derived from the Data Flow Systems HyperTAC software flow, pressure, and valve position data exports.

Figure 3-1 shows the RCW system model updates by location. Model representation was presented to and confirmed by CCU at the workshop held on April 22, 2019.

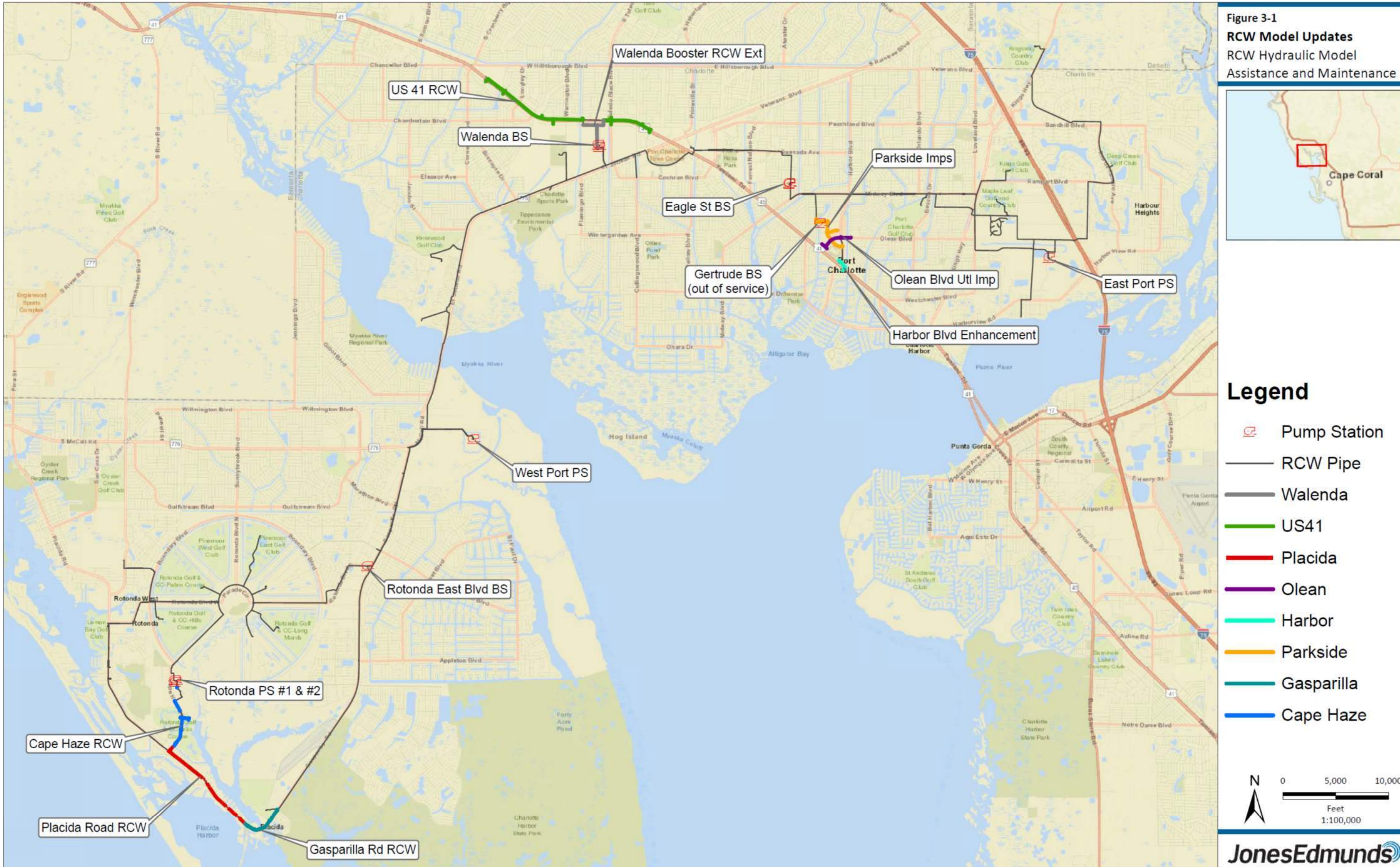


Figure 3-1

RCW Model Updates

RCW Hydraulic Model Assistance and Maintenance

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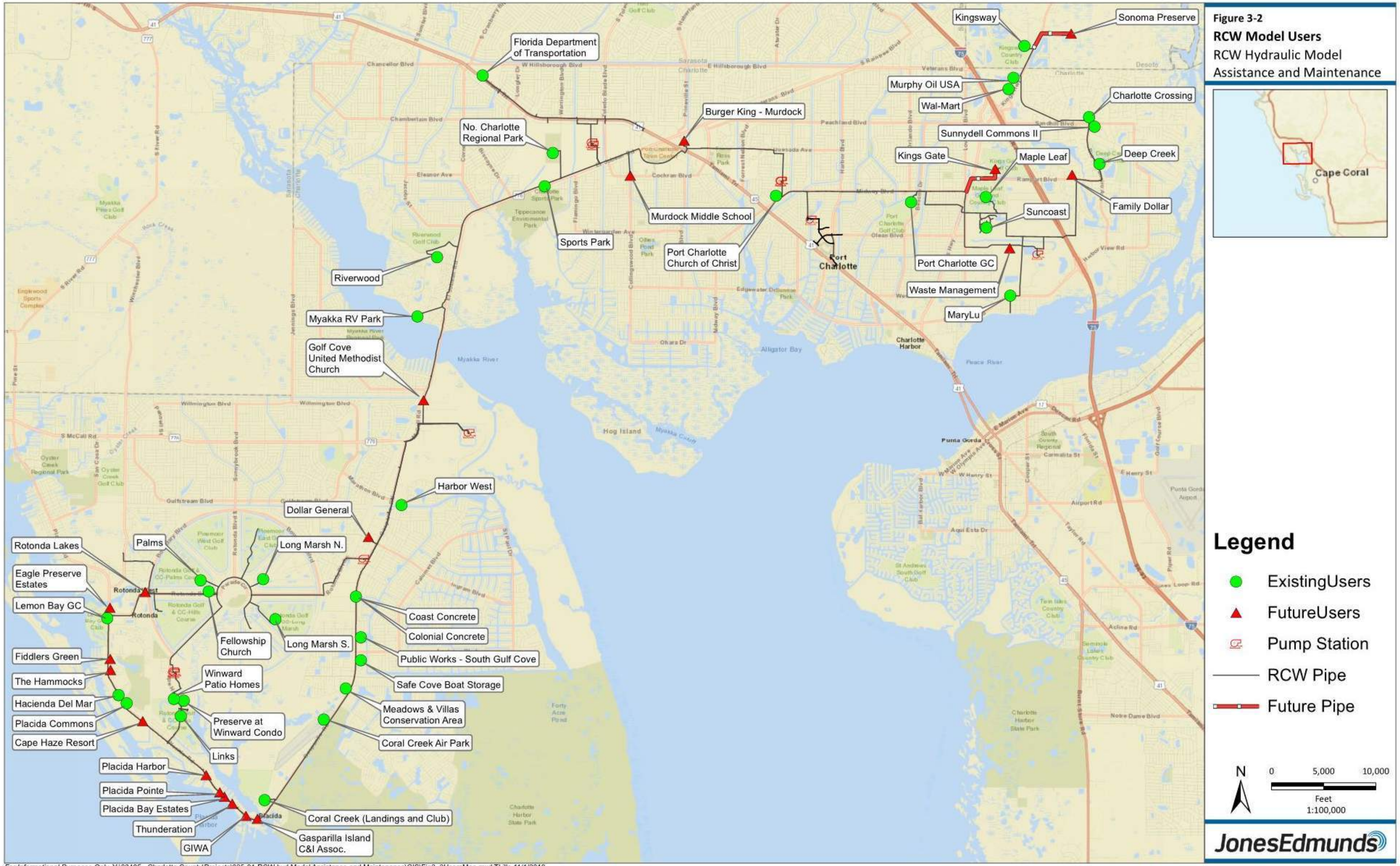
The model also includes the RCW users' demands based on their agreements with the County regarding how much RCW they will be provided daily. Table 3-2 lists the current and future RCW users, grouping them by County location (Central or West County) and the amount of RCW that is allocated for daily usage according to their RCW supply contract with CCU. The total RCW amount allocated to RCW Users (Current and Future) is 6,398,382 gallons per day (gpd). Figure 3-2 shows the locations of existing, and Table 3-2 summarizes future RCW users.

Table 3-2 Reclaimed Water Users

Reclaim Sites	Pond/ Pressurized	Current/ Future User	Agreement Amount (MGD)
Central County Reclaim Sites			
Burger King – Murdock	Pressurized	Future	N/A
CC Parks Department Sports Park	Pond	Current	0.25
Charlotte Crossing	Pressurized	Current	0.0045
Deep Creek Golf Club	Pond	Current	0.18
Family Dollar	Pressurized	Future	0.00072
Florida Department of Transportation	Pressurized	Current	0.0007
Golf Cove United Methodist Church	Pressurized	Future	0.0014
Kings Gate GC	Pond	Future	0.13
Kingsway Country Club GC	Pond	Current	0.23
Maple Leaf Estates	Pond	Current	0.23
Marylou Home Owners Association	Pressurized	Current	0.038
Murdock Middle School	Pressurized	Future	0.0014
Murphy Oil USA	Pressurized	Current	0.00109
Myakka RV Park	Pressurized	Current	0.04
North Charlotte Regional Park	Pressurized	Current	0.05
Port Charlotte Golf Course	Pond	Current	0.613
Port Charlotte Church of Christ	Pressurized	Current	N/A
Riverwood GC	Pond	Current	1.2
Sonoma Preserve	Pond	Future	0.2599
Suncoast Lakes Home Owners	Pressurized	Current	0.067
Sunnydell Commons II	Pressurized	Current	0.004112
Wal-Mart	Pressurized	Current	0.018
Waste Management	Pressurized	Future	0.008
Central County		**Sub-Total**	**3.3278**

Reclaim Sites	Pond/ Pressurized	Current/ Future User	Agreement Amount (MGD)
West County Reclaim Sites			
Cape Haze Resort	Pressurized	Future	0.042
Coast Concrete	Pressurized	Current	0.06
Colonial Concrete	Pressurized	Current	0.006
Coral Creek Air Park	Pressurized	Current	N/A
Coral Creek Club	Pond	Current	0.308
Coral Creek Landings	Pressurized	Current	0.12
Dollar General	Pressurized	Future	N/A
Eagle Preserve Estates	Pressurized	Future	0.0835
Fellowship Church	Pressurized	Current	0.027
Fiddlers Green	Pressurized	Future	0.0374
Gasparilla Island C&I Association	Pressurized	Future	0.0373
Gasparilla Island Water Association	Pressurized	Future	0.16701
Hacienda Del-Mar	Pressurized	Current	0.105
Harbor West	Pond	Current	0.14
Lemon Bay GC	Pond	Current	0.342
Meadows & Villas Conservation Area	Pressurized	Current	0.0015
Placida Bay Estates	Pressurized	Future	0.0588
Placida Commons	Pressurized	Future	0.0615
Placida Harbor	Pressurized	Future	0.0465
Placida Pointe	Pressurized	Future	0.0426
Preserve at Windward Condominium	Pressurized	Current	0.005
Public Works-South Gulf Cove	Pressurized	Current	0.00075
RGP Links Golf Club	Pressurized	Current	0.29
RGP Long Marsh North	Pond	Current	0.225
RGP Long Marsh South	Pond	Current	0.225
RGP Palms Golf Club	Pond	Current	0.29
Rotonda Lakes	Pressurized	Future	0.0215
Safe Cove Boat Storage	Pressurized	Current	0.0003
The Hammocks	Pressurized	Future	0.06
Thunderation	Pressurized	Future	0.0169
Windward Patio Homes	Pressurized	Current	0.25
West County		**Sub-Total**	**3.07056**
Total RCW Agreement Amount to Current and Future Customers			**6.3984**



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4 MODEL CONVERSION AND VERIFICATION

The hydraulic model was updated from steady-state to an extended period simulation (EPS). Pressures and flows recorded during March 2016 were compared and matched very well using the EPS model. A summary of the model correlation with observations was presented to CCU at the workshop held on April 22, 2019.

CCU performed RCW system testing during the week of September 16, 2019 to evaluate how much water could be conveyed from East Port WRF to Lemon Bay GC under varying pumping conditions and piping configurations. The hydraulic model parameters were adjusted to match the RCW system test results. The model is accurately predicting flows at Lemon Bay GC and Riverwood GC to within 10 percent and pressures to within 5 percent.

5 RCW SYSTEM OPERATIONS

5.1 CENTRAL COUNTY

The Central County RCW system consists of the following pump and storage systems to supply RCW to users:

- East Port WRF RCW HSPS and a 95-MG RCW pond.
- Walenda BPS and a 0.5-MG ground storage tank (GST).
- Eagle Street BPS and a 0.5-MG GST.

The current and desired operations are discussed below.

5.1.1 EAST PORT WRF

The East Port WRF has two RCW pumping stations, the existing HSPS No. 1 and the newly constructed HSPS No. 2.

CCU will use HSPS No. 2 as the primary pumps station for delivering RCW from East Port WRF to its customers. HSPS No. 2 will be operated to deliver RCW 7 -days a week, and capable of providing RCW at a flow rate of 9 MGD (6,250 gallons per minute [gpm]) at 108 pounds per square inch (psi). The station will be able to provide flow rates down to 500 gpm at 50 psi using a tank recirculation valve that discharges back to the pump wetwell. Pump speeds are varied using the variable frequency drives (VFDs) to maintain the discharge pressure set-point. CCU intends to operate the discharge pressure of HSPS No. 2 at 80 psi. HSPS No. 2 will convey water from the new 95-MG RCW pond and will be capable of supplying RCW to the Central County and West County RCW distribution system without any periods of supply shortage. CCU would like to maintain a pressurized system with a minimum pressure of 50 psi to all customers. The RCW from East Port WRF supplies current RCW users and fills the Walenda and Eagle Street GSTs based on system demands.

The existing RCW HSPS No. 1 is located at the chlorine contact tank (CCT) No. 1 and No. 2 clearwell. HSPS No. 1 will remain in-service at East Port WRF, and will continue to be used for non-potable plant water system including the following: yard hydrant washdown, backwash water for belt filter presses, pump seal water, dilution / carrier water for chlorine and polymer chemical feed systems and unit process water that receives plant water from the 8-inch distribution header that loops the WRF site. HSPS No. 1 operates at a pressure setpoint range from 60 to 100 psi, with 70 to 80 psi as a normal setpoint. The HSPS No. 1 has three, 100 Hp high-service pumps operating on VFDs to match flow to demand over a range of 350 to 2,000 gpm firm capacity.

In addition, if HSPS No. 2 is temporarily taken off-line for maintenance, inspection or repair, HSPS No. 1 can act as a backup HSPS to provide up to 2,000 gpm (2.9 MGD) for RCW to public access reuse customers and provide WRF plant water. If the existing HSPS No. 1 is to provide RCW to public access reuse customers, the existing valves (normally closed) needs to be open that connect to the RCW discharge header that feeds the RCW distribution system. As noted, HSPS No. 1 can only provide approximately 2 MGD of RCW to public access reuse customers, so use of this system for backup should only be short-term to avoid RCW supply issues.

5.1.2 Walenda Booster Pump Station

The Walenda BPS is always available for RCW pumping; however, it currently only operates as needed by CCU staff based on system demands. This site contains a 0.5-MG GST that is filled with RCW as needed from the East Port WRF. The pumps at this station run as needed and contain VFDs that are set to maintain a station discharge pressure setting of 80 psi. The BPS has a tank recirculation line. The recycle/ recirculation valve open set-point is set so that it opens when pump speed reduces to 70 percent and closes if the pump speed increases to 98 percent.

5.1.3 Eagle Street Booster Pump Station

The Eagle Street BPS is configured identically to the Walenda BPS and is operated the same fashion, except the station discharge pressure setting is 72 psi.

5.2 West County

The West County RCW water system includes the following pump and storage systems supplying RCW to users:

- West Port WRF RCW PS and a 20-MG RCW pond.
- Rotonda WRF RCW PS and a 3-MGD GST.
- Rotonda East BPS.

Currently, the Rotonda East Boulevard BPS remains primarily unused, and therefore a description of the current operations is excluded from discussion. However, CCU would like to place this BPS in operation to improve flow and pressure to West County customers.

5.2.1 West Port WRF

West Port WRF RCW PS distribution pressures vary from 3 to 50 psi based on their current operating strategy. Between 7am and 10:30pm, the pumps operate in the low-pressure mode, delivering RCW to bulk users with ponds. Between 10:30pm and 7am, the pumps operate in a high-pressure mode. All other users within this system, except for Coast Concrete, have their own pumps to boost RCW pressure to their individual irrigation systems. The West County RCW system is currently shared by the West Port WRF and

Rotonda PS #1. The system is operated together with constant communication by the County.

5.2.2 Rotonda WRF

The Rotonda WRF operates two different RCW systems, Rotonda PS #1 and Rotonda PS #2. The Rotonda PS #1 system is a low-pressure, flow-based system that conveys RCW from a storage pond at the Rotonda WRF to RCW user's ponds with open-ended pipes. This system usually operates 16 hours a day, 7 days a week when an operator is present to oversee the system. The Rotonda PS #1 system is interconnected with the West Port WRF RCW system.

The Rotonda PS #2 system is pressure-based and conveys flow from a 3-MG GST at the Rotonda WRF to the system and maintains a discharge pressure of 90 psi. The pumps at PS #2 use VFDs to maintain the discharge set-point. This system operates 24 hours a day, 7 days a week.

5.3 Pond Discharges

Many of the large RCW users are golf courses and golf course communities. Most receive water through throttling control valves into ponds. The valves are opened when pond levels are low and closed when pond levels are high. Table 5-1 summarizes which current RCW users have electronic throttling control valves, manually throttled valves, or open-ended pipes with no valves.

Table 5-1 Existing Pond Discharges

RCW Customer	Pond Discharge Type
Central County Customers	
Riverwood Golf Course	Control Valve
Port Charlotte Golf Course	Control Valve
CC Parks Department Sports Park	Control Valve
Maple Leaf Estates	Manual Valve
Deep Creek Golf Club	Control Valve
Kingsway Country Club	Control Valve
West County Customers	
Lemon Bay Golf Course	Control Valve
Coral Creek Club	Control Valve
RGP Palms Golf Course	No Valve
RGP Long Marsh South	No Valve
RGP Long Marsh North	No Valve
Harbor West	Control Valve

6 MODEL ANALYSIS AND RESULTS

Model scenarios were developed to assess the ability to convey flows during existing, near-term, and future demand conditions. CCU's goal is to operate a pressurized system with a minimum pressure of 50 psi sustained throughout as determined feasible. Modeling scenario analyses were performed to establish the improvements that would allow the system to continually operate fully pressurized and sustain a minimum of 50 psi.

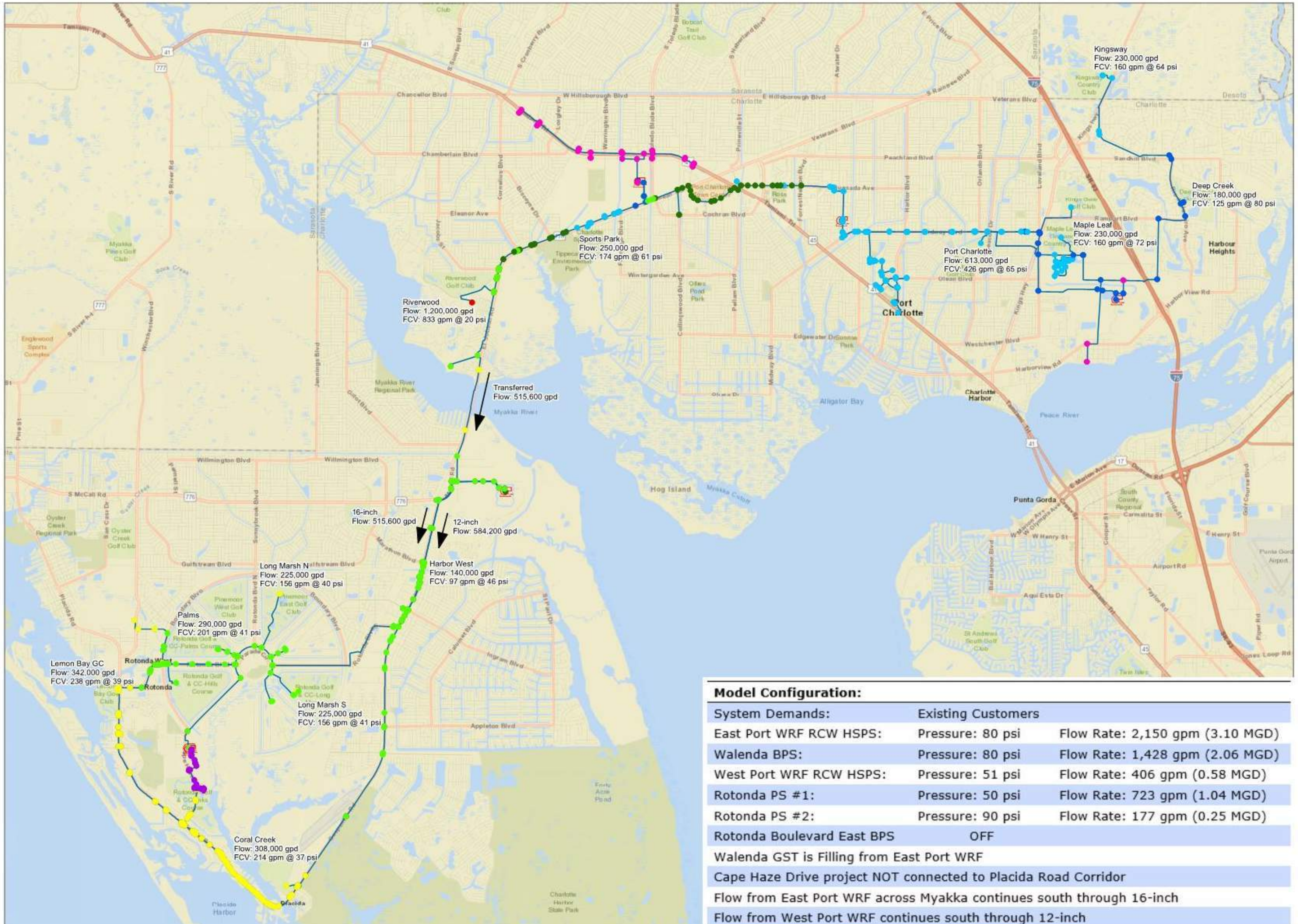
The model scenarios were developed in three groups – near-term conditions, intermediate term conditions, and future conditions – to demonstrate how the system pressures and flows will fluctuate as the phases of recommended improvements are completed. These analyses included the following scenarios:

The Near-Term Condition results are shown in Figure 6-1. This condition includes the new East Port WRF RCW HSPS No. 2, all current customers including Lemon Bay GC, and the system improvements recommended in Section 7.1. The model results indicate that all current users are able to receive their RCW agreement amount listed in Table 3-2 under these recommended conditions. The system will be fully pressurized, however current RCW users along the Placida Corridor will have system pressures between 40-50 psi which is less than the targeted minimum pressure of 50 psi.

The Intermediate-Term Condition results are shown in Figure 6-2 This model scenario is the same system configuration as the Near-Term, with the addition of the Cape Haze Drive project which is expected to be completed in approximately one year. As described in Section 7.2, the Cape Haze Drive RCW connection is a key project that which connects the Rotonda WRF RCW PS #2 system, which operates near 90 psi system pressure, to the Placida Road corridor. This system connection will allow the RCW system to operate above the minimum 50 psi system pressure.

The Future Condition results are shown in Figure 6-3. This model scenario includes all current and future RCW users, and the recommended system improvements necessary for those users to receive their RCW agreement amount at the minimum system pressure of 50 psi.

Figure 6-1
Near-Term Conditions
RCW Hydraulic Model
Assistance and Maintenance



Model Configuration:		
System Demands:	Existing Customers	
East Port WRF RCW HSPS:	Pressure: 80 psi	Flow Rate: 2,150 gpm (3.10 MGD)
Walenda BPS:	Pressure: 80 psi	Flow Rate: 1,428 gpm (2.06 MGD)
West Port WRF RCW HSPS:	Pressure: 51 psi	Flow Rate: 406 gpm (0.58 MGD)
Rotonda PS #1:	Pressure: 50 psi	Flow Rate: 723 gpm (1.04 MGD)
Rotonda PS #2:	Pressure: 90 psi	Flow Rate: 177 gpm (0.25 MGD)
Rotonda Boulevard East BPS	OFF	
Walenda GST is Filling from East Port WRF		
Cape Haze Drive project NOT connected to Placida Road Corridor		
Flow from East Port WRF across Myakka continues south through 16-inch		
Flow from West Port WRF continues south through 12-inch		

Legend

- Pump Station
- RCW Main

Pressure (psi)

- <20
- <30
- <40
- <50
- <60
- <70
- <80
- <90
- <100

N
0 5,000 10,000
Feet
1:100,000

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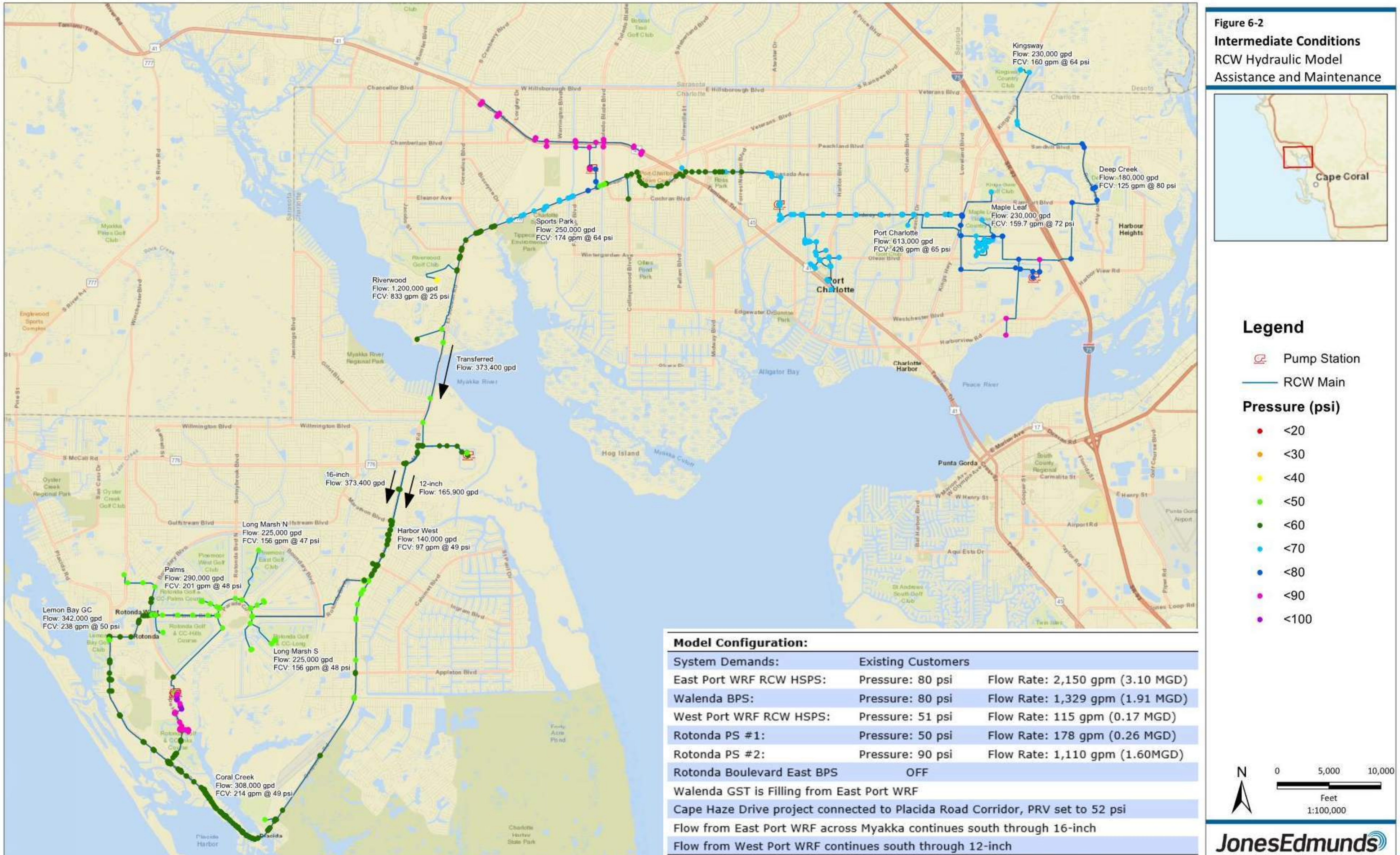

Model Configuration:		
System Demands:	Existing Customers	
East Port WRF RCW HSPS:	Pressure: 80 psi	Flow Rate: 2,150 gpm (3.10 MGD)
Walenda BPS:	Pressure: 80 psi	Flow Rate: 1,329 gpm (1.91 MGD)
West Port WRF RCW HSPS:	Pressure: 51 psi	Flow Rate: 115 gpm (0.17 MGD)
Rotonda PS #1:	Pressure: 50 psi	Flow Rate: 178 gpm (0.26 MGD)
Rotonda PS #2:	Pressure: 90 psi	Flow Rate: 1,110 gpm (1.60MGD)
Rotonda Boulevard East BPS	OFF	
Walenda GST is Filling from East Port WRF		
Cape Haze Drive project connected to Placida Road Corridor, PRV set to 52 psi		
Flow from East Port WRF across Myakka continues south through 16-inch		
Flow from West Port WRF continues south through 12-inch		

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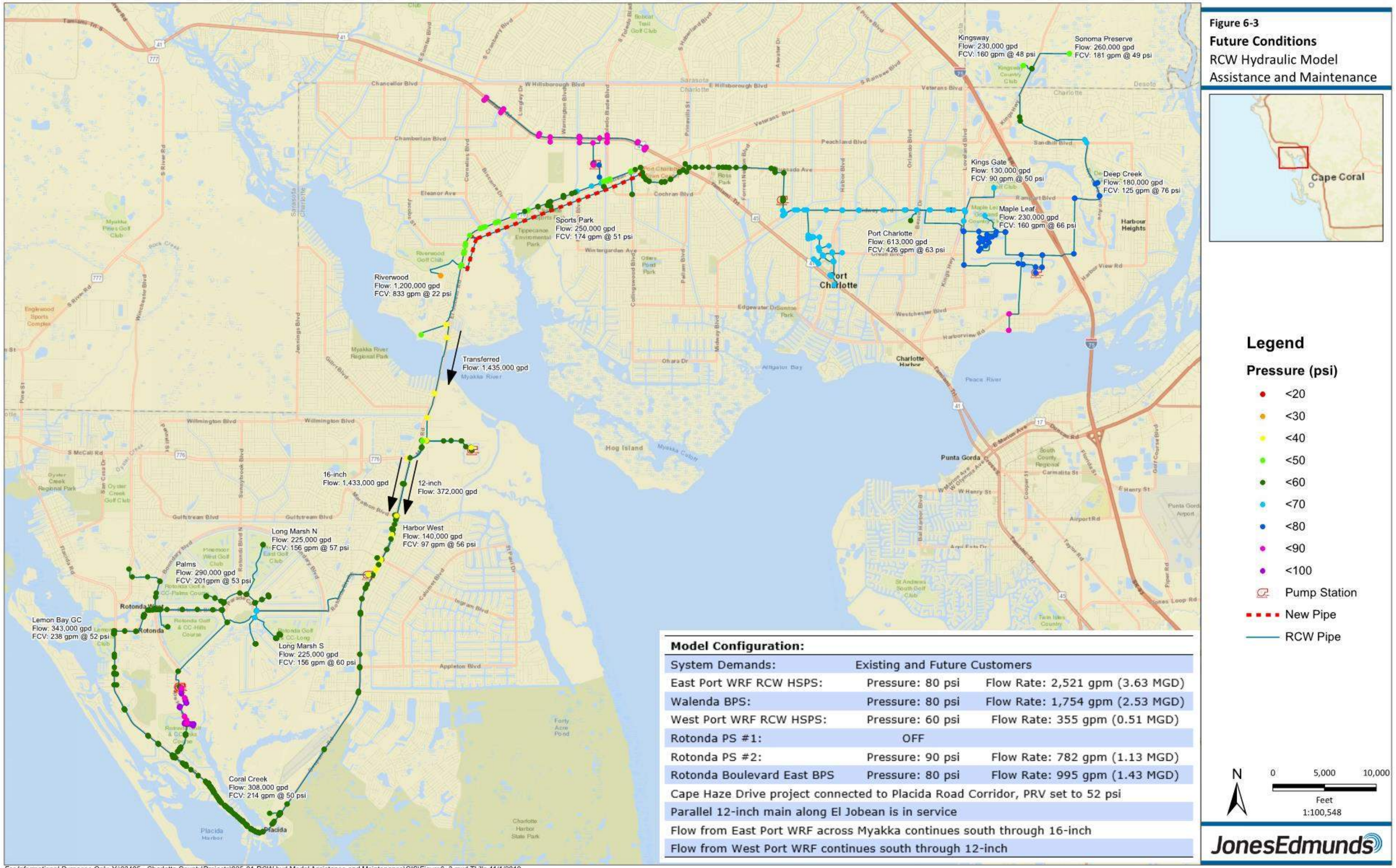


Model Configuration:		
System Demands:	Existing and Future Customers	
East Port WRF RCW HSPS:	Pressure: 80 psi	Flow Rate: 2,521 gpm (3.63 MGD)
Walenda BPS:	Pressure: 80 psi	Flow Rate: 1,754 gpm (2.53 MGD)
West Port WRF RCW HSPS:	Pressure: 60 psi	Flow Rate: 355 gpm (0.51 MGD)
Rotonda PS #1:	OFF	
Rotonda PS #2:	Pressure: 90 psi	Flow Rate: 782 gpm (1.13 MGD)
Rotonda Boulevard East BPS	Pressure: 80 psi	Flow Rate: 995 gpm (1.43 MGD)
Cape Haze Drive project connected to Placida Road Corridor, PRV set to 52 psi		
Parallel 12-inch main along El Jobean is in service		
Flow from East Port WRF across Myakka continues south through 16-inch		
Flow from West Port WRF continues south through 12-inch		

7 RECOMMENDATIONS

Recommended improvements are provided in three groups – near-term, intermediate-term, and future improvements. These recommended projects are outlined below.

7.1 NEAR-TERM RECOMMENDATIONS

The near-term recommendations include the improvements that CCU can implement immediately to modify the current RCW system to be a fully pressurized with all users receiving their daily RCW agreement amount.

All near-term recommendations assume the following operational conditions:

- East Port WRF RCW HSPS No. 2 is ON and set to an 80 psi discharge pressure.
- Walenda BPS is ON set to an 80 psi discharge pressure and the GST is filling.
- Eagle Street BPS is OFF.
- West Port WRF RCW PS is ON and set to a 51 psi discharge pressure.
- Rotonda WRF PS #1 is ON and set to a 50 psi discharge pressure.
- Rotonda WRF PS #2 is ON and set to a 90 psi discharge pressure.
- Rotonda Boulevard East BPS is OFF.
- Flow from East Port WRF across the Myakka River continues south SR 776 through the 16-inch main past Cattle Dock Point Road to Gasparilla Road.
- Flow from West Port WRF continues south on Gasparilla Road through the 12-inch main.
- Rotonda WRF PS #2 system is not connected to the Placida Road Corridor.

7.1.1 CURRENT AND NEAR-TERM FLOW CONTROL VALVE INSTALLATIONS

The installation of hydraulically operated rate of flow control valves (FCV) at all current major RCW users with pond discharges in the Central and West county areas will provide the greatest near-term benefit to the RCW system. The model conditions assume the flow set-point for these valves is equal to the daily RCW Agreement amount, spread evenly across 24 hours in a day. Table 7-1 lists the recommended location of the FCVs and their flow set-points.

The recommended FCVs will prevent excessive flow to the bulk RCW pond users by limiting the flow to a preselected, field-adjustable value regardless of changes in upstream line pressure. These valves use an orifice plate installed on the downstream side of the valve and pilot controls to adjust and throttle the valve.

Most hydraulically controlled FCVs can also include a pressure-sustaining feature. At this time, we do not recommend that pressure sustaining valves (PSVs) be installed in the system until all future improvements are completed. The model has demonstrated that the FCVs installed at the recommended locations allow all bulk RCW users to receive their agreed RCW amount under maximum demand conditions, while maintaining the highest system pressure possible. Additionally, these valves could integrate level controls to allow the valve to open or close, at the flow and pressure set-points, based on the levels in the discharge ponds.

Table 7-1 Near-Term and Intermediate-Term RCW User Flow Control Valve Recommendations

RCW Customer	RCW Agreement (MGD)	FCV Setpoint (gpm)	Near-Term (psi)	Intermediate-Term (psi)
Central County Customers				
Riverwood Golf Course	1.2	833	20	25
Port Charlotte Golf Course	0.613	426	65	65
CC Parks Department Sports Park	0.25	174	61	64
Maple Leaf Estates	0.23	160	72	72
Deep Creek Golf Club	0.18	125	80	80
Kingsway Country Club	0.23	160	64	64
West County Customers				
Lemon Bay Golf Course	0.342	238	39	50
Coral Creek Club	0.308	214	37	49
RGP Palms Golf Course	0.29	201	41	48
RGP Long Marsh South	0.225	156	41	48
RGP Long Marsh North	0.225	156	40	47
Harbor West	0.144	100	46	49

7.2 Intermediate-Term Recommendations

The intermediate-term recommendations include the improvements necessary for the Placida Road corridor to operate above the 50 psi system pressure and all current RCW users to receive their daily agreement amount. All intermediate-term recommendations assume the same operational conditions described above in Section 7.1, with the addition of the Cape Haze Drive RCW connection.

7.2.1 Cape Haze Drive RCW Connection and Pressure-Reducing Valve (PRV)

The completion of the Cape Haze Drive project and connection of the Rotonda WRF RCW PS #2 system to the Placida Road Corridor is necessary project for providing a pressurized RCW system above 50 psi.

This near-term project consists of installing a pressure-reducing valve (PRV) with a 52-psi reducing set-point south of Cape Haze project near the intersection of Cape Haze Drive and Westwind Drive. This improvement project allows the Rotonda PS #2 to continue supplying its high-pressure service area with a 70- to 90-psi system pressure and send excess flow to the Placida Road Corridor RCW users.

This improvement will boost pressures along the Placida Road Corridor above the target 50-psi goal; however, the pressure increase will reduce the flow contribution from the West Port WRF RCW PS. Figures 7-1 and 7-2 show the pressures in this area before and after the Cape Haze connection is completed.

Figure 7-1 Placida Road Corridor Pressures without Cape Haze Drive Connection

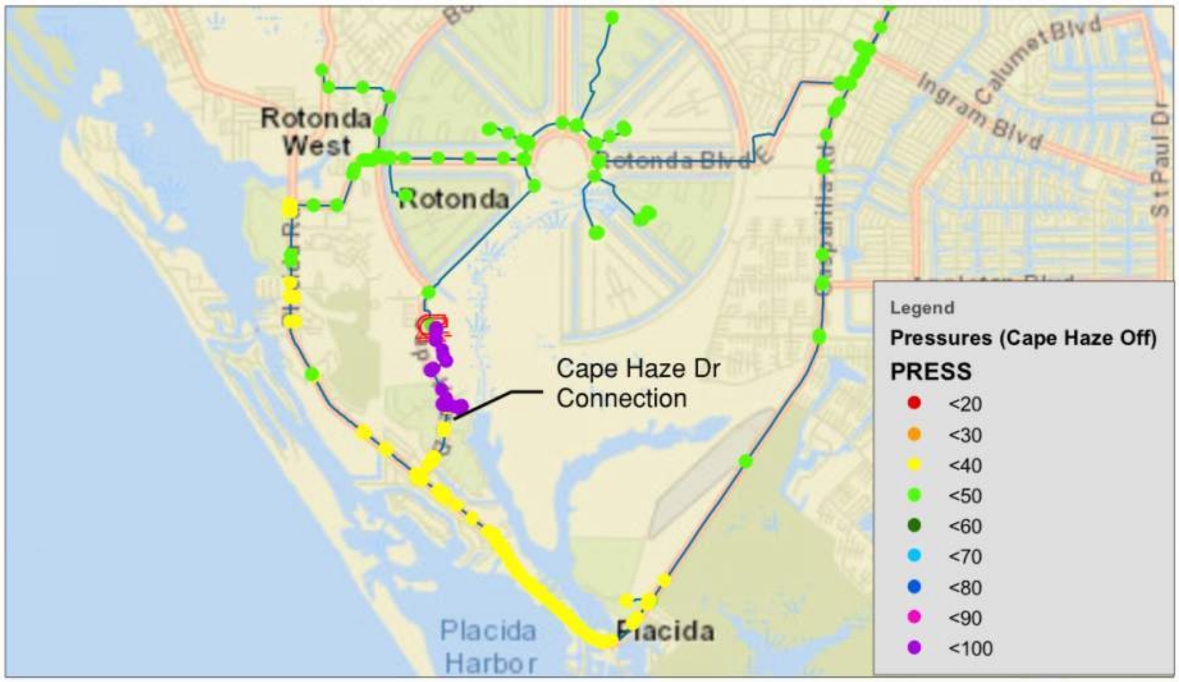
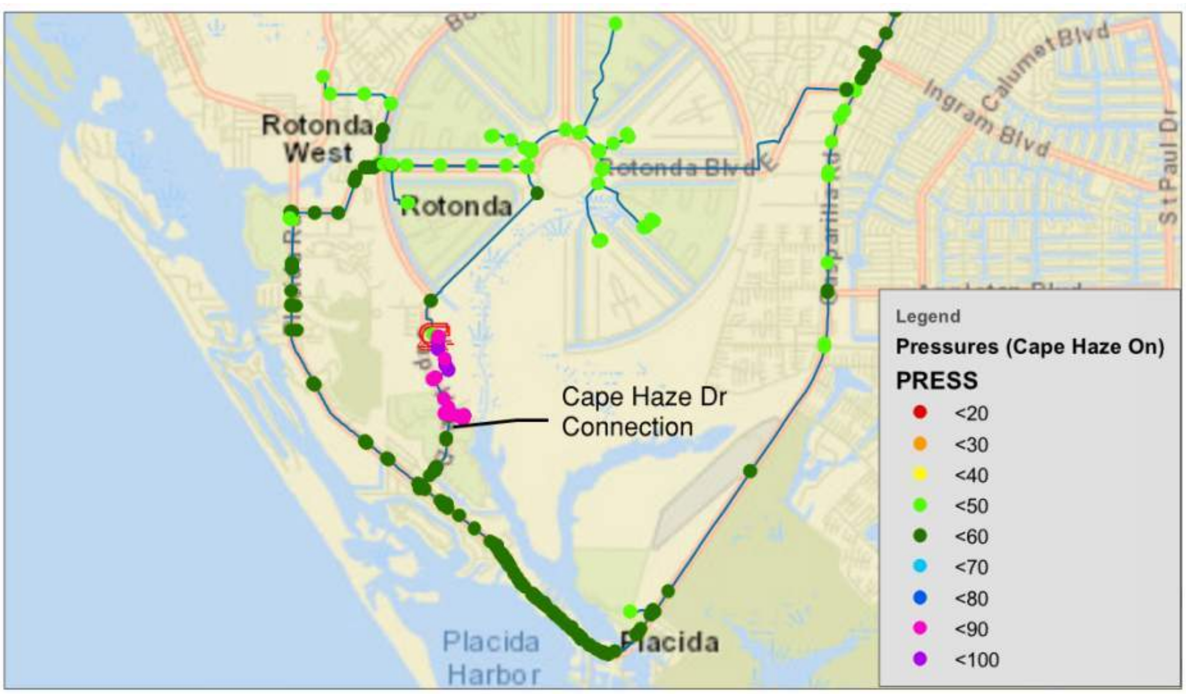


Figure 7-2 Placida Road Corridor Pressures with Cape Haze Drive Connection

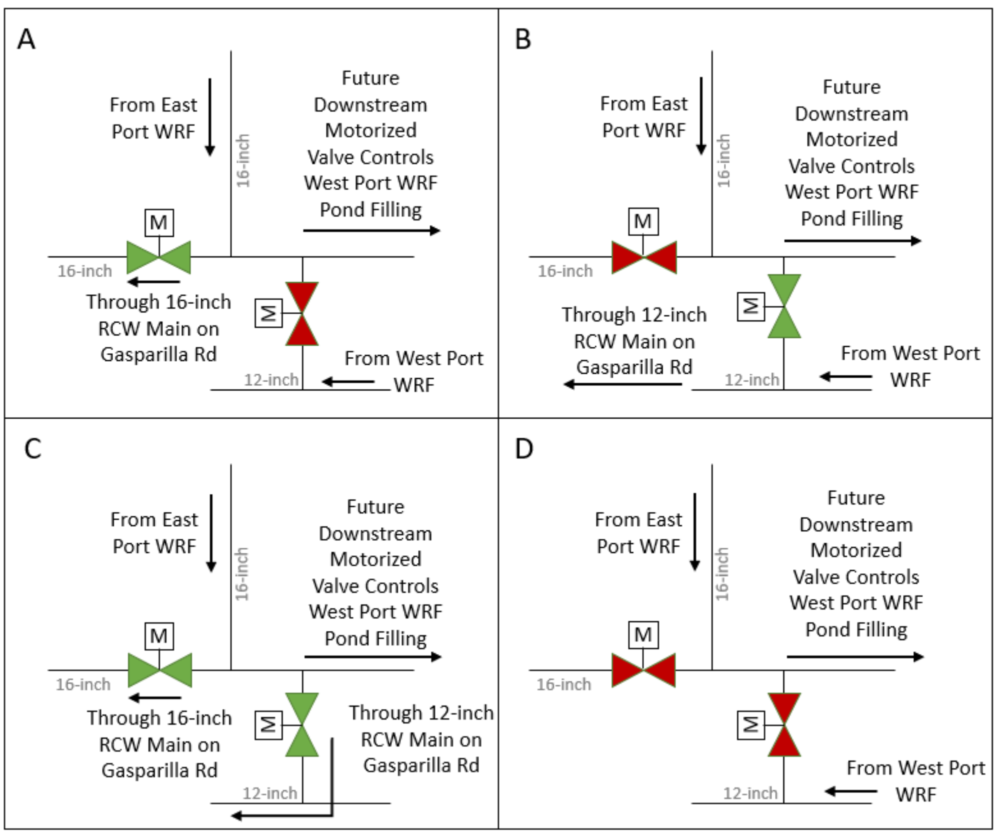


7.2.2 Cattle Dock Point Road Motorized Valve Assembly

The recommended intermediate-term system conditions use the 16-inch RCW main on SR 776 Road for conveying flow from East Port WRF and the 12-inch RCW main for flow from West Port WRF. The installation of a motorized valve assembly in the easement on Cattle Dock Point Road east of SR 776 will not provide a system pressure benefit to the West County area; however, it will provide operational flexibility to CCU staff to route flow through all the configurations listed below in Figure 7-3:

- (A) Route RCW south through the 16-inch RCW main along Gasparilla Road.
- (B) Route RCW south through the 12-inch RCW main along Gasparilla Road.
- (C) Route RCW south through the 12- and 16-inch RCW mains along Gasparilla Road.
- (D) Route RCW only to the West Port WRF to fill the RCW storage pond. A motorized valve is recommended at the discharge to the storage pond.

Figure 7-3 Proposed Motorized Valves and Operation



7.3 Future Recommendations

CCU has agreements signed with future RCW users that will increase the system demands in the West County area by approximately 1.2 MGD. Figure 7-6 identifies the future recommended improvement projects to meet existing, near-term, and future RCW demands while maintaining a pressurized system.

All future recommendations assume the following operational conditions:

- East Port WRF RCW HSPS No. 2 is ON and set to an 80-psi discharge pressure.
- Walenda BPS is ON set to an 80-psi discharge pressure and the GST is filling.
- Eagle Street BPS is OFF.
- West Port WRF RCW PS is ON and set to a 60-psi discharge pressure.
- Rotonda WRF PS #1 is OFF.
- Rotonda WRF PS #2 is ON and set to a 90-psi discharge pressure.
- Rotonda Boulevard East BPS is ON and set to an 80 psi discharge pressure.
- The recommended parallel 12-inch main along El Jobean Road is in service.
- Flow from East Port WRF across the Myakka River continues south SR 776 through the 16-inch main past Cattle Dock Point Road to Gasparilla Road.
- Flow from West Port WRF continues south on Gasparilla Road through the 12-inch main.
- Rotonda WRF PS #2 system is connected to the Placida Road Corridor through Cape Haze Drive.

7.3.1 Future RCW Customer Flow Control Valve Installations

Similar to the near-term recommendations, all future RCW customers who discharge to a storage pond should receive an FCV to maintain system pressure. The future user FCVs should be adjusted to the set-points listed below in Table 7-2. These flow set-points are equal to the agreement amount spread evenly across a 24-hour period.

Table 7-2 Future RCW User Flow Control Valve Recommendations

RCW Customer	RCW Agreement (MGD)	FCV Setpoint (gpm)	Pressure (psi)
Central County Customers			
Sonoma Preserve	0.2599	180	49
Kings Gate Golf Club	0.13	90	68

7.3.2 El Jobean Road Parallel RCW Main

The RCW main feeding Walenda BPS and across the Myakka River reduces from a 16-inch to 12-inch along El Jobean Road (SR 776) between Murdock Circle and west of the entrance to Riverwood Golf Course. This pipe size reduction lowers the system pressures and restricts the conveyance of flow and from East Port WRF to Riverwood and West County customers.

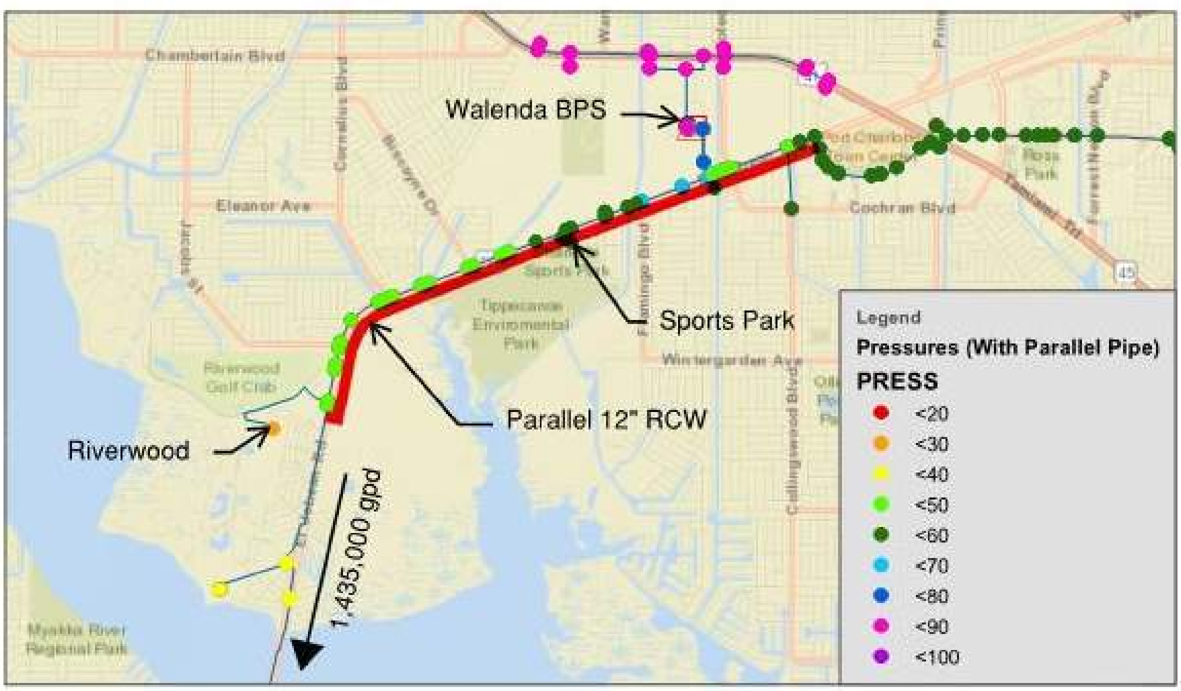
The installation of approximately 21,000 linear feet of a 12-inch main along El Jobean Road will provide the needed system capacity to meet the desired future hydraulic conditions and provide CCU staff with operational flexibility for the Walenda BPS. The parallel mains should be interconnected upstream of major users such as Sports Park and Riverwood. This project will increase conveyance to West County from approximately 1.1 MGD to 1.5 MGD.

A 12-inch parallel main is the minimum size needed to meet the future conditions based on the known future RCW users. Upsizing the pipe to a 16-inch parallel main would provide the ability to increase flows across the Myakka River by 120,000 gpd based on the future reclaim users demands. This upsize will provide additional conveyance to Central County as future customer demands increase.

Figures 7-4 and 7-5 show the expected hydraulic conditions before and after the El Jobean parallel RCW main is installed.

Figure 7-4 System Conditions without El Jobean Parallel RCW Main

Figure 7-5 System Conditions with El Jobean Parallel RCW Main



The four operational modes possible with this parallel pipe improvement are described below:

- Mode 1 – Walenda BPS Pumping and Filling
  - Provides the ability to pump from Walenda BPS while filling the GST through the existing 12-inch RCW pipe to Walenda BPS while flow continues east to west from East Port WRF through the parallel 12-inch RCW pipe. Currently, a check valve in the main 12-inch RCW pipe prevents any flow from East Port WRF to continue west when Walenda BPS is pumping.
  - This is assumed to be the primary future operational mode.
- Mode 2 – Walenda BPS Pumping
  - Provides additional pressure and flow to RCW users west of Walenda BPS.
- Mode 3 - Walenda BPS Off
  - Allows for station maintenance any time of the year.
  - Rotonda East Boulevard BPS should not be operated while Walenda BPS is offline due to low suction pressure concerns.
  - Under this operational mode, RCW flow across the river to West County will be restricted to approximately 0.5 MGD.
- Mode 4 - Walenda BPS Filling
  - Provides the ability to fill the GST through the existing 12-inch RCW pipe to the Walenda BPS while flow continues east to west from East Port WRF through the existing and parallel 12-inch RCW pipes. With the additional conveyance capacity, filling the tank will not significantly reduce the pressures and available flow to downstream RCW users as it does now.

7.3.3 West Port WRF RCW PS Improvements

The current West Port WRF RCW PS can only maintain a discharge pressure of 51 psi. With the predicted near-term and future system pressures, West Port WRF will have limited contribution to RCW demands until pump station upgrades are completed. It is recommended that the PS is upgraded to contain pumps with a design point of 335 gpm at 60 psi (139 feet of head) and operate on VFDs to maintain the set-point. This upgrade will allow the West Port WRF to contribute to meeting RCW user demands (flows) with increased pressures.

A motorized valve should be installed from the 16-inch RCW transmission pipe to the West Port WRF pond. Currently, the West Port WRF RCW pond is filled by discharging to atmospheric pressure. By installing the motorized valve, CCU operators will have the operational flexibility to fill the West Port WRF pond based on system conditions. The valve and motorized actuator will need the capability to be adjusted by percentage open, to restrict flow into the pond and maintain the upstream system pressure.

7.3.4 Walenda BPS Improvements

The available GST volume at Walenda BPS may become a limiting factor under future conditions for sending RCW across the Mayakka River to West County. Under future model conditions, Walenda BPS will be pumping approximately 2.5 MGD, which would require constant filling and repumping RCW from the 0.5-MG GST. Modifying the Walenda BPS to allow an in-line boosting operational mode would be a more energy efficient operational condition and would alleviate any GST volume concerns. This future project should be analyzed further in an EPS model simulation to determine the design flows and pressures and develop recommended operational strategies.

7.3.5 Rotonda WRF Improvements

Rotonda PS #2 will provide a majority of the pressure to the Placida Road Corridor in both near-term and future system conditions. Under future conditions Rotonda PS #1 is not required and can be decommissioned.

Once PS #1 is decommissioned we recommend the RCW main between Parade Circle and the WRF be modified to fill the Rotonda WRF GST when there is available storage in the GST and excess RCW from either East Port WRF or West Port WRF during low-demand periods. Supplementing RCW availability at the Rotonda WRF to then be repumped by PS #2 would provide operational flexibility for CCU staff and increased system reliability for customers along the Placida Road Corridor.

The WRF as-builts indicate that a 12-inch main exists between the PS#1 effluent discharge and the discharge for PS #2. We recommend that this 12-inch main be modified to include a connection to the GST fill pipe. A control valve, such as a PSV, will be necessary to regulate the excess RCW flow from the system into the GST to reduce the likelihood of impacting system pressure when filling the tank. It is recommended that the PSV be set to 51 psi. Additional valve controls will be needed to close the valve when the GST is full. The model predicts that under future maximum demand conditions this improvement project could supplement storage at the Rotonda WRF by approximately 0.25 MGD.

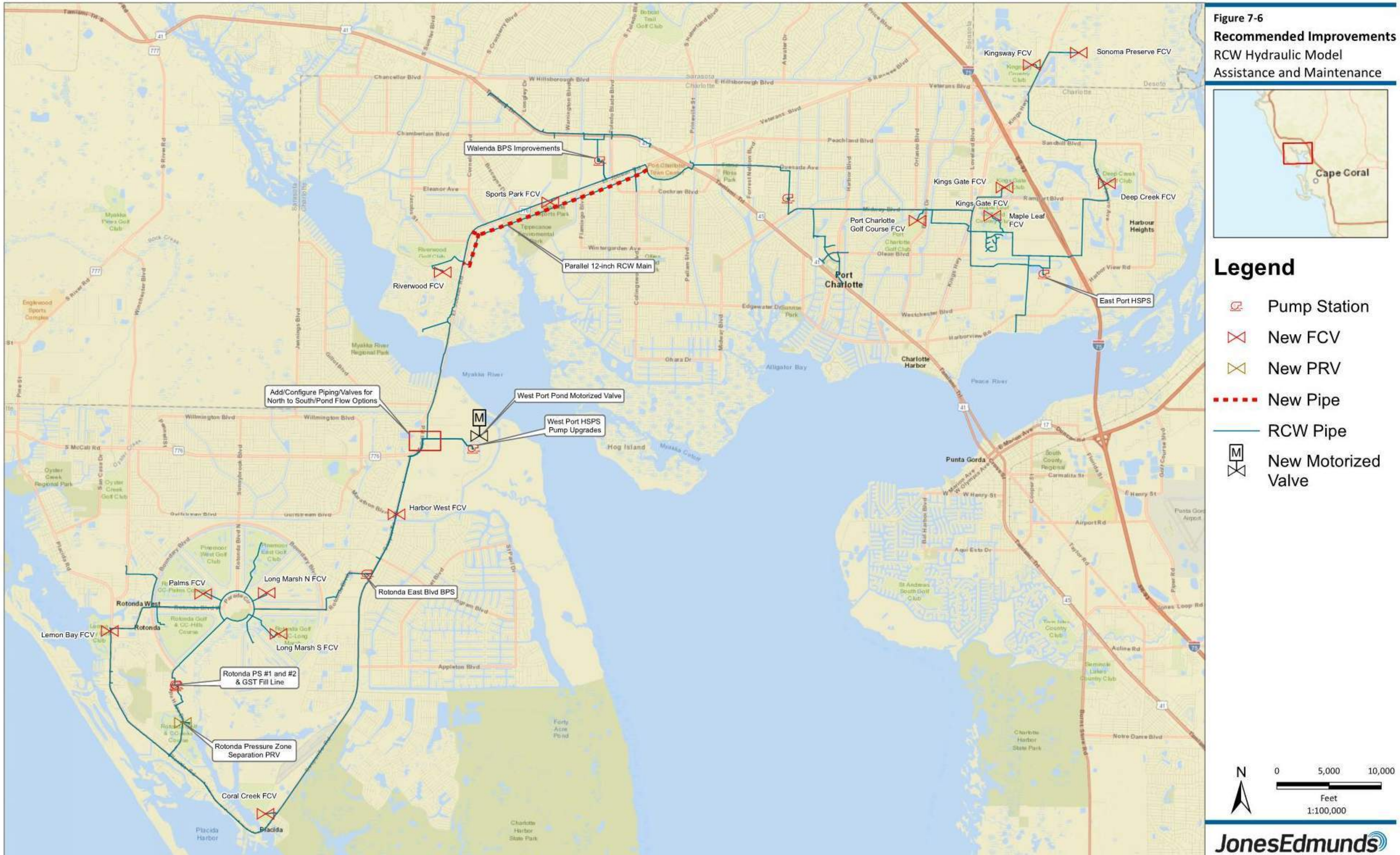


Figure 7-6
Recommended Improvements
RCW Hydraulic Model Assistance and Maintenance

For Informational Purposes Only Y:\03405 - Charlotte County\Projects\025-01-RCW hyd Model Assistance and Maintenance\GIS\Figure7_1.mxd TLillo 11/4/2019

7.4 Recommended Operations

The recommended near-term and future improvements will allow the system to be run continuously pressurized to maintain a system pressure at or near 50 psi throughout a majority of the system and allow sufficient flexibility to control where water comes from to provide a balance between available reclaimed water in the West and Central County RCW systems.

7.4.1 Central County

7.4.1.1 East Port WRF

The East Port WRF RCW HSPS should be operated at a varying discharge pressure in a typical range of 70 to 90 psi. A discharge set-point of 80 psi has been used for all model analyses.

7.4.1.2 Walenda BPS

The Walenda BPS should be operated at a discharge pressure set-point of 80 psi. This BPS is critical for the operation of this pressurized RCW system. CCU operators will need to closely monitor, adjust, and maintain the GST levels with the near-term and future flows required at this station.

After the parallel 12-inch pipe is installed along El Jobean Road, four modes of operation will be available at Walenda BPS that always allow flow to be conveyed from the East Port WRF HSPS past the Walenda BPS.

7.4.1.3 Eagle Street BPS

This BPS will not be required to operate in the near-term or future to meet system demands.

7.4.2 West County

7.4.2.1 West Port WRF

The West Port WRF is recommended to operate the RCW PS at a 51-psi discharge pressure in the near-term and 60 psi in future conditions. In near-term conditions, the West Port WRF will be limited in its contribution to West County RCW demands until future pump station upgrades to a 60-psi discharge pressure are completed.

The motorized valve project will provide CCU operations staff four modes of flow conveyance between the Central and West County system. The recommended mode of operation for the valves is to convey flow from East Port WRF through the 16-inch main and flow from West Port through the 12-inch main.

Allowing flow from East Port WRF past the West Port WRF is possible through the 16-inch RCW main south, with additional RCW used to fill the West Port RCW pond through a new PSV.

7.4.2.2 Rotonda WRF

The Rotonda PS #1 can be decommissioned. This PS will no longer be required to meet the RCW demands. CCU operations staff have mentioned issues with the intake screen clogging with aquatic plants and snails in the pond that it draws water from. Decommissioning PS #1 will eliminate this on-going maintenance issue.

The Rotonda PS #2 should only pump south toward the Placida Corridor at a 90-psi discharge pressure. After the Cape Haze Drive project is completed and the recommended PRV is installed south of the Links Golf Course, CCU will be able to maintain 80–90 psi upstream of the PRV and allow excess pressure to increase the system pressure along the Placida Corridor. The Rotonda service area will continue to have two pressure zones – one for the Cape Haze area and one for the Placida Corridor.

7.4.2.3 East Boulevard BPS

The Rotonda East Boulevard BPS is not recommended to be used until the El Jobean parallel RCW main is constructed. If operated prior to the El Jobean parallel main, this station will reduce upstream pressures and impact the ability to meet demands at Riverwood Golf Course.

Under future conditions, the Rotonda East BPS is recommended to operate with a discharge pressure set-point of 80 psi. When operated, this station will reduce the flow requirements from the Rotonda PS #2. Transfer of flows from Rotonda WRF to West Port WRF should no longer be required for deep injection disposal during dry months.