Indian River County
Utilities Services

ATKINS
Member of the SNC-Lavalin Group

RECLAIMED WATER MASTER PLAN

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Reclaimed Water Master Plan

Indian River County Utilities Services

March 2021

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Member of the SNC-Lavalin Group

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Executive Summary

Indian River County (IRC) operates three Water Treatment Facilities (WWTFs) in the South, West, and Central regions of the County. Reclaimed Water is produced at each facility that currently meets the advanced wastewater treatment (AWT) standards as defined by Florida Department of Environmental Protection (FDEP)[1].

This Reclaimed Water Master Plan lays out a capital improvement plan for the existing regional systems to have adequate disposal for wet weather events in addition to meeting the current and projected customer base. The reclaimed water customer base will expand more quickly than the expected increase in wastewater flow (reclaimed water supply) throughout the 2040 planning horizon. The goal of this master plan is to establish a backbone for the reclaimed water system where the reclaimed water supply will meet projected demands through 2040. A summary of the capital improvement plan project requirements for the improvement of the reclaimed water system are included in this executive summary.

Development of the Master Plan

The development of the Master Plan included multiple evaluations including review of existing reclaimed water assets, the hydraulic capacity of the system, and ability to meet existing and projected reclaimed water demands. The most important consideration for meeting the existing and proposed reclaimed water demands was the interdependence of the reclaimed water system.

The interdependence between the reclaimed water facilities was considered when developing the Reclaimed Water Master Plan, as recommended operational and/or capacity improvements can create challenges for the consecutive facilities. For that reason, the development of the Master Plan began with the South WWTF and the recommended capital improvement projects were utilized when determining the needs of consecutive facilities. This process is continued through the evaluation of the entire reclaimed water system.

Capital Improvement Projects

Recommended capital improvement projects for each facility and its associated infrastructure were based on evaluations of multiple factors including wet weather storage, reuse and disposal options, and hydraulic capacity. Below is a brief summary of the findings for each of the four reclaimed water facilities and the recommended capital improvement projects.

South WWTF: The peaking factor of 3.85 creates significant operational issues during peak hour flow and wet weather events. This is exacerbated by the both the lack of equalization storage and the hydraulic constraints in the existing transmission piping. The recommended capital improvement projects address peak flow equalization and upgrades to the existing transmission piping.

[1] Although the reclaimed water from the Central WWTF currently meets the AWT standards, the Plant is permitted for a phosphorous limit that exceeds AWT standards.

Table ES-1. Recommended Capital Improvement Projects for South WWTF

Threshold Capacity	Project Number	Description	Deficiencies	Correction
Current	IRC-SRRW-1	Install 0.75 MG on-site storage tank	No storage to attenuate peak flows causing disposal and transfer issues.	Install storage to attenuate peak flows and wet weather events. Allows for smoother transfer of reclaimed water to the West WWTF.
0.9 MGD into South WWTF In ~2029	IRC-SRRW - 2	Upgrade 8-inch transmission main to 16-inch – timed with DOT projects	The existing 1,800 gpm pumps are limited to 1,200 gpm due to the hydraulic constraints in the system.	Upgrade to a 16-inch transmission main, which will significantly decrease energy loss and allow pumps to operate as designed, meeting transfer requirements through 2040.

West WWTF: The West WWTF is responsible for disposal and/or transmission of the reclaimed water from both the West WWTF and the South WWTF. Currently, peak hour flows overwhelm the facility and overflow to the adjacent wetlands. There are several reasons that this occurs including the inability to transfer the flow due to hydraulic constraints in the transmission system, lack of on-site storage and disposal, and FDEP constraints on the use of the existing wetlands for disposal. The recommended capital improvement projects address peak flow equalization and on-site disposal options.

Table ES-2. Recommended Capital Improvement Projects for West WWTF

Threshold Capacity	Project Number	Description	Deficiencies	Correction
Current	IRC-WRRW-1	West WWTF Wetlands at Design Capacity of 4.0 MGD	Peak wet weather disposal options are limited on at the West WWTF due to FDEP modifications to the wetlands permit.	Continue negotiations with regulatory agencies to return to wetlands discharge concentrations that allow full use of the wetlands permitted capacity of 4.0 MGD.
Current	IRC-WRRW-2	2 MG West WWTF Reuse Storage Capacity	Currently there is no equalization storage in the system to use for demands.	Installing a 2 MG storage tank at the West WWTF will equalize peak flows transferred from the South and West WWTFs.
6.0 MGD *combined* West in-fluent and South trans-fer flows In ~2030	IRC-WRRW-3	Proposed Wetlands or Deep Injection Well	Additional wet weather disposal options are required at the West WWTF.	Install new wetlands or deep injection well with a minimum capacity of 4.0 MGD on the County-owned parcel at the West WWTF.

Central WWTF: The majority of the County's reuse customers are associated with the Central Service Area. In addition, Central WWTF must be able to provide reclaimed water to the storage tank at the North Reuse Facility while meeting the demands of the reuse customers. Central WWTF cannot meet all of these demands and is dependent on the flow that is transferred into the system from the West WWTF. The recommended capital improvement projects address the ability to meet customer demands while also filling the North Reuse Facility storage tank and future wet weather storage.

Table ES-3. Recommended Capital Improvement Projects for Central WWTF

Threshold Capacity	Project Number	Description	Deficiencies	Correction
Current	IRC-CRW-1	Backpressure Sustaining Valves	Operational issues require simultaneously filling storage tank and golf course stormwater ponds.	Install backpressure sustaining valves at each of the Central pond customer sites and the North Reuse Facility storage tank fill line.
3.15 MGD into Central WWTF In ~2029	IRC-CRW-3	0.35 MG Central WWTF Reuse Storage Capacity Conversion	Wet weather equalization storage at the Central WWTF required as early as 2029.	Re-purpose existing abandoned 0.35 MG concrete tank for use as a wet weather equalization tank.

North Reuse Facility: This system feeds customers on the Barrier Island and is the only service area with a pressurized reuse system. The anticipated modification to the John's Island reclaimed water agreement, as discussed below, reduces the need for improvements at the facility or in the transmission system.

Overall Reuse System: A review of the overall reuse system showed the need for future wet weather storage in the reclaimed water system. This led to a recommendation for a capital improvement project to create a storage and repump facility at the Bent Pine RIBs site in the late 2030s.

Table ES-4. Recommended Capital Improvement Projects for Overall Reuse System

Threshold Capacity	Project Number	Description	Deficiencies	Correction
9.3 MGD combined influent to all WWTFs In ~2037	IRC-ORW-1	Bent Pine Reuse Storage and Repump Facilities	Storage for entire IRC reclaimed water system requires an additional 3 MG storage/disposal.	Provide a new storage and repump facility, centrally located between West and Central WWTFs at Bent Pine RIBs site.

In review of the reclaimed water balance, it was determined that there is sufficient reclaimed water produced to meet the current demands of the County's existing reuse customers. However, as detailed in this Master Plan, hydraulic limitations in the transmission system preclude sharing all of the reclaimed water produced by the South and West WWTFs and the transfer flow is limited to 2

MGD. This is a sufficient to meet the anticipated demands as originally predicted for this Master Plan. However, in June 2020, John's Island Water Management (John's Island) requested 3 MGD of reclaimed water from IRC.

The John's Island request requires IRC to deliver reclaimed water to a storage and repump facility, located near the North Reuse Facility, that will be owned and operated by John's Island. John's Island will then transfer the reclaimed water to customers on the Barrier Island. Due to the hydraulic constraints in the system, reuse augmentation will be required to meet John's Island reuse request. This augmentation can be met through the addition of the Storm Grove Reuse Augmentation Facility, an IRC reclaimed water augmentation facility included in the FDEP permit for the West WWTF. Figure ES-1 below shows the supply and demand projections for the North and Central service areas both with and without John's Island requested reuse quantities.

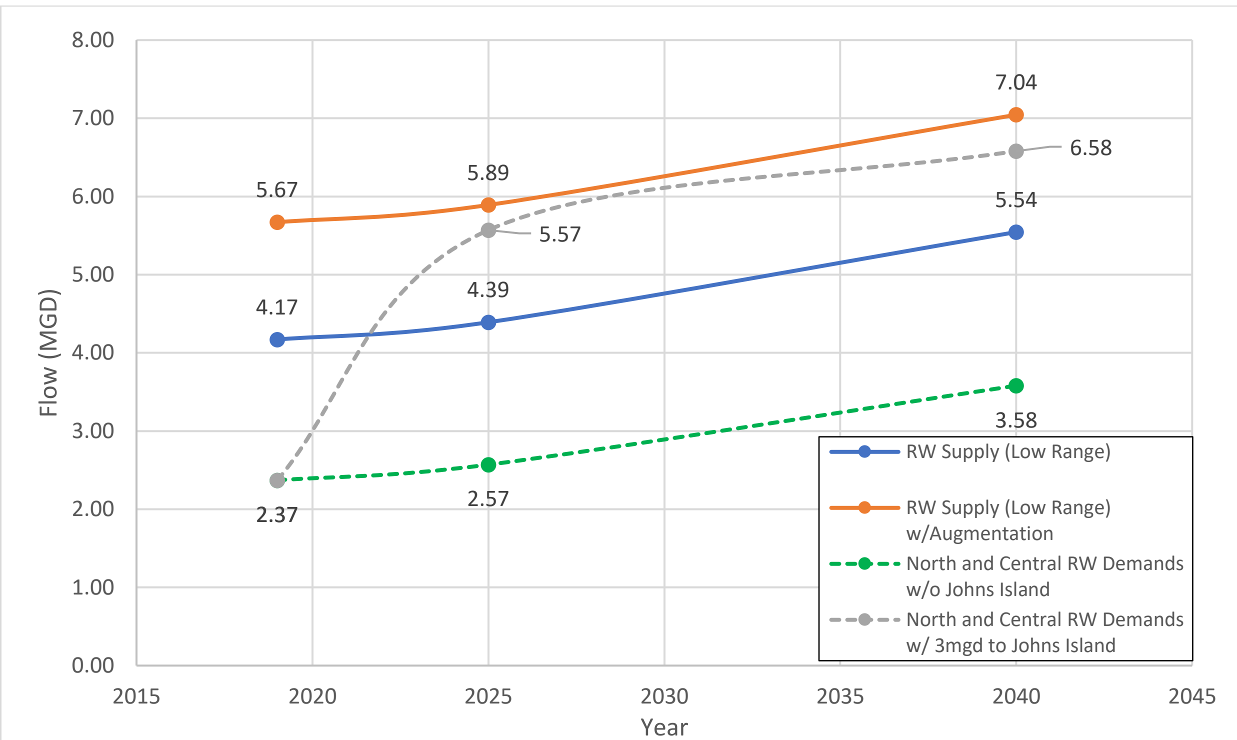

Figure ES-1 - IRC Reclaimed Water Supply and Demands for Central and North Service Areas

ES-5. Recommended Capital Improvement Project for Reuse Augmentation

Threshold Capacity	Project Number	Description	Deficiencies	Correction
When John's Island Storage and Repump Facility comes online[1]	IRC-CRW-2	Storm Grove Reuse Augmentation System	As future customer demands increase, reuse augmentation is required	Install Storm Grove Augmentation System, with a capacity of 1.5 MGD, to meet future demands.

[1] Dependent on timing of John's Island RW Storage and Repump Facility.

The estimated capital costs and anticipated year of operational need for each of the capital projects listed above is shown below.

ES-6. Anticipated Costs for IRC Capital Improvement Projects

CIP Project No.	Capital Project	Capital Costs	Anticipated Year of Operational Need				
			2020	2025	2029	2030	2038
IRC-SRRW-1	South WWTF RW Storage Tank	$3,690,000	X				
IRC-WRRW-2	West WWTF RW Storage Tank	$5,250,000	X				
IRC-WRRW-1	West WWTF Existing Wetlands Permit Update	$80,000	X				
IRC-CRW-1	Backpressure Valves for Central Customers	$210,000	X				
IRC-CRW-2	Storm Grove Augmentation System*	$2,770,000		X			
IRC-SRRW-2	South WWTF Transmission Main Improvements	$1,400,000			X		
IRC-CRW-3	Central WWTF RW Storage Tank	$830,000			X		
IRC-WRRW-3	West WWTF New Wetlands or Deep Injection Well	$12,570,000				X	
IRC-ORW-1	Bent Pine Reuse Storage and Repump Facility	$6,780,000					X
	Total Capital Costs	$33,580,000	$9,230,000	$2,770,000	$2,230,000	$12,570,000	$6,780,000

*Dependent on timing of John's Island RW Storage and Repump Facility.

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Acronyms and Abbreviations

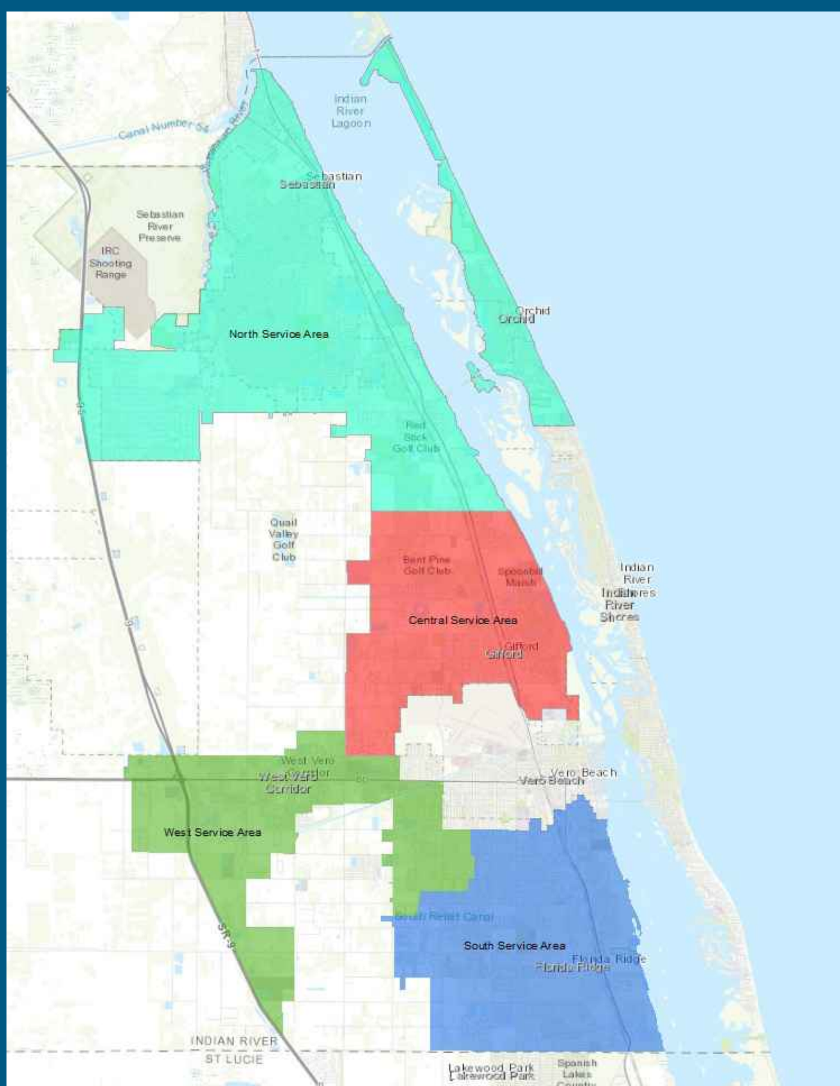
AAD	Annual average daily
AADD	Annual average daily demand
AADF	Annual average daily flow
ASR	Aquifer Storage and Recovery
AWT	Advanced wastewater treatment
BEBR	Bureau of Economic and Business Research
BMAP	Basin Management Action Plan
BOD	Biological Oxygen Demand
$CBOD_5$	Carbonaceous biochemical oxygen demand
CUP	Consumptive Use Permit
CWA	Clean Water Act
DEAR	Division of Environmental Assessment and Restoration
Delta (Δ)	A difference, or change
EPA	U.S. Environmental Protection Agency
EPS	Extended period simulation
ERP	Environmental Resource Permit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
fps	Feet per second
gal	Gallon
GIS	Geographic Information System
gpd	gallons per day
IRC	Indian River County
IRL	Indian River Lagoon
lb/yr	Pounds per year
LDR	Land Development Regulations
lf	Linear feet
LOS	Level of service
mg/L	Milligrams per liter
MGD	Million gallons per day
ml	Milliliters
MOR	Monthly operating report
N	Nitrogen
NPDES	National Pollution Discharge Elimination System
P	Phosphorous

PAR	Public access reuse
PRC	Potable Reuse Commission
PVC	Polyvinylchloride
RIB	Rapid Infiltration Basin
SCADA	Supervisory control and data acquisition
SDWA	Safe Drinking Water Act
SJRWMD	St. Johns River Water Management District
SR	State Road
SWDA	Safe Water Drinking Act
TDH	Total Dynamic Head
TDS	Total dissolved solids
TM	Technical Memorandum
TN	Total nitrogen
TP	Total phosphorus
TSS	Total suspended solids
VFD	Variable-frequency Drive
WRAP	Water Reuse Action Plan
WWTF	Wastewater Treatment Facility

Indian River County Facilities' Common and Proper Names

Central WWTF	Central (Gifford) WWTF
North Reuse Facility	North Reuse Storage and Repump Facility at the North WWTF (off-line)
South WWTF	South Regional WWTF
West WWTF	West Regional WWTF

Introduction



Section 1: Introduction

Indian River County (IRC) is a publicly owned and operated utility service agency serving the needs of approximately 125,000 people in a 90-square-mile area encompassing the Indian River County Florida communities of Vero Beach, Sebastian, Indian River Shores, and Fellsmere. Approximately two-thirds of the IRC's service area is located in unincorporated portions of the County, and more than 90 percent of the population live in the eastern third of the County. Figure 2-1 displays IRC's service area.

Reclaimed water is produced at IRC's three wastewater treatment facilities (WWTFs). The South Regional WWTF (South WWTF) and the West Regional WWTF (West WWTF) produce reclaimed water that meets the advanced wastewater treatment (AWT) standards as defined by Florida Department of Environmental Protection (FDEP). The Central WWTF has a permitted phosphorous limit that exceeds AWT. Combined reclaimed water flows from the West and Central WWTFs and feeds the North Reuse Storage and Repump Facility (North Reuse Facility), which, in turn, provides pressurized reclaimed water to the Barrier Island.

Approximately 46 miles of reclaimed water transmission and distribution lines are owned and maintained by IRC. The existing infrastructure provides reclaimed water to ponds associated with golf course irrigation systems throughout the County. IRC has two large disposal sites, manmade wetlands at the West Regional WWTF (West WWTF) and rapid infiltration basins (RIBs) at Bent Pine RIBs.

Reclaimed water systems are primarily developed to offset potable water demands used for irrigational purposes. However, IRC's reclaimed water system is unique and is not a traditional reclaimed water system. With the exception of the three Barrier Island customers receiving pressurized flow from the North Reuse Facility, the majority of IRC’s reclaimed system currently operates as a low-pressure disposal system. This low pressure system transfers treated effluent to stormwater pond systems associated with their golf course customers and/or to County owned disposal sites at Bent Pine RIBs or the West WWTF Wetland.

1.1 Service Areas

IRC's reclaimed water system is divided into four distinct service areas: South, West, Central, and North. The majority of reuse customers are located in the North and Central service areas. There is only one customer located in the South service area and there are no customers in the West service area.

The existing transmission system upstream of the North Reuse Facility is not considered a pressurized system. The reclaimed water pumps at the South WWTF are sized to meet the pressure requirements associated with transferring reclaimed water to the West WWTF. The reclaimed water pumps at the West WWTF and the Central WWTF are sized to meet the pressure requirements associated with filling golf course ponds and with filling the North Reuse Facility and are not sized to meet the pressure requirements associated with directly connected irrigation systems.

The only portion of IRC's reclaimed water system that is considered pressurized is downstream of the North Reuse Facility. This portion of the system provides reuse to meet the demands of the Barrier Island at approximately 85 pounds per square inch (psi). The three commercial customers in this region are directly connected to IRC's reclaimed water distribution mains and are metered for usage.

Currently, residential customers in the County primarily irrigate using private groundwater wells. Larger commercial users who are not connected to the reclaimed water system, such as golf courses and newer communities, collect and treat stormwater in pond systems on site and repump the stormwater for their irrigation needs.

A few large golf course customers recently were removed from the IRC reclaimed water system due to regulatory issues involving the Indian River Lagoon System and Basin Act of 1990 and the Indian River Lagoon Basin Management Action Plan. St. John's River Water Management District (District) is the regulatory agency that oversees discharge of reclaimed water to stormwater pond systems and determines if there is sufficient pond volume to treat nutrient loading for both the stormwater and reclaimed water.

The golf courses removed from service include: Orchid Island, Windsor, and Vista Plantation. In addition, the District has denied a permit for Waterway Village development that would allow IRC to augment their reclaimed water by discharging to their stormwater pond. These reclaimed demands equate to approximately 2 million gallons per day (MGD), on average. The District prefers that the pond customers have a lined storage pond to prevent reclaimed water from entering the Indian River Lagoon Basin via tributaries. This may not be possible for some systems as it includes a large expense, so these potential customers are inclined to use onsite stormwater ponds and/or groundwater wells for irrigation. Although the groundwater well withdrawal is not considered a potable demand, this still depletes the aquifer of needed water for potable drinking water supply.

Hydraulic limitations in the transmission system preclude sharing all of the reclaimed water produced throughout the system. The 8-inch transmission piping between the South and West WWTFs creates head loss that limits the existing reclaimed water pump capacity at the South WWTF. The transmission main between the West WWTF to the Central Service Area is even more restrictive. This pipeline consists of approximately 42,000 LF of 12-inch-diameter pipe, which restricts the transfer of reclaimed water produced at the South and West WWTFs, which, consequently, reduces the supply available to the majority of potential future customers.

John’s Island Water Management (John's Island) has requested approximately 3 MGD per day from IRC - 2 MGD by 2025 and an additional 1 MGD by 2040. The goal is to deliver the reclaimed water to storage and repump facilities owned and operated by John's Island located near the North Reuse Facility. John's Island will be responsible for transferring the reclaimed water to customers. This is favorable to the County as infrastructure updates will not be required to meet these demands. Since the supply is limited in the Central region, reuse augmentation will be required to meet future reuse demands through the addition of the Storm Grove Reuse Augmentation Facility, an IRC reclaimed water augmentation facility included in the FDEP permit for the West WWTF.

1.2 An Interdependent System

The four IRC Facilities are connected as follows:

- South WWTF to West WWTF
- West WWTF to transmission piping downstream of the Central WWTF
- Central WWTF and West WWTF to North Reuse Facility
- North Reuse Facility to the Barrier Island

The interdependence between the reclaimed water facilities must be taken into account when creating a Master Plan, as recommended operational and/or capacity improvements, can create challenges for the consecutive facilities. A few of the operational considerations that were incorporated into this Master Plan are as follows:

- The South WWTF has only one reuse demand, which is less than the current South WWTF average effluent flow rate. Therefore, the South WWTF is dependent on the West WWTF for disposal of surplus reclaimed water.
- The reclaimed water system at the West WWTF must have the ability at all times to dispose of or transfer the reclaimed water coming from the South WWTF in addition to its own reclaimed water.
- The reclaimed water from both the South and West WWTFs are needed to meet the reuse system demands in the Central and North service areas.
- Attempting to match reclaimed pump and transmission pipe capacities for wet weather events from the County's three WWTFs increases equipment size, which, in turn, increases capital costs as well as operation and maintenance costs.
- Because the Plants are sequential, the increased flow from the South WWTF must be included in the pump sizing of the West WWTF reclaimed pump system for disposal or transfer. In turn, this increased flow, if transferred into the Central WWTF reclaimed water system, will increase the total dynamic head requirements on the reclaimed pumps at the Central WWTF.
- Providing reclaimed water to Central service area customers reduces flow to the North Reuse Facility storage tank due to the hydraulic grade line in the Central service area.

1.3 Master Plan Goals and Objectives

The goals and objectives of this Reclaimed Water Master Plan are to provide a roadmap for decision-making regarding reclaimed water supply, future demands, and system development for reclaimed water capital improvement planning. The original intent of the plan was to assist IRC in identifying improvements required for expansion of the reuse system to facilitate the addition of new customers. However, multiple evaluations and subsequent discussions with IRC Staff resulted in expansion of the initial objective to include evaluations of operational improvements. This was due to the following factors:

- Preliminary supply and demand balances appeared to show sufficient supply to meet reclaimed water demands through 2040. However, results of hydraulic modeling showed hydraulic limitations, reducing the ability to transfer reclaimed water between service areas to end users.
- A review of the anticipated increase in population as defined in the Bureau of Economic and Business Research (BEBR) population projections would typically correlate to an increase in wastewater influent rates, corresponding to an increase in reclaimed water available. However, a large portion of the County's population is not connected to the sewer system. After discussing this with IRC Staff, IRC requested an in-depth review of the last 5 years of Daily Monitoring Reports (DMRs). The result was a creation of low, medium, and high wastewater influent rates for use in determining future reclaimed water availability, as well as reclaimed water system improvements.
- If future customers require a pressurized system for irrigation sprinkler systems, the reclaimed water system upstream of the North Reuse Facility would need to be pressurized or individual booster pump stations for each irrigation system customer would be required. In addition, existing regulatory requirements can be read as requiring potential customers to connect to a nearby reclaimed water system but only if the system is pressurized.
- Septic-to-sewer conversions in IRC are scheduled to begin within the next 5 years, according to IRC's Septic-to-Sewer Conversion Evaluation. Locations of these conversions required geolocating so that they could be assigned to a WWTF and included in future influent flows along with population growth projections. The timing of these conversions will directly correlate to reclaimed water supply. However, due to funding and legal issues, the timing of these conversions is not easily defined, and some assumptions were required.
- Management of peak hour flows and wet weather events required evaluation to determine the effect those operations had on downstream facilities. The results of those evaluations explained existing operational issues associated with overflow of reclaimed water to onsite RIBs or wetlands and resulted in recommendations for Capital Improvement Projects at individual WWTFs.
- When looked at on an individual WWTF basis, there is sufficient reclaimed water wet weather and reject storage to meet FDEP requirements. However, individually permitted storage does not consider that most of the storage is shared with multiple WWTFs, i.e. West WWTF wetlands and Bent Pine RIBs. This prompted a holistic evaluation of the overall system to determine if storage is needed today or would be needed in the future.

1.4 Master Plan Activities

Considering the interdependence of the system and the operational considerations listed above, the follow activities were performed and are included in the Report:

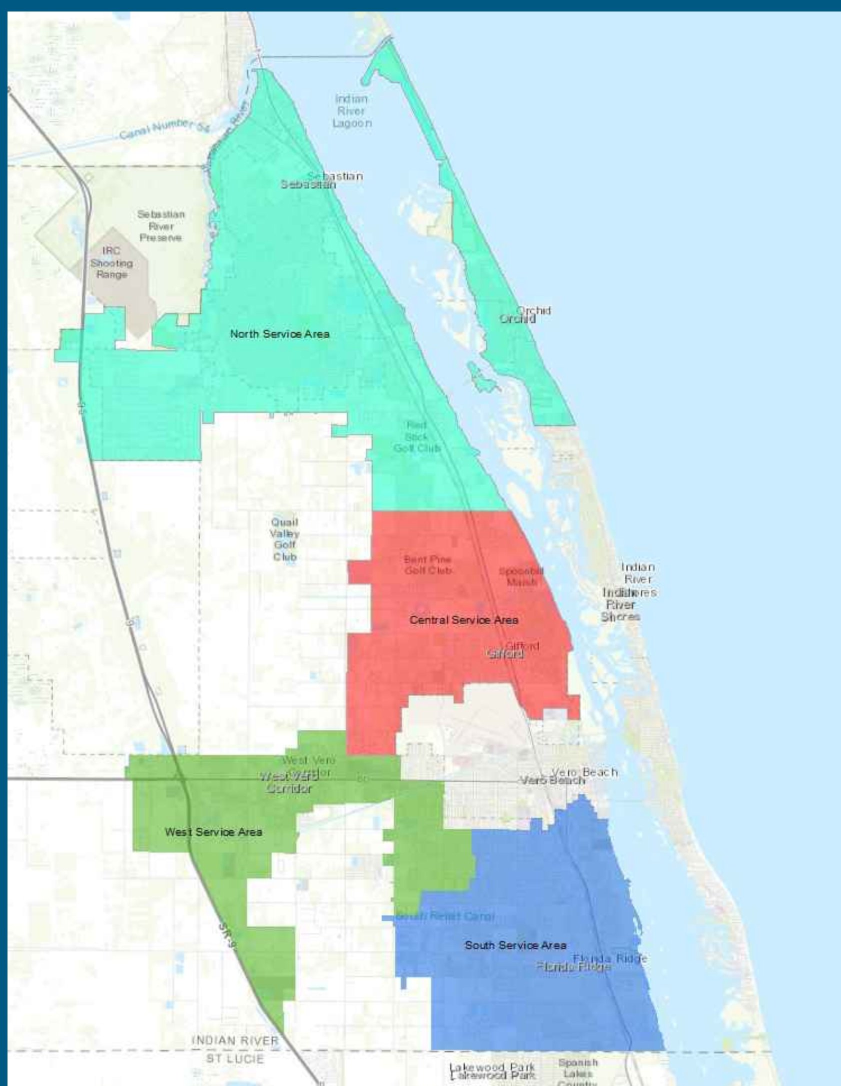
1. **Updated Evaluation Criteria**: Reviewed system performance criteria based upon planning criteria and made recommendations for revised or new criteria as required. Evaluated the existing reclaimed water distribution system's ability to meet updated evaluation criteria.
2. **Updated Hydraulic Model**: Created a hydraulic model that incorporated IRC's Geographic Information System (GIS) capabilities. Verified the hydraulic model through comparison to

observed actual conditions utilizing data derived from the supervisory control and data acquisition (SCADA) system and through observational knowledge provided by Plant Operators.

3. **Incorporated Upstream Operations in WWTF Evaluations**: Reviewed each reclaimed water facility on its own, then included the effects of the operation of upstream facilities in subsequent facilities, thus creating a clear view of existing operations and the effects of upstream capital improvements and operations.
4. **Evaluated Existing and Future Reclaimed Water System**: Evaluated the existing and future system operation and made recommendations for system improvements to correct deficiencies in the existing reclaimed water system and to meet demands for the future system.
5. **Developed Threshold Capacities for Improvements:** Developed criteria utilized to determine the threshold capacity of the facility and the anticipated date of need for each capital improvement in order to create a phased implementation plan for recommended capital improvements.

The results of these activities culminated a comprehensive system-wide plan, including cost estimates and prioritization of the capital improvement projects. The findings from each of these activities are provided in the subsequent Sections of this Report with a summary of the conclusions provided in Section 10.

Data Analysis and Projected Flows



Section 2: Data Analysis and Demand Projections

2.1 Introduction

To prepare the Indian River County (IRC) Reclaimed water Master Plan, Atkins collected and evaluated information and data associated with the existing reclaimed water system. This data included, but was not limited to, Florida Department of Environmental Protection (FDEP) development permits, current and potential reuse customers, customer billing, existing reclaimed water system, previous evaluations of the pipe network, and anticipated wastewater collection expansion projects. This review culminated in projecting the future supply and demands for reclaimed water in the service area.

This section summarizes the data that was collected and reviewed, then utilized to develop reclaimed water supply quantities, reuse demands (existing and projected), and hydraulic model input needed for the IRC Reclaimed Water Master Plan. The information is discussed in detail in the following sections:

- Section 2.2: Data Collected
- Section 2.3: Existing Reclaimed Water System
- Section 2.4: Projected Supply and Demands

2.2 Data Collected

Data required to update the Master Plan included: parcel data, land use and zoning data, customer records for water billing data, plant flow data, and population projections from IRC Planning Department, as well as parcel data from the St. Johns River Water Management District (SJRWMD). Existing and future land use data were used to estimate the location of the current population and identify locations of future population growth throughout IRC.

Previous master plans and reclaimed water studies were reviewed to incorporate relevant information in the update process, including:

- *Preliminary Engineering Report for the North Indian River County Barrier Island Reuse Water Storage and Pumping Facilities* (Schulke, Bittle, & Stoddard, LLC, April 2019)
- *Indian River County Comprehensive Water, Wastewater and Reclaimed Water Rate* Study (Raftelis, September 2018)
- *Reuse System Evaluation Report* (Masteller & Moler, Inc., June 2018)
- *Septic to Sewer Conversion Evaluation* (Schulke, Bittle, & Stoddard, LLC, June 2017)
- *Reclaimed Water Reuse Implementation Plan* (Brown & Caldwell, March 2007)

2.3 Existing Reclaimed Water System

IRC's existing reclaimed water system as shown in Table 2-1 consists of transmission piping between four IRC Facilities and includes transmission piping to the Barrier Island. The four IRC Facilities are connected as follows:

- South WWTF to West WWTF
- West WWTF to transmission piping downstream of the Central WWTF
- Central WWTF and West WWTF to North Reuse Facility
- North Reuse Facility to the Barrier Island

Table 2-1 summarizes the pump and storage capacities serving the IRC reclaimed water system.

Table 2-1: Reclaimed water Pump and Storage Tank Capacities

Site	Storage Tanks (MG)	Reclaimed Water Pump Station		
		No. of Pumps	Rated Capacity (each pump)	HP
Central WWTF	—	4	2,800 gpm @ 113 feet TDH	100
		1	1,150 gpm @ 52 feet TDH	25
South WWTF	—	3	1,400 gpm @ 167 feet TDH	100
West WWTF	—	2	1,400 gpm @ 242 feet TDH	100
North Reuse Facility	3.0	3	850 gpm @ 195 feet TDH	60
		1	250 gpm @ 195 TDH	25

The existing infrastructure provides reclaimed water for public landscape irrigation and to stormwater ponds associated with golf course irrigation systems throughout the County. Disposal of excess reclaimed water is available at the manmade wetland system located at the West WWTF site, Bent Pine Rapid Infiltration Basins (RIBs), and on-site reject ponds and tanks. The South WWTF and the West WWTF produce reclaimed water that meets the advanced wastewater treatment (AWT) standards as defined by Florida Department of Environmental Protection (FDEP). The Central WWTF has a permitted phosphorous limitation that exceeds AWT.

The existing transmission system upstream of the North Reuse Facility is not considered a pressurized system. The reclaimed water pumps at the West WWTF and the Central WWTF are sized to meet the pressure requirements associated with filling golf course ponds and with filling the North Reuse Facility storage tank and are not sized to meet the pressure requirements associated with irrigation systems. The North Reuse Facility is sized to meet the pressure requirements of irrigation systems on the Barrier Island.

Table 2-2 provides an annual summary of historical influent flows based on the monthly operating reports (MORs) from August 2014 to August 2019. IRC's three WWTFs treat an average 5.04 million MGD, or 42 percent of their total permitted capacity of 12.00 MGD. The current reclaimed water requiring disposal, assuming 100 percent of the wastewater treated is distributed through the reclaimed system, is 5.04 MGD.

Table 2-2: Current WWTF Influent Flows (2014-2019)

WWTF	Influent Flows (MGD)	
	Design Capacity	Average Day
West	6.00	2.18
South	2.00	0.73
Central	4.00	2.13
Totals	**12.00**	**5.04**

* Average Day from MORs from August 2014 to August 2019.

2.3.1 Existing Reclaimed Water Disposal Capacity

Table 2-3 presents the current permitted reuse and effluent disposal sites in IRC. These sites have a total permitted capacity of 23.92 MGD. The public access reuse (PAR) customers consist primarily of golf courses and WWTF site irrigation in IRC's service area. Note that some users are permitted but do not have the required infrastructure to accept reclaimed water. The remaining permitted effluent disposal methods include rapid infiltration basins (RIBs) and wetlands. Although the wetlands are permitted for 4.0 MGD, flow into the wetlands is constrained due to nutrient loading limitations as defined in an amendment to the West WWTF Permit. Therefore, the permitted capacity presented in Table 2-3 is not the actual reclaimed water disposal capacity, just the permitted maximum capacity that the sites are capable of accepting into their stormwater management systems.

Table 2-3 includes Orchid Island Golf Course, which recently discontinued accepting reclaimed water from IRC due to insufficient volume in its stormwater pond system to treat the nutrient load. They are primarily irrigating with stormwater and have a groundwater well as backup.

Table 2-3: Permitted Effluent Disposal Capacity[1]

Reuse Water Site	Permitted Capacity[2] (MGD)	Primary WWTF
Bent Pine RIBs	14.0	Central, South, and West
Grand Harbor Golf Course[3]	0.75	Central
Hawk's Nest Golf Course[4]	1.00	Central
Indian River Country Club Golf Course	0.50	South
North Regional WWTF on-site irrigation	0.05	Central
North Regional WWTF RIBs	0.07	Central
John's Island Golf Course	0.50	Central
Orchid Island Golf Course	0.08	Central
Redstick Golf Course	1.00	Central
Sandridge Dunes Golf Course[4]	1.00	Central
Sandridge Lakes Golf Course	0.42	Central
South WWTF RIBs	0.45	South
West WWTF RIBs	0.10	West
West Wetlands	4.00 (0.70[5])	West and South
Total Permitted Capacity	**23.92**	

Notes:

1 Source: FDEP Operation Permits for the individual users.
2 Permitted capacity based on annual average daily flow (AADF).
3 Includes a 2.25 MG isolated reclaimed water storage pond.
4 Includes a 3 MG isolated reclaimed water storage pond.
5 Maintenance requirement for the wetland system.

2.3.1.1 Central Wastewater Treatment Facility

The Central WWTF has the largest reclaimed water service area and currently delivers 100 percent of its effluent to PAR, as presented in Table 2-3. Backup disposal capacity is available at the Bent Pine RIBs site.

2.3.1.2 South Wastewater Treatment Facility

The South WWTF services customers in the South regional area. The only public access reuse customer currently serviced by the South WWTF is the Indian River Country Club Golf Course, where reclaimed water is stored in onsite ponds. This reclaimed water is then repumped by the customer for use as irrigation of the golf course as well as single-family residential lots within the development. Excess reclaimed water from the South WWTF is directed to the West WWTF where it is combined with the reclaimed water from the West WWTF to be sent to the North Reuse Facility, the wetlands, or to Bent Pine RIBs for disposal.

2.3.1.3 West Wastewater Treatment Facility

The West WWTF service area extends from the Indian River County line to State Road (SR) 60 and utilizes the West WWTF Wetlands and the Bent Pine RIBs site for reclaimed water disposal or supplements the Central service area by supplying reclaimed water to customers in the Central region or filling the North Reuse Facility storage tank.

2.3.2 Existing Reuse Water Customers

The majority of the existing uses of reclaimed water within the County are landscape and golf course irrigation. Figure 2-1 illustrates the reuse customers currently served by IRC. Figure 2-1 also includes past reuse customers including Vista Plantation Golf Course and the Bent Pine Golf Course. IRC's existing customers and their annual average demand from 2006 to 2019 are listed in Table 2-4. As shown in the table, there are currently 10 reclaimed water users, with the Sandridge Dunes Golf Course having the maximum average annual demand of 0.71 MGD, utilizing approximately 71 percent of its permitted capacity. The total annual average daily demand (AADD) for the existing reclaimed water system is currently 3.14 MGD. This demand has decreased by approximately 0.42 MGD with Orchid Island Golf Course offline in mid-2020. The existing reclaimed water system AADD would then be 2.72 MGD.

Figure 2-2 graphically displays the monthly reuse demand for IRC. Figure 2-2 shows the reclaimed water demands trending upward beginning in October 2009. This increase is attributed to more users coming online as IRC's service area expands. Recently, more stringent regulations, evolving from the Indian River Lagoon Basin Management Plan, have required that stormwater management systems accepting reclaimed water to supplement irrigation, submit additional information involving treatment capacity. The additional information requires a capacity analysis report to determine whether the treatment volume capacity is acceptable to include the additional reclaimed water nutrient load removal. It was determined that the stormwater management system for the Orchid Island Golf Course does not have sufficient volume to treat both the stormwater and reclaimed water nutrient loads. Therefore, St. John's River Water Management District (SJWMD) has restricted discharge of reclaimed water to this stormwater pond system.

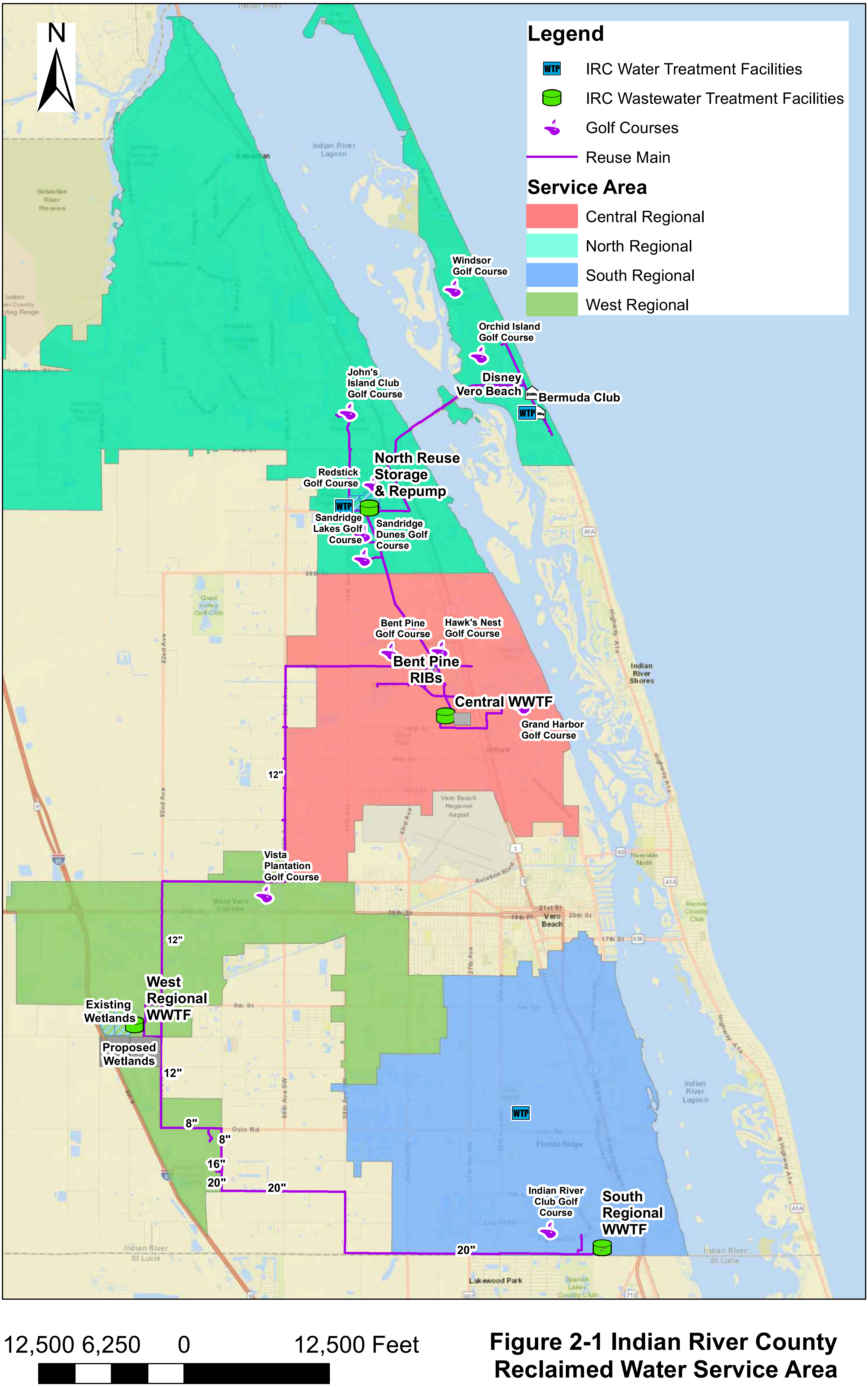


Figure 2-1 Indian River County Reclaimed Water Service Area

Table 2-4: 2006 to 2019 Annual Average Monthly Reclaimed Water Demands

Month	Grand Harbor Golf Course	Hawks Nest Golf Course	Sandridge Lakes Golf Course	Sandridge Dunes Golf Course	John's Island Golf Course	Redstick Golf Course	Orchid Island Golf Course	Indian River Country Club	Disney Vero Beach Resort Club	Bermuda Club	Total Monthly Demand (MGD)
January	0.18	0.11	0.23	0.77	0.18	**0.57**	0.31	0.36	0.05	0.07	2.83
February	0.21	0.22	0.27	0.74	0.24	0.52	0.32	0.40	0.05	0.07	3.03
March	**0.33**	0.28	0.34	**0.77**	0.34	0.52	0.39	0.37	0.04	0.08	3.44
April	0.30	0.30	**0.38**	0.67	**0.35**	0.50	**0.52**	**0.47**	0.05	0.09	**3.63**
May	0.28	0.30	0.37	0.63	0.31	0.44	0.47	0.45	0.04	0.09	3.37
June	0.20	0.27	0.31	0.72	0.25	0.52	0.48	0.38	0.04	0.06	3.24
July	0.18	0.31	0.29	0.67	0.20	0.52	0.47	0.41	0.04	0.12	3.20
August	0.18	**0.32**	0.32	0.68	0.25	0.49	0.46	0.40	0.05	0.11	3.28
September	0.14	0.24	0.23	0.65	0.15	0.48	0.51	0.28	0.06	**0.15**	2.90
October	0.14	0.22	0.27	0.70	0.21	0.52	0.38	0.32	0.04	0.10	2.88
November	0.20	0.17	0.33	0.76	0.23	0.53	0.38	0.41	**0.07**	0.10	3.17
December	0.18	0.11	0.24	0.73	0.18	0.53	0.33	0.36	0.04	0.07	2.77
Annual Average Daily Demands (AADD) - MGD	0.21	0.24	0.30	0.71	0.24	0.51	0.42	0.38	0.05	0.09	3.14
Maximum Monthly Demand (MGD)	0.33	0.32	0.38	0.77	0.35	0.57	0.52	0.47	0.07	0.15	3.63
Permitted Capacity (MGD)	0.75	1.00	0.42	1.00	0.50	1.00	0.08	0.50	—	—	—
Percent of Permitted Capacity Utilized	28%	24%	71%	71%	48%	51%	-	77%	—	—	—

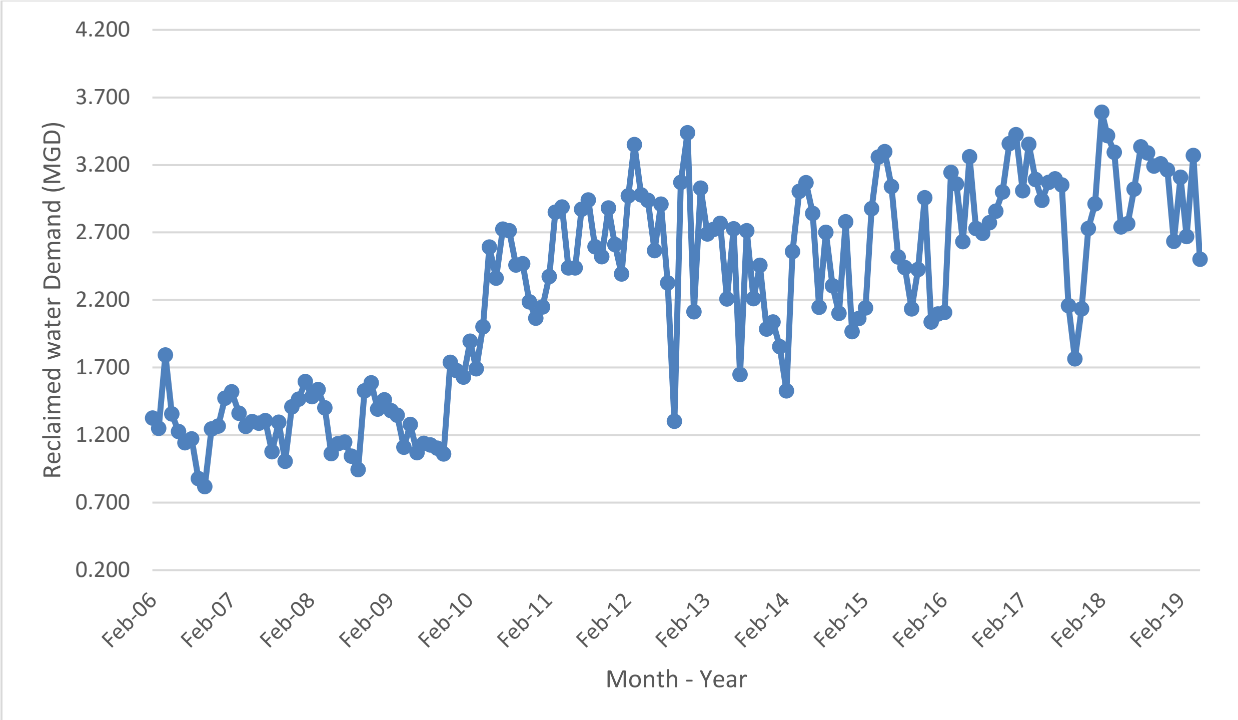


Figure 2-2: Monthly Reuse Demand (February 2006 - May 2019)

2.3.2.1 Existing Reuse Water Customer Agreements

Standard Reclaimed Water Development Agreements are a necessity of any reclaimed water system's regulatory structure. The Agreement describes the specific commitments of the Utility and the customer in regard to the needs and service requirements. The standard user agreement used by the County applies to users of the system that will have a demand of 100,000 gallons per day (gpd) or greater on an AADF basis. The agreement sets the requirements and obligations for both the County and user.

The County currently has six agreements with reuse customers that are using over 100,000 gpd. These six reuse customers are golf courses and accept reclaimed water into stormwater ponds. Table 2-5 includes a summary of each of the six reuse agreements.

Table 2-5: Existing Reuse Customer Agreements

Golf Course Customer	Maximum Capacity	Cost	Date Established	Term
Grand Harbor	1.0 MGD	No cost for the first 5 years $0.21 per 1,000 gallons there-after	4-14-87	40 years; Automatically renews unless either party notifies the other of cancellation not less than 1 year in advance.
Hawk's Nest	1.0 MGD (0.7 no charge; 0.3 may charge)	$0.21 per 1,000 gallons	4-7-87	40 years; Automatically renews unless either party notifies the other of cancellation not less than 1 year in advance.
Sandridge	No limit - Sandridge accepts as much wet weather reclaimed water discharge as is necessary for con-tinued wastewater operation.	$0.00 per 1,000 gallons	9-27-99	10 years; Automatically renews unless either party notifies the other of cancellation not less than 180 days in advance.
Indian River Club	0.30 MGD	No charge first 10 years $0.21 per 1,000 gallons there-after	11-5-96	10 years; Automatically renews unless either party notifies the other of cancellation not less than 90 days in advance.
John's Island Club	4,500,000 gpd	$0.21 per 1,000 gallons	8/10/04	7 years; Automatically renews unless either party notifies the other of cancellation not less than 180 days in advance.
Redstick	181,350 gpd (not guaranteed)	$0.21 per 1,000 gallons	10-5-99	7 years; Automatically renews unless either party notifies the other of cancellation not less than 180 days in advance.
John's Island East	1.0 MGD	Not specified in agreement	12-5-2017	25 years; Automatically renews unless either party notifies the other of cancellation not less than 180 days in advance.
Sea Oaks	0.0178 MGD (Phase 1) 0.129 MGD (Phase 2) 0.284 MGD (Phase 3)	Not specified in agreement	10-6-2020	10 years; Automatically renews and additional 10 years unless either party notifies the other of cancellation not less than 180 days in advance.

2.4 Supply and Demand Projections

Wastewater influent flows to the three WWTFs in IRC are anticipated to increase over the next 20 years due to population growth and septic-to-sewer conversions. Assuming that all of the wastewater flow will be treated to reclaimed water standards, a similar increase in reclaimed water can be expected. Disposal of this increase in reclaimed water can be managed through multiple means including the following:

- Public access irrigation of golf courses, parks, residential properties, highway medians, and other landscaped areas.
- Urban uses such as toilet flushing, car washing, dust control, and aesthetic purposes such as decorative lakes, ponds, and fountains.
- Agricultural uses such as irrigation of pasture lands, grasslands, and other feed and fodder crops; and irrigation at nurseries.
- Wetlands creation, restoration, and enhancement.
- Recharging groundwater with the use of RIBs, which are also known as percolation ponds, absorption fields, and direct injections to groundwater.
- Industrial uses including plant wash down, processing water, and cooling water purposes.

Data was analyzed to project the anticipated availability of reclaimed water as well as the anticipated reclaimed water demands. These projections assist in providing data on surplus reclaimed water, which will drive planning for disposal methods beyond public usage.

In addition, data was analyzed to establish peaking factors at each WWTF in order to determine peak hour flows. Peak hour flows are one factor in projecting wet weather events, which will assist in evaluating storage and improvements necessary to meet hydraulic requirements.

2.4.1 Projected Availability of Reclaimed Water

Table 2-6 through Table 2-12 summarize the historical and projected reclaimed water supply/wastewater influent flows for each of the regional service areas. The historical flows are based on MORs from August 2014 through August 2019. Projected future flows are based on wastewater flow projections derived from the historical data over the last 5 years. A projected low, median, and high supply were estimated for each service area. The projected low was concluded by deriving the lowest increase in the last 5 years; the projected median derived from the average increase in the last 5 years; and the projected high supply from the highest increase over the last 5 years.

For planning purposes, equipment and infrastructure improvements will be sized based on the high projection estimates and projected low reclaimed water supplies will be utilized to verify the ability to meet demand projections. This presents a conservative approach for expanding the future reclaimed water system. The historical and projected reclaimed water data are presented in Table 2-6 through Table 2-12 and Figures 2-3 through 2-5 for each regional system.

Table 2-6: South WWTF Historical Reclaimed Water Supply

	2014	2015	2016	2017	2018	2019	5-Year % Change 2019/2014
MGD	0.75	0.60	0.71	0.85	0.74	0.71	–5%
Annual Δ vs. 2019	5%	–18%	0%	16%	4%	0%	

Table 2-7: South WWTF Projected Reclaimed Water Supply

Scenario	Projected Reclaimed Water Supply (MGD)		
	2019	2025	2040
Low Baseline	0.71	0.59	0.48
Median Baseline	0.71	0.72	0.74
High Baseline	0.71	0.83	0.96
Increase in Wastewater Supply due to Septic-to-Sewer Conversion	–	–	1.20
Projected Low Supply	0.71	0.59	1.68
Projected Median Supply	0.71	0.72	1.94
Projected High Supply	0.71	0.83	2.16

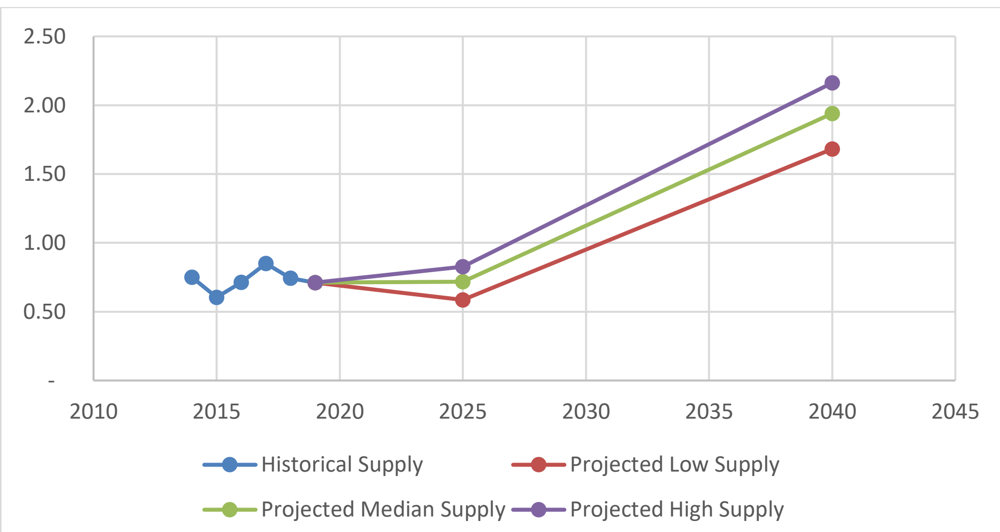


Figure 2-3: South WWTF Historical and Projected Reclaimed Water Supply

Table 2-8: West WWTF Historical Reclaimed Water Supply

	2014	2015	2016	2017	2018	2019	5-Year % Change 2019/2014
MGD*	2.12	2.21	2.18	2.16	2.13	2.22	5%
Δ vs. 2019	−5%	0%	−2%	−3%	−4%	0%	

* Average based on MORs from August 2014 to August 2019

Table 2-9: West WWTF Projected Reclaimed Water Supply

Scenario	Projected Reclaimed Water Supply (MGD)		
	2019	2025	2040
Low Baseline	2.22	2.11	2.10
Median Baseline	2.22	2.18	2.18
High Baseline	2.22	2.22	2.55
Increase in Wastewater Supply due to Septic-to-Sewer Conversion	–	–	1.20
Projected Low Supply	2.22	2.11	3.30
Projected Median Supply	2.22	2.18	3.38
Projected High Supply	2.22	2.22	3.75

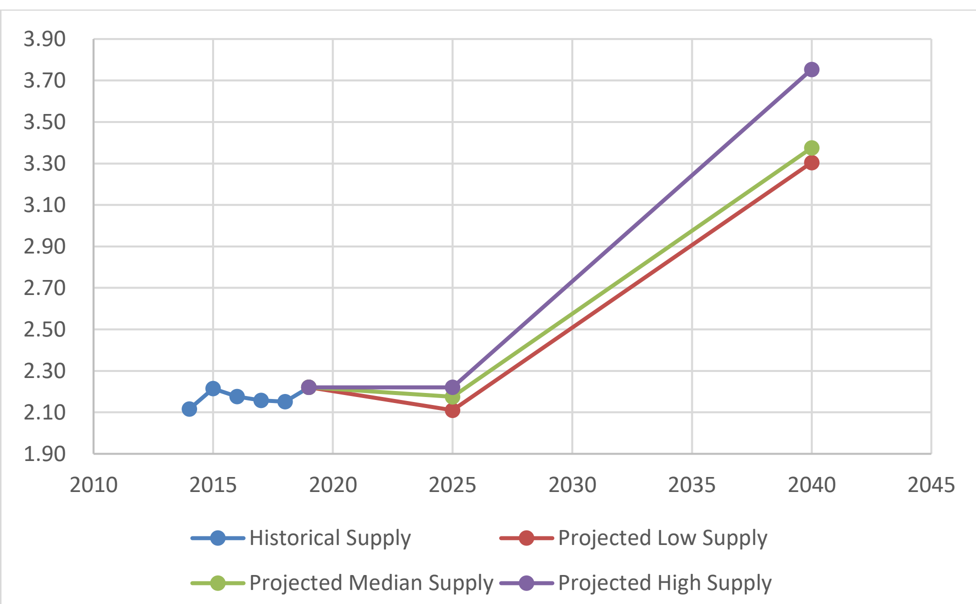


Figure 2-4: West WWTF Historical and Projected Reclaimed Water Supply

Table 2-10: Central WWTF Historical Reclaimed Water Supply

	2014	2015	2016	2017	2018	2019	5-Year % Change 2019/2014
MGD	1.91	2.04	2.22	2.22	2.10	2.17	14%
Annual Δ vs. 2019	-14%	-6%	2%	2%	-3%	0%	

Table 2-11: Central WWTF Projected Reclaimed Water Supply

Scenario	Projected Reclaimed Water Supply (MGD)		
	2019	2025	2040
Low Baseline	2.17	1.88	1.74
Median Baseline	2.17	2.11	2.11
High Baseline	2.17	2.22	2.55
Increase in Wastewater Supply due to Septic-to-Sewer Conversion	-	0.52	1.80
Projected Low Supply	2.17	2.39	3.54
Projected Median Supply	2.17	2.62	3.91
Projected High Supply	2.17	2.73	4.35

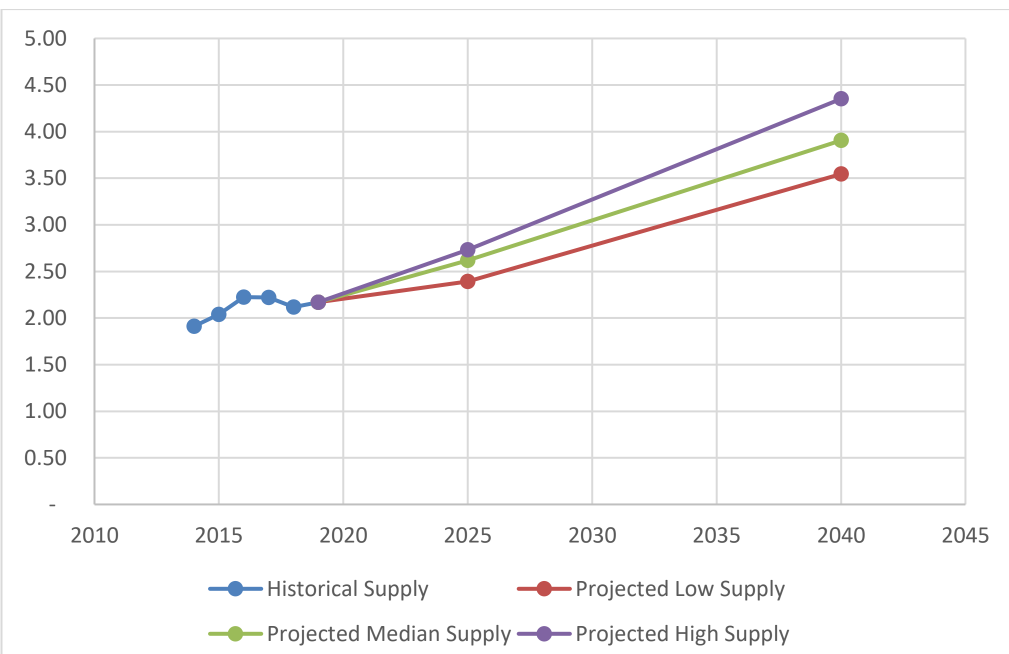


Figure 2-5: Central Historical and Projected Reclaimed Water Supply

The projected availability of reclaimed water for all of the IRC WWTFs is summarized in Table 2-12.

Table 2-12: Summary of Projected AAD Flows for IRC WWTFs

	2019 AAD Flows (MGD)			2025 AAD Flows (MGD)			2040 AAD Flows (MGD)		
WWTF	**Low**	**Median**	**High**	**Low**	**Median**	**High**	**Low**	**Median**	**High**
South	0.71	0.71	0.71	0.59	0.72	0.83	1.68	1.94	2.16
West	2.22	2.22	2.22	2.11	2.18	2.22	3.30	3.38	3.75
Central	2.17	2.17	2.17	2.39	2.62	2.73	3.54	3.91	4.35
Totals	**5.10**	**5.10**	**5.10**	**5.09**	**5.51**	**5.78**	**8.53**	**9.22**	**10.27**

2.4.2 Projected Public Demand

Based on the projected low reclaimed water supply, approximately 5 MGD of reclaimed water will be available in the service area in 2025 and almost 9 MGD in 2040. Expansion of an existing public access reuse system is typically based on potential users and should be accompanied by wet weather storage as required by FDEP. In order to determine whether projected public demand will match the projected available reclaimed water at each WWTF, a generalized expansion of the reclaimed water customer base has been assumed. The two-phased expansion as shown in Table 2-13 is based on conversations with IRC Utility Department Staff and review of FDEP consumptive use permits (CUPs). It is assumed that Orchid Island and Windsor Golf Courses will come online as pressurized users in 2040 and not remain on-site pond customers due to regulatory requirements of the stormwater management systems.

Due to regulatory and financial constraints, there are a number of potential uses of reclaimed water that were considered but deemed not viable in the projected reuse demands shown in Table 2-13. These include the following:

- The use of reclaimed water in existing single-family developments with substantial infrastructure in place was not considered as a viable, cost-effective reclaimed water market.
- Expanding the existing transmission network to subdivisions where septic-to-sewer replacements are anticipated was not considered a cost-effective reclaimed water market.

Table 2-13: Two-Phased Expansion of Public Access Reuse System

South WWTF Customers	AADD (MGD)	Existing Customers	2025 Phase 1 Expansion	2040 Phase 2 Expansion
Indian River Country Club	0.38	X	X	X
Falcon Trace Phase 3	0.08			X
IRC Landfill	0.20			X
Tripson Estates Planned Development	0.08			X
South WWTF Total Demands		**0.38**	**0.38**	**0.74**
Central WWTF Customers	**AADD (MGD)**	**Existing Customers**	**2025 Phase 1 Expansion**	**2040 Phase 2 Expansion**
Grand Harbor Golf Course	0.21	X	X	X
Hawks Nest Golf Course	0.24	X	X	X
Sandridge Dunes Golf Course	0.71	X	X	X
Sandridge Lakes Golf Course	0.30	X	X	X
Redstick Golf Course	0.51	X	X	X
John's Island West Golf Course	0.24	X	X	X
John's Island East Homeowners Assoc.	2.00		X	X
Central WWTF Total Demands		**2.21**	**4.21**	**4.21**
North Repump Station Customers	**AADD (MGD)**	**Existing Customers**	**2025 Phase 1 Expansion**	**2040 Phase 2 Expansion**
Bermuda Club	0.09	X	X	X
Disney Vero Beach Resort Club	0.05	X	X	X
Sea Oaks Phase 1	0.02	X	X	X
Sea Oaks Phase 2	0.20		X	X
Windsor Golf Course	0.31			X
John's Island East Golf Course	1.00			X
Orchid Island Golf Course	0.42			X
Sea Oaks Phase 3	0.28			X
GHO Homes[1]	0.50			
Old Orchid[1]	0.09			
Waterway Village[1]	1.00			
North Repump Station Total Demands		**0.16**	**0.36**	**2.37**
Total IRC Customer Demands		**2.75**	**4.95**	**7.32**
West WWTF Wetlands Maintenance Requirement		0.7	0.7	0.7
Total IRC Reclaimed Water Demands		**3.45**	**5.65**	**8.02**

[1] Potential future customer pending regulatory approval and/or pond improvements

2.4.3 Peak Hour Flows and Projected Wet Weather Events

To ensure that future storage and pump requirements are sufficiently sized to manage peak hour flows and wet weather events, these values were determined through analysis of existing data. Peak hour flows are defined as follows:

Peak Hour Flow (MGD) = AADF (MGD) x *Peaking Factor*

For planning purposes, peak flow rates for IRC WWTFs are based on the projected high reclaimed water supply values as established in Section 2.4.1. This presents a conservative approach when determining equipment and infrastructure improvements needed for management of wet weather events. Peaking factors were established through a review of daily operations for one year at each WWTF. Peaking factors and projected peak hour flows for each WWTF are shown below in Table 2-14.

Table 2-14: WWTF Peaking Factors and Peak Hour Flows

		Projected High AAD Flows (MGD)			Projected Peak Hour Flows (MGD)		
WWTF	**Peaking Factor**	**2019**	**2025**	**2040**	**2019**	**2025**	**2040**
South	3.85	0.71	0.83	2.16	2.74	3.19	8.32
West	2.5	2.22	2.22	3.75	5.55	5.55	9.38
Central	1.73	2.17	2.73	4.35	3.75	4.73	7.53

The unusually high peaking factor at the South WWTF is due to redirection of peak hour flows at Lift Station 89 from the West WWTF to the South WWTF. During high flow events, reduction in flow from Lift Station 89 to the West WWTF is necessary in order to avoid negatively affecting downstream lift stations.

Wet weather events are typically related to either peak hour or max day flow rates, depending on the treatment facilities and the reclaimed water disposal options. In the case of IRC, peak hour flows, as opposed to max day flows, were utilized as they occur at approximately the same time for all three WWTFs, compounding the effect on pumps and transmission main sizes as the reclaimed water moves sequentially through the County's reclaimed water system. Therefore, for IRC, a wet weather event is defined as follows:

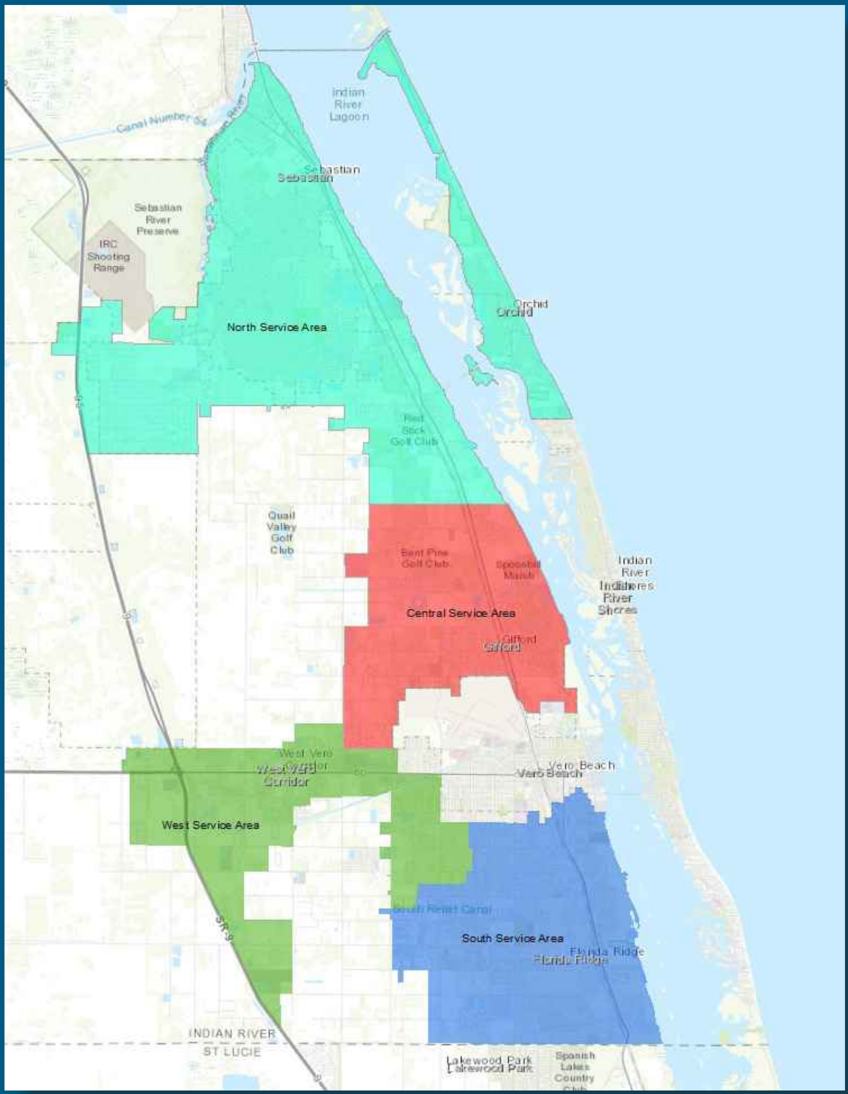
Wet Weather Event (gallons) = Peak Hour Flow (gallons/hour) x *4-hour duration*

Table 2-15 below summarizes the projected volume of reclaimed water anticipated from a wet weather event for each WWTF. Management of wet weather events are evaluated and discussed in Section 4, Hydraulic Modeling.

Table 2-15: Projected Wet Weather Event Volumes (gal)

		Projected Wet Weather Event Volume (gal)		
WWTF	**Event Duration (hr)**	**2019**	**2025**	**2040**
South	4	439,000	511,000	1,335,000
West	4	578,000	578,000	977,000
Central	4	271,000	341,000	543,000

Regulatory Review



Section 3

Section 3: Regulatory Review

3.1 Regulatory Background

Prior to the 1960s, disposal of effluents from industrial and commercial plants, including WWTFs, was not largely regulated or managed beyond state or local initiatives and effluent was generally directed to the nearest waterbody. This ultimately caused major pollution issues and created public health crises throughout the United States. The health concerns associated with these polluted waterways were first addressed in 1948 with the Federal Water Pollution Control Act, but this act had little success as it limited federal authority and did not set limits on pollutants. It did, however, provide a steppingstone for future regulations from federal, state, and local agencies that, today, clearly define the required wastewater treatment levels and acceptable disposal methods for industrial and commercial effluents; including wastewater effluent. The regulatory restrictions on disposals of wastewater effluent has, by necessity, forced public and private entities to look for viable options for wastewater effluent disposal. These options typically include pressurized distribution networks to land application sites and are generally referred to as reclaimed water systems. Other options for discarding reclaimed water include created wetlands, aquifer injection, and infiltration basins and are generally referred to as disposal systems.

A summary of the current regulations governing disposal of wastewater effluent and reclaimed water systems is detailed below by regulatory entity. Each section includes the effect of the regulations on Indian River County (IRC). The final section contains anticipated regulatory changes and the potential effect those changes may have on IRC.

3.2 Federal Requirements

There are two federal laws that directly affect potential disposal of wastewater effluent. The Clean Water Act (CWA) established a national commitment to protect the nation's surface waters, and the Safe Water Drinking Act (SWDA) regulates the quality of drinking water and provides protection for underground drinking water sources. The requirements of these two federal laws and their effect on the disposal of wastewater effluent are discussed below.

Although these federal laws address wastewater effluent disposal, there are currently no federal regulations that specifically address or support options for reclaimed water applications or the proper implementation of water reuse systems. However, the Environmental Protection Agency (EPA) has published recommended best practices for water reuse systems, *2012 Guidelines for Water Reuse*. These guidelines are utilized by state and local governments in setting regulations associated with reclaimed water systems.

In September 2019, EPA introduced the draft National Water Reuse Action Plan (WRAP). This document was the result of concerns at both federal and state levels that sources of water for potable use have become scarce and are expected to become more so in the foreseeable future, as well as a need for technical guidance regarding options for creating long-term sustainable water sources. The intent of WRAP is to provide an action plan that will garner consideration and support for the implementation of reclaimed water as a sustainable source of water for potable use, or as an alternative source of water for non-potable use. WRAP is not a guidance document for implementation of reclaimed water but is, instead, a list of activities that will result in the identification of "critical technology, policy, and programmatic issues" associated with the use of reclaimed water as a water source.

3.2.1 The Clean Water Act

The Federal Water Pollution Control Act was rewritten in 1972, and further amended in 1977 and 1987, to become what is known today as the Clean Water Act. The CWA defined laws and regulations associated with the protection of the nation's waters and wetlands and authorized EPA with enforcement of the laws and with assisting states with the enforcement and technical support required to meet CWA regulations.

The CWA introduced the National Pollutant Discharge Elimination System (NPDES), a permitting system for regulating point sources of pollution including effluent from WWTFs. Point sources are not allowed to discharge pollutants to surface waters without an NPDES permit. The system is managed by EPA in partnership with state environmental agencies. For the State of Florida, NPDES permits are the responsibility of the Florida Department of Environmental Protection (FDEP). All wastewater facility permits authorized by FDEP include the requirements associated with a federal NPDES permit; therefore, WWTFs do not require a secondary NPDES permit. All three of IRC's WWTFs include these federal provisions in their permits.

3.2.2 The Safe Drinking Water Act

In 1974, the Public Health Act was amended to include the Safe Drinking Water Act (SWDA). The intent of SDWA is to ensure the safety of public drinking water. Under the SDWA, EPA is required to set the water quality standards for public drinking water and ensure that the standards are followed. Although the SDWA is primarily focused on potable water quality, this regulation also includes provisions for EPA protection of underground sources of drinking water, including aquifers common in Florida drinking water supply. This protection includes strict requirements on the use of injection wells for disposal of effluent streams. IRC does not currently utilize aquifers for reclaimed water disposal or storage.

3.3 State Requirements

The FDEP was created in the 1990s when the state merged the Department of Environmental Resources with the Department of Natural Resources. FDEP is responsible for the state's natural environment and is divided into three primary areas-Land and Recreation, Regulatory, and Ecosystem Restoration. Within FDEP, there are three branches associated with reclaimed water and reclaimed water systems:

1. **The Division of Water Resource Management Domestic Wastewater Program** is responsible for permitting and regulatory oversight of wastewater treatment and effluent disposal. Disposal quality, quantities, and methods are authorized through this Division of FDEP.
2. **The Water Management Districts** are responsible for the administration of water resources throughout the state. As part of their management and permitting of water supply sources, the Water Management Districts also engage in water conservation initiatives, such

as the use of reclaimed water, in an effort to conserve available water resources and reduce negative impacts associated with overuse of water supply sources.

3. **The Division of Environmental Assessment and Restoration** (DEAR) is responsible for assessing, verifying, and instigating solutions to pollution of surface water systems. For at-risk surface water systems, DEAR is responsible for working with key stakeholders to develop and implement a Basin Management Action Plan (BMAP). IRC is one of the stakeholders associated with the Central Indian River Lagoon (IRL) BMAP.

Details on disposal of wastewater effluent and reclaimed water system requirements as determined by each of these FDEP branches are detailed below.

In addition, FDEP works with multiple task groups to research and develop guidelines for new regulations. A summary of the task groups and potential new regulations associated with reclaimed water are included in Section 3.5.

Discharge from IRC's WWTFs is also governed by the Indian River Lagoon System and Basin Act of 1990. This Act established three objectives for WWTFs – elimination of surface water discharges, investigation of reclaimed water feasibility, and the centralization of WWTFs. This Act also called for the reduction of surface water discharges associated with the improper use of septic tanks. The objectives associated with this Act are generally being managed through the IRL BMAP.

3.3.1 FDEP Division of Water Resource Management

The FDEP Division of Water Resource Management is responsible for the development and permitting of proper wastewater treatment processes and effluent disposal alternatives, including reuse of reclaimed water, reclaimed water to wetlands, and underground injection well permits. All permits are authorized and managed through six district offices. Indian County is located in FDEP's Southeast District, which is headquartered in West Palm Beach.

In 1987, Florida initiated its reclaimed water program and added reclaimed water provisions to the Florida Administrative Code (FAC) Chapter 17-40 State Water Policy and began evaluating ways to promote reuse of reclaimed water. Florida Statute 403.064 Reuse of Reclaimed Water was first enacted in 1989 and was one of the first state legislative bills to acknowledge the importance of reclaimed water as a water conservation measure and required that, with few exceptions, a permit for a wastewater treatment plant should also include a reclaimed water feasibility study. In 1989, FDEP created reclaimed water rules in FAC Chapter 17-610, which incorporated elements of EPA's natural resource protection guidance documents. In 1993, FDEP changed the numbering of its rules from Title 17 series to Title 62 series and redefined and expanded reclaimed water rules in FAC Chapter 62-610, "Reuse of Reclaimed Water and Land Application." Chapter 62-610 is intended to be used in conjunction with FAC Chapter 62-600, "Domestic Wastewater Facilities."

FAC Chapter 62-610 provides design and permit application requirements, as well as operation and maintenance criteria for reuse and land application systems that may discharge reclaimed waters or domestic wastewater effluent to groundwater. Reuse and land application are divided into five categories, as listed below:

- Slow-rate land application systems including public access areas, residential irrigation, and edible crops that will be peeled, skinned, or cooked.
- Slow-rate land application systems with restricted public access such as farmlands.
- Rapid-rate land application system such as rapid infiltration basins (RIBs).
- Groundwater recharge and indirect potable reuse systems.
- Overland flow systems with final reclaimed water used for a beneficial purpose.

FAC Chapter 62-610 also defines reclaimed to wetlands projects as reclaimed water projects if there is a detailed document demonstrating that the reclaimed water is utilized to create, restore, or enhance the wetlands. The rules associated with wetlands projects are further defined in FAC Chapter 62-611, "Wetlands Application."

The FDEP permits for IRC WWTFs authorize the reuse of reclaimed water for slow-rate public access application systems, Bent Pine RIBs and Plant RIBs sites, and for maintenance of IRC's constructed wetlands, which are permitted under the West WWTF Permit.

In the case of the IRC West WWTF Wetlands, the permit for the wetlands amended to restrict wetlands use from average loading limits of nitrogen and phosphorus to loading concentration limits of nitrogen and phosphorus, which are the more stringent of the two monitoring requirements.

3.3.1.1 Reclaimed Water Quality

Each of the five categories for land application of reclaimed water, as listed above, have specific requirements for the quality parameters of the reclaimed water. The guidelines for determining water quality criteria of reclaimed water for each land application category are defined in FAC Chapter 62-610. FAC Chapter 62-611 defines the guidelines for determining the water quality criteria for reclaimed water that is discharged to a treatment wetland. The guidelines in these two FAC chapters, in conjunction with the Engineering Report and other permit application documents, are used to determine the final wastewater effluent quality parameters that are defined in each FDEP Domestic Wastewater Facility Permit. These requirements set the treatment processes required within the WWTF.

For public safety, FDEP requires high-level disinfection of reclaimed water at WWTFs. Per FAC Chapter 62-600, high-level disinfection is defined as meeting the following criteria:

- Over a 30-day period (monthly), 75 percent of the fecal coliform values must be below detection limits.
- No sample shall exceed 25 fecal coliform values per 100 milliliter (mL) of sample.
- No sample can exceed 5.0 milligrams per liter (mg/L) of total suspended solids (TSS) prior to disinfection.
- A total chlorine residual of at least 1.0 mg/L must be maintained throughout the disinfection process.

The reclaimed water quality requirements for each of the three IRC WWTFs and for the created wetlands adjacent to the West WWTF are summarized by application categories in Table 3-1 and Table 3-2 below.

Table 3-1: Reclaimed Water Quality Requirements for Public Applications and RIB Sites

Parameter	Units	Max/Min	Statistical Basis	Central WWTF	West WWTF	South WWTF
Flow Allocation	MGD	Max	Annual Average	6.75	6.67	2.45
BOD, Carbonaceous 5-day, 20C	mg/L	Max	Annual Average	20	20	20
		Max	Monthly Average	30	30	30
		Max	Weekly Average	45	45	45
		Max	Single Sample	60	60	60
Solids, Total Suspended	mg/L	Max	Single Sample	5	5	5
Coliform, Fecal	#/100 mL	Max	Single Sample	25	25	25
Coliform, Fecal, percent less than detection	percent	Min	Monthly Total	75	75	75
pH	s.u.	Min	Single Sample	6	6	6
		Max	Single Sample	8.5	8.5	8.5
Chlorine, Total Residual (for Disinfection)	mg/L	Min	Single Sample	1	1	1

Definitions:

MGD = million gallons per day

BOD = biochemical oxygen demand

s.u. = standard units

Table 3-2: Reclaimed Water Quality Requirements for Wetlands Application for IRC WWTFs

Parameter	Units	Max./Min	Statistical Basis	West (R-001)	South (R-003)	Wetlands
Flow	MGD	Max	Annual Average	4	2	4
BOD, Carbonaceous 5-day, 20C	mg/L	Max	Annual Average	10	10	3
		Max	Monthly Average	12.5	12.5	3.75
		Max	Weekly Average	15	15	4.5
		Max	Single Sample	20	20	6
Solids, Total Suspended	mg/L	Max	Annual Average	10		3
		Max	Monthly Average	12.5		3.75
		Max	Weekly Average	15		4.5
		Max	Single Sample	20	5	6
Coliform, Fecal	#/100 mL	Max	Monthly Geometric Mean	200	75	
		Max	Annual Average	200		
		Max	Single Sample	800	25	Report
pH	s.u.	Min	Single Sample	6	6	6
		Max	Single Sample	8.5	8.5	8.5
Chlorine, Total Residual (for Disinfection)	mg/L	Min	Single Sample	0.5	1	
Nitrogen, Total	mg/L	Max	Annual Average	6	6	Report
		Max	Monthly Average	7.5	7.5	
		Max	Weekly Average	9		
		Max	Single Sample	12	12	
	lb/yr	Max	Monthly Average			41.7
		Max	Weekly Average			50
		Max	Daily Average			66.7
		Max	Annual Average			2,838
Phosphorus, Total (as P)	mg/L	Max	Annual Average	0.75	0.75	Report
		Max	Monthly Average	0.94	0.94	
		Max	Weekly Average	1.125		
		Max	Single Sample	1.5	1.5	
	lb/yr	Max	Monthly Average			4.2
		Max	Weekly Average			5
		Max	Daily Average			3.7
		Max	Annual Average			159

Definitions:
lb/yr = pounds per year

3.3.1.2 Reuse System Quantities

Along with defining reclaimed water quality, FDEP Domestic Wastewater Facility Permits also define the quantity in MGD of reclaimed water that can be applied per reuse application or disposal type. Typically, the total of these quantities exceeds the design capacity of the associated WWTF. Once the 3-month average daily flow exceeds 50 percent of the permitted capacity of the reclaimed water and disposal systems, or 50 percent of the permitted capacity of the treatment plant, a capacity analysis report must be submitted to FDEP. In some cases, FDEP will include alternative reclaimed water sources in the permit that could provide supplemental water for reclaimed water systems. See Table 3-3 for permitted treatment and reclaimed water system capacities for each IRC WWTF.

Table 3-3: Permitted Treatment and Reuse Capacities for Indian River County WWTFs

WWTF	Permitted Treatment Capacity (MGD)	Permitted Reclaimed water/Disposal (MG)				
		On-Site Reject	Wetlands	RIBs	Public Access Reuse	Total Reuse
West	6	0.1	4	14	6.57	24.67
South	2	0.45	2	14	2	18.45
Central	4	0.4	0	15.5*	6.35	22.25

*Includes Bent Pine RIBs Cell #1

3.3.1.3 Wet Weather and Reject Storage Requirements

FAC Chapter 62-610 defines the storage requirements for two reclaimed water scenarios-equalization for reclaimed water systems with defined application sites and storage for systems with insufficient application sources. For equalization systems, the storage provisions are required to be evaluated and documented in the Engineering Report that is submitted with the permit application. These provisions are reviewed by FDEP to ensure that diurnal cycles have been considered and that sufficient storage capacity is provided for conditions that could affect land application such as weather and maintenance.

For systems with insufficient disposal resources, system storage capacity is required to be three times the effluent volume. Additionally, reject storage requirements include 1 day of storage equal to the annual average daily demands of the reuse system. An inventory of the storage systems must be maintained and any modifications to the inventory must be submitted to the FDEP for approval before they can be utilized.

For IRC, the Bent Pine RIBs, on-site RIBs, and the North Reuse Facility storage tank currently provide sufficient storage for equalization of the effluent from all three WWTFs. Table 3-4 shows a summary of the storage available for IRC wet weather and reject water storage.

Table 3-4: Indian River County Wet Weather and Reject Water Storage

Location	Storage Capacity (MG)
On-Site RIBs at South WWTF	0.5
On-Site RIBs at West WWTF	0.1
Reject Storage Tank at Central	0.7
Bent Pine RIBs (Cell 1)	1.5
Bent Pine RIBs (Cells 2 - 7)	14.0
North Tank	3.0
West Existing Wetlands	4.0
Total Storage/Disposal	**23.8**

3.3.1.4 Application Site Requirements

FDEP also permits new or expanded reclaimed water application systems. The owner of the land application site is the permit applicant, i.e., golf courses and agricultural site owners. The permit request must include an Engineering Report that contains information on the boundaries of the reuse or land application project, anticipated land uses for the next 10 years within 1 mile of the site boundaries, type of disposal facilities, hydraulic loading, and water balance calculations. FAC Chapter 62-610 lists the design, operation, and long-term maintenance requirements that must be documented for application site approval. These requirements include a minimum hydraulic capacity of 1.5 times the maximum daily flow, posting of signs, and protection of potable water through cross-connection control devices.

Disposal to sites that drain to a surface water require additional application information and extensive Engineering Reports. This requirement includes stormwater ponds and golf course irrigation storage ponds that could overflow to surface waters. Permitting of these ponds often include restrictions on nutrient loading and minimum wet weather volumes, which can prohibit their use for reclaimed water storage.

IRC WWTFs are permitted to provide reclaimed water for public use, such as golf courses and land applications, RIBs, and wetlands application sites.

3.3.1.5 Injection Well Requirements

As discussed in Section 3.2 and per SDWA, EPA is responsible for the protection of underground water sources including the injection of wastewater effluent. Permitting responsibility has been delegated to FDEP and the permit requirements for the disposal of reclaimed water through injection wells are included in FAC Chapter 62-610. These requirements are extensive and even the injection of high-quality effluents is restricted as it could cause movement within the aquifer and shift contaminants toward drinking water sources. In addition, the following criteria must be met to be:

- Wastewater effluent must contain less than 3,000 mg/L of TSS

- Wastewater effluent must meet primary drinking standards
- Must include a 1-year pilot study
- Must be located at least 1,000 feet from the nearest drinking water well

The Engineering Reports necessary to obtain an underground injection well permit are extensive and include proof that injection would not cause movement in the aquifer, or that, if there was movement, it would not be detrimental to adjacent water users or water sources. There are cases where injection of reclaimed water is considered beneficial such as when reclaimed water is used to create a barrier against saltwater intrusion. Potential changes to the restrictions on injection of reclaimed water are discussed in Section 3.5 of this document.

Currently, IRC does not utilize an injection well for effluent disposal.

3.3.2 FDEP Water Management Districts

In 1972, the Florida Water Resources Act created regional water management districts within FDEP. Water management districts focus on the protection of Florida's natural resources, including protection and conservation of water sources, management of water usage, stormwater and flood management, and stewardship of natural systems. IRC is located in the St. Johns River Water Management District (SJRWMD), which is headquartered in Palatka, Florida.

As part of its charter, SJRWMD's policy is to implement reuse to the maximum extent feasible and provide greater availability of reclaimed water district-wide. This is accomplished through incorporation of reuse implementation requirements in permit requirements and through funding of water conservation projects as stated in Florida Statute 373.250. The permits most associated with reuse implementation, CUPs and Environmental Resource Permits (ERP), are discussed below.

As part of their mandate to protect water sources, SJRWMD is influential in determining reclaimed water disposal methods and nutrient loading rates associated with disposal in stormwater and irrigation ponds. Isolated ponds that do not directly or indirectly drain to surface waters can be designated as disposal sites for reclaimed water as long as it does not affect the pond's ability to provide wet weather volume. However, for ponds that drain to surface waters, reclaimed water must meet advanced waste treatment (AWT) as defined in Florida Statute 403.086. AWT standards require reclaimed water have received high-level disinfection and must not exceed (on an annual average basis) the following concentrations:

- 5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) - 5 mg/L
- Suspended Solids - 5 mg/L
- Total Nitrogen, expressed as N - 3 mg/L
- Total Phosphorus, expressed as P - 1 mg/L

3.3.2.1 Consumptive Use Permits

Included in the responsibilities of the water management districts is permitting of water supply systems through CUPs. These permits establish the type of supply (groundwater, surface water, etc.), water uses, and the capacity of the system. Residential wells are exempted from this permitting process. CUPs also include a water conservation plan and require the use of reclaimed water or stormwater when available. If reclaimed water is available, non-potable water users are generally required to utilize reclaimed water prior to being allocated water from other sources.

IRC WWTFs are allowed by permit to provide reclaimed water to land application sites that may currently have CUPs for water supply or may be in the process of obtaining or renewing CUPs. If IRC's reclaimed water system is available and provides sufficient pressure for irrigation equipment, SJRWMD will require the use of IRC's reclaimed water system as the first option for water supply as a condition for obtaining a CUP for the land application site.

3.3.2.2 Environmental Resource Permits

Water Management Districts are also responsible for ERPs. The intent of an ERP is to ensure that changes due to new construction and/or the activities associated with new construction do not adversely affect the environment. These permits are intended to protect wetlands and conservation areas, prevent flooding, and ensure source water quality. ERPs are required for all construction projects and require an operations and maintenance plan upon completion of construction. These permits can influence wastewater disposal as quantities could be increased as construction runoff is directed to sewer collection systems instead of storm drains, which can influence both the quantity and quality of the reclaimed water. A significant change in the quality of the reclaimed water may restrict disposal sites while an increase in reclaimed water could overtax wet weather storage.

3.3.3 Division of Environmental Assessment and Restoration

FDEP's DEAR works in collaboration with key stakeholders to develop and implement BMAPs. IRC is one of the stakeholders associated with the Central IRL BMAP. The Central IRL BMAP was finalized in January 2013. This BMAP represents a long-term plan to restore deeper water seagrass habitats in the IRL Basin through the reduction of watershed loadings of total nitrogen (TN) and total phosphorus (TP) (nutrients). Although it appears that the loss of the seagrass is associated with legacy TN and TP loads, removing the sources of nutrients from the lagoon's watershed is expected to remediate the legacy load.

The current IRL BMAP does not require that IRC make additional nutrient reductions through wastewater treatment as the County currently meets requirements for reclaimed water disposal, thus is already meeting the discharge limits for reuse as set by the BMAP. The majority of the BMAP projects assigned to IRC are associated with management and cleaning of stormwater runoff.

3.4 Local Requirements

Local regulations associated with reclaimed water and reclaimed water systems vary throughout the State of Florida. The regulations typically address the requirements associated with new construction, the rate structure associated with the use of reclaimed water, and the standards associated with the installation of reclaimed water systems. Local regulations can be found in multiple locations but are typically summarized in the municipalities' building codes, permitting requirements, and/or the utilities' technical guides.

In June 2018, IRC adopted the Indian River County 2030 Comprehensive Plan, Chapter 3A: Sanitary Sewer Sub-Element. The recommendations within this plan are included in IRC's Land Development Regulations (LDR).

The LDR contains the following requirements for new commercial developments:

> The developer of a project estimated to have a peak irrigation demand of ten thousand (10,000) gallons or more per day shall construct effluent re-use lines on-site and off-site, as required by the county utility services department, when the development project:
>
> a. Lies within the urban service area, and
>
> b. Lies within one (1) mile of an effluent re-use line or a facility that is available to supply re-use water to the project, as determined by the county utility services department.

The LDR contains the following requirements for new residential developments:

> All new residential subdivisions and residential projects of twenty-five (25) or more lots/units located within one-quarter (¼) of a mile of an effluent re-use line that is available to supply re-use water shall connect the project to the re-use line and make re-use water available as a source of irrigation water within the project. Re-use water shall be considered available if the county utilities services department can guarantee that an amount of re-use water sufficient to meet the irrigation needs of the project will be available and if the county utilities services department agrees to incorporate that guarantee into a negotiated agreement between the project developer and the county utility services department. Connections to the re-use system and development of re-use service infrastructure shall be approved through the county utility services department.

IRC does not currently collect revenue from all of its reclaimed water system customers. This may be due to the perception that IRC is utilizing irrigation ponds for disposal only and golf courses are maintaining their own irrigation pumping systems. However, per Florida Statute 403.064 and FAC 62-610.800, reclaimed water suppliers are encouraged to meter the use of reclaimed water in order to generate revenue as a means to maintain and operate reclaimed water systems.

3.5 Upcoming Regulatory Changes

Two State Bills were introduced in 2020 with potential impacts to IRC's reclaimed water system - Senate Bill 712, Environment Resource Management (also known as the "Clean Waterways Act"), and House Bill 715, Reclaimed Water. Senate Bill 712 was signed into law and went into effect on July 1, 2020 while House Bill 715 was withdrawn in the Appropriations Sub-Committee but portions addressed briefly in the Clean Waterways Act.

As of January 2021, one new piece of legislation has been introduced: Senate Bill 64, Reclaimed Water. This bill is still working its way through the Committees but, if enacted, will significantly curtail surface water discharge throughout the State. All of these Bills are summarized and their significance to IRC are discussed below.

3.5.1 Senate Bill 712, the Clean Waterways Act, 2020

Senate Bill 712 addresses numerous environmental issues, mostly those associated with BMAPs. These environmental issues include the creation of septic remediation plans by local governments in specific BMAPs and a requirement that all reclaimed water that may discharges into a surface water body meet AWT Standards. The Bill also requires that FDEP initiate rule revisions based on recommendations from the Potable Reuse Commission (PRC) as discussed in Section 3.5.2.

Since IRC's Comprehensive Plan addresses septic remediation, IRC appears to meet the intent of the Bill and may be eligible for funding associated with implementation of their septic-to-sewer program. An initial reading of the Bill did not clarify the ongoing uncertainty associated with the legal enforcement of a requirement for residential owners of onsite septic tanks to connect to a municipal sewer collection system. This could undermine the implementation of septic-to-sewer plans across the State and make planning for WWTF expansions difficult to predict.

Currently, both the South and West WWTFs meet AWT standards. However, the Central WWTF does not and may require upgrades by 2025.

3.5.2 House Bill 715, Reclaimed Water, 2020

In 2018, the Potable Reuse Commission (PRC) was created to develop a framework for the expansion of potable reuse as an alternative water supply. In January 2020, the PRC published the final version of their report titled "Advancing Potable Reuse in Florida: Framework for the Implementation of Potable Reuse in Florida." The 174-page report can be downloaded at this link: PRC 2020 Report. This report discusses the challenges associated with potable reuse both in public perception and in assuring public health and provides potential solutions to these challenges. The report concludes with recommendations on regulatory changes.

This report was the basis for Florida House Bill Number 715 (House Bill 715). If enacted, this bill would have enabled FDEP to do the following:

- Designate potable reuse as an alternative water supply
- Make potable reuse projects eligible for alternative water supply funding
- Update rules and regulations to address the use of potable reuse
- Set the monitoring requirements for using potable reuse
- Set the point of compliance for potable reuse quality as the point of entry to the distribution system from the water treatment plant
- Set requirements for the use of reclaimed water for aquifer recharge

House Bill 715 passed the Florida House of Representative unanimously but died in the Senate Appropriation Committee. This was due to concerns noted in a January 2020 Report written by Carollo Engineers, Inc. (Carollo) at the request of the Florida Water Environment Association Utility Council. The report centered on both the timing and the costs of meeting the Bill's requirement to prohibit (with some exceptions) surface water discharges by January 2026. The costs associated with this requirement were considered prohibitive and thus the Bill was allowed to die in Committee.

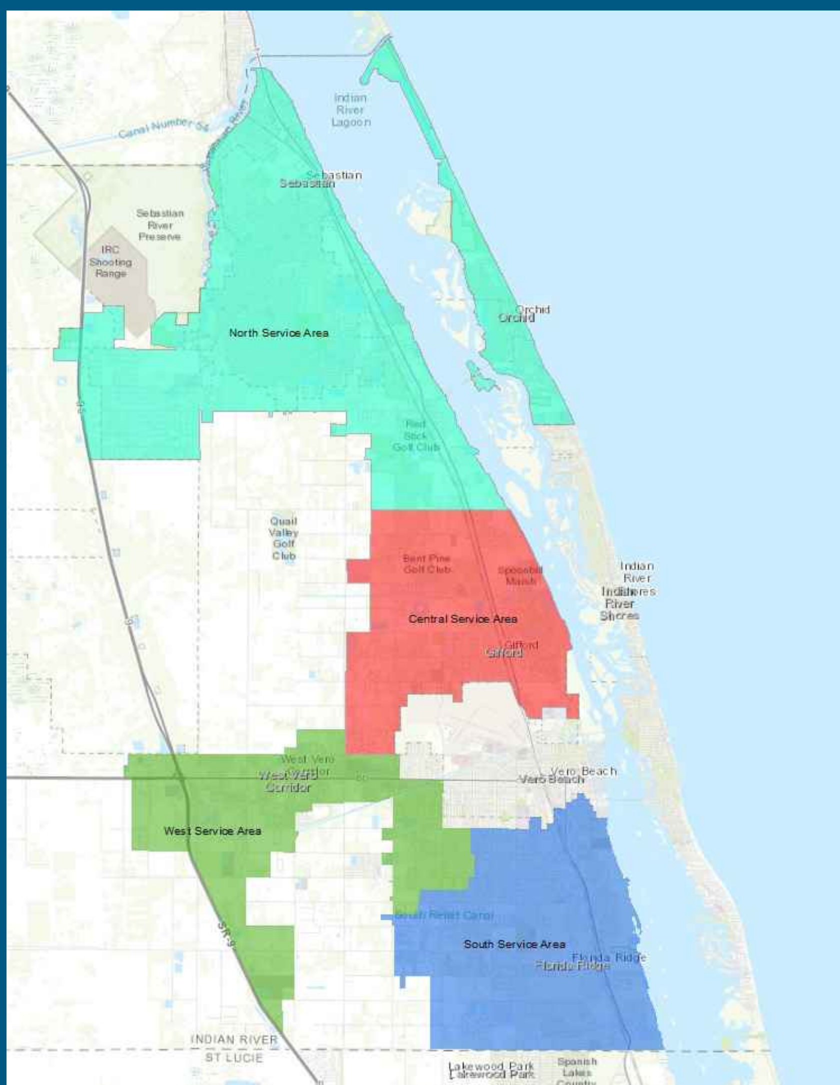
Fortunately, portions of House Bill 715 were included in the Clean Waterway Act (House Bill 712). In particular, the Clean Waterway Act declared reclaimed water as a raw water source for public water supply and mandated that FDEP initiate rule revisions based on the PRC 2020 Report by December 31, 2020. The implications of this legislation for IRC could be significant. The use of reclaimed water as a potable water source and aquifer recharge source provide options for reclaimed water use that may be more economically viable than creating a pressurized reclaimed water system and developing reclaimed water systems in existing neighborhoods. In addition, these options would provide access to alternative water supply funding that is not currently available to the County. Although implementation of potable reuse is several years out, IRC should consider potable water reuse options when evaluating future reclaimed water disposal methods.

3.5.3 Senate Bill 64, Reclaimed Water, 2021

Following the submittal of the Draft Version of this Master Plan, IRC requested that Atkins review the 2021 Senate Bill 64 (SB 64) to determine how it could affect IRC reclaimed water system. SB 64 is focused on surface water discharge. If passed, SB 64 would require wastewater utilities that dispose of reclaimed water through surface water discharge to "submit to the department for review and approval a plan for eliminating nonbeneficial surface water discharge within 5 years". Although there are exceptions to this requirements, the term "nonbeneficial surface water discharge" is not clearly defined and the exceptions are open to interpretation.

This legislation, if passed, could negatively affect IRC's current discharge from the wetlands at the West WWTF into the Indian River Lagoon beyond the current FDEP restrictions. However, SB 64 clearly allows for reclaimed water aquifer storage and recovery wells under the normal FDEP restrictions associated with recharge wells. This option along with the acknowledgement in Florida's 2020 Clean Waterway Act that reclaimed water is a potable water supply source provides a strong basis for IRC to be able to get a permit for deep injection wells as a disposal option for the reclaimed water at the West WWTF. A comprehensive report on the potential size, cost, depth and schedule for the permitting and construction of a deep injection well for IRC was prepared by JLA Geosciences and is included in Appendix F.

Hydraulic Modeling



Section 4

Section 4: Hydraulic Modeling

4.1 Introduction

There were several alternatives and scenarios evaluated using the hydraulic models. In addition to having each system operated for years 2019, 2025, and 2040 with the current and projected flows, there were additional alternatives developed to accurately reflect certain potential future operating conditions. Previously identified capital improvement projects, if they were identified as being hydraulically based, were evaluated for priority and timing as part of the modelled scenarios. This section discusses the development and calibration of IRCs reclaimed water system.

4.2 Hydraulic Model Development

A new reclaimed water hydraulic model was created of the County's reclaimed water distribution system using the Bentley WaterGEMS™ platform. County staff assisted in the update of the hydraulic model by providing their latest GIS data for pipes, topography layer, confirming operational data, facility as-built information, and supplying system demands. The following sections summarize the model updates completed for this project.

4.2.1 Model Pipe Update

The County's GIS data was used to create the reclaimed water distribution piping network in the model (i.e., diameters, lengths, and connectivity). A model connectivity review was preformed utilizing the County's ArcGIS Viewer after the pipe updates to confirm functionality.

Additionally, minor losses were calculated based on the as-built information provided and included at each pump station.

4.2.2 Reuse Water Demands

As presented in Technical Memorandum 1, the reclaimed water system consists of two types of demands; pond customer demands and pressurized customer demands. The pond users are primarily golf courses that accept reclaimed water into their stormwater pond system, which is then used for irrigation. The pressurized users receive reclaimed water demands directly from the reclaimed transmission mains. Table 4-1 presents the reclaimed water system demands.

Table 4-1: Reclaimed Water System Demands

Month	Pond Customer								Pressurized Customer		AADD (MGD)
	Grand Harbor Golf Course	Hawks Nest Golf Course	Sandridge Lakes Golf Course	Sandridge Dunes Golf Course	John's Island Golf Course	Redstick Golf Course	Orchid Island Golf Course	Indian River Country Club	Disney Vero Beach Resort Club	Bermuda Club	
AADD (MGD)	0.21	0.24	0.30	0.71	0.24	0.51	0.42	0.38	0.05	0.09	3.14

The model was updated to include the pond discharge assembly with losses and a reservoir to simulate the maximum pond water levels. Figure 4-1 displays the assembly that was included in the model. As shown on the figure, a throttle control valve is included in each pond discharge assembly. The throttle control valves is used to control flow delivered to each pond site. A valve characteristics curve was imported for each of the golf course pond sites to mimic pond fill operation in the hydraulic model. The characteristics curve was edited during calibration to match flow meter data provided from SCADA for each of the golf course sites. All pond filling flows in the model were within 5 percent of the SCADA information provided.

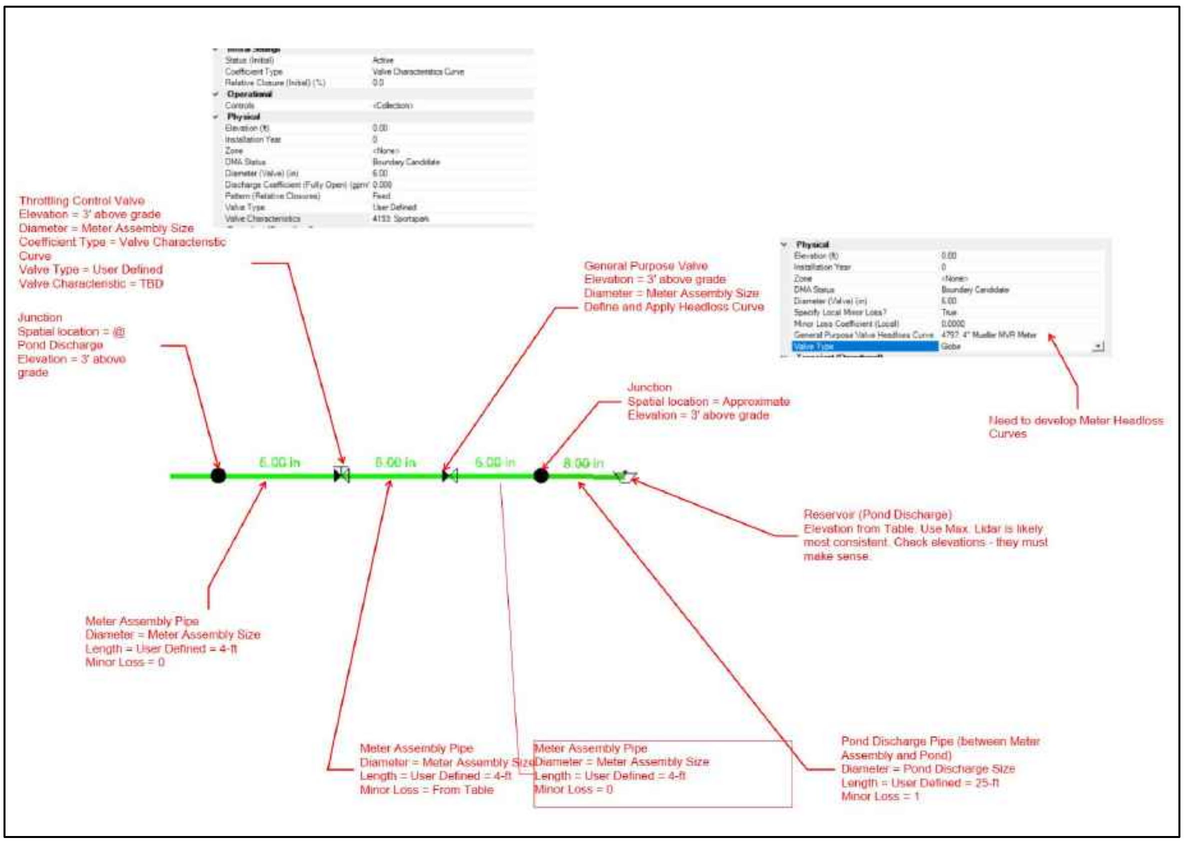


Figure 4-1: Pond Discharge Assembly

4.2.3 Hydraulic Model Validation

Validating a hydraulic model involves taking historical flow data from plants and observed behaviors of the system and applying them to the hydraulic model. The County provided information, and the existing (2019) hydraulic model was validated according to the appropriate method described in this section.

A 24-hour extended period simulation (EPS) was used to analyze the reclaimed water system. The County indicated several operating conditions that should be included when validating the reclaimed water model:

- The North Reuse Facility storage tank level is checked by operations at the beginning of the morning shift to determine whether the water level is below the valve open setpoint. If it is below the valve setpoint, reuse in needed to fill tank. To do so operations must close each pond valve. Once the storage tank is within 1 to 2 feet from reaching high water elevation (52.4 feet), operators must open the pond valves that are at a low water level. The tank fill valve cannot close when all pond site valves are closed. This will cause high pressure to build-up and line breaks will occur. With the available reuse site pond valves open the North Reuse Facility storage tank will not receive any reuse due to the water elevation in the tank. The North Reuse Facility storage tank influent valve can remain open during normal operations.
- The golf course flow discharges to a pond only when the valve is closed at the North Reuse Facility storage tank. Typically, the pond is filled within 24-hour period.
- The West and Central WWTFs direct flows to the North Reuse Facility storage tank.
- The South WWTF currently directs all reclaimed water to Indian River Club golf course pond. The South WWTF has the capability of transferring to the West WWTF wetlands on an as-needed basis.

Based on the above information, the diurnal demand curves were adjusted to match the current operation of the facilities. The system was the allowed to run within the model over 24-hour average day period. The North Reuse Facility storage tank was reviewed to see how it filled and emptied. The amount of flow available from the wastewater treatment plants was made consistent with that actually available from each plant. When the system was consistent with the current operating methods described by the operators, the system was assumed to be validated for the purposes of the Master Plan period.

4.2.4 Hydraulic Model Evaluation Criteria

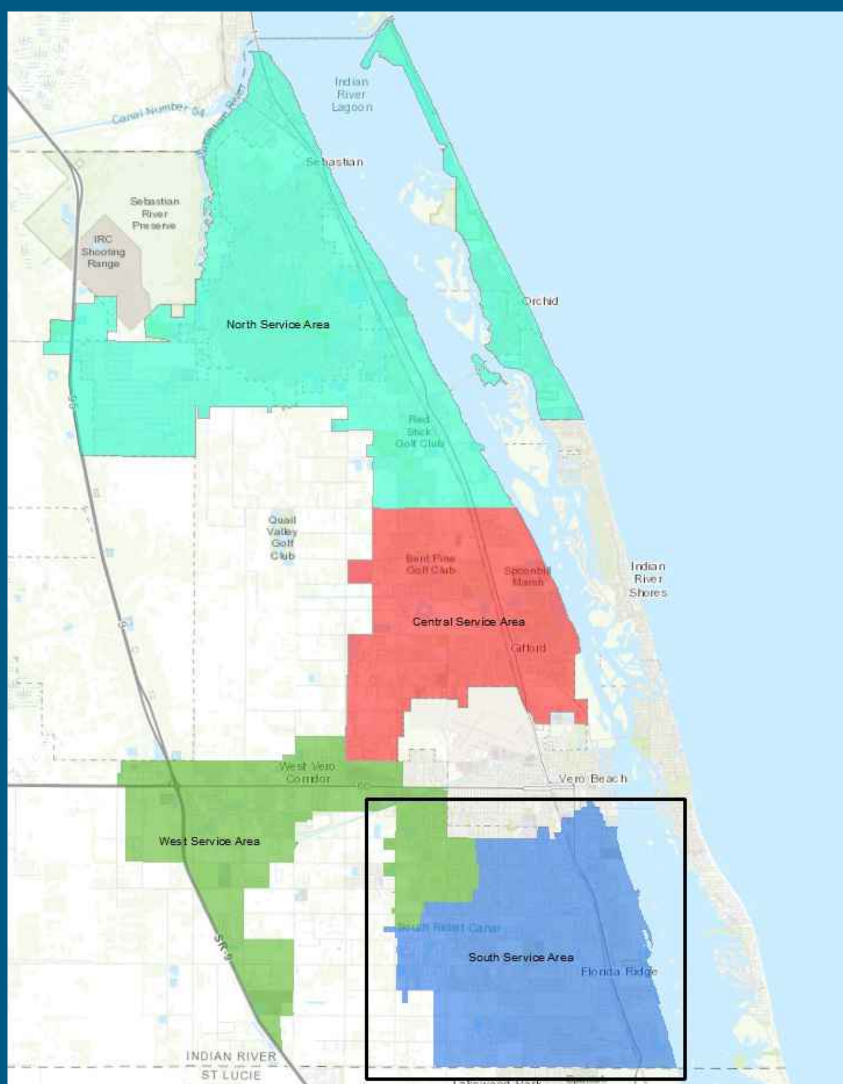
The level of service (LOS) that is provided to a community is the minimum standards applied to their utility system that can be delivered to a customer. For this evaluation, the LOS criteria were used to generate criteria to evaluate the results from the hydraulic model and the operations of various scenarios. This section describes the planning and operating criteria used in the evaluation of the reclaimed water distribution system relative to the existing, 2025, and 2040 projected demand conditions.

The planning criteria for the design and evaluation of potable water facilities in the County are based on existing system performance characteristics, past criteria used by the County, and current industry standards. Planning criteria include standards for demand peaking factors, system pressures, pipeline velocities, and booster pump stations. These criteria are the basis for evaluating reclaimed water system performance and determining facilities required to serve future developments. The criteria used to evaluate the performance of water facilities and proposed improvements are in Table 4-2.

Table 4-2: Reclaimed Water System Evaluation Criteria for the Hydraulic Model

Criteria	Level of Service
Maximum pressure at the high service pumps	95 psi
Maximum velocity during maximum day demands	10 feet per second (fps)
Minimum storage volumes	4 hours of peak flow
Peaking factors	South WWTF – 3.85 West WWTF – 2.50 Central WWTF – 1.73

South Regional Wastewater Treatment Facility Projected Flows and Alternatives Analysis



Section 5

Section 5: South Regional Wastewater Treatment Facility Projected Flows and Alternatives Analysis

Section 5 provides information and alternatives analysis associated with the South Regional WWTF (South WWTF). This Section is organized as follows:

- **Existing System**: Review of existing assets, including hydraulic capacities of pumps and transmission mains
- **Storage Capacity**: Review of available reclaimed water storage capacity
- **Comparison of Existing System to Projected Needs**: Review of the ability of the WWTF to meet projected reuse demands and/or transfer to storage and disposal
- **Wet Weather Event Analysis**: Defining a wet weather event at the Plant, followed by analysis of alternatives for operational management of wet weather events
- **Transmission System Review**: Results of hydraulic analysis of the existing transmission system, determining and defining hydraulic constraints, and providing options for improvements
- **Storage Requirements**: Defining storage requirements based on wet weather event analysis and transmission main improvements
- **Summary of Recommendations**: Summary of final recommendations for capital improvement projects associated with the South WWTF

The South WWTF is located at 2500 6th Avenue SW, Vero Beach, Florida. The plant has a permitted capacity of 2.0 million gallons per day (MGD) annual average daily flow (AADF) under FDEP Permit Number FLA010435. The service area for the South WWTF is shown in Figure 5-1.

There are currently three options for disposal of the reclaimed water produced at the South WWTF. These options are:

- Provide reclaimed water to Indian River Club
- Dispose of reclaimed water at on-site RIBs (limited to 0.45 MG)
- Transfer of reclaimed water to the West WWTF for repump and/or disposal

Projected supply and demands for the South WWTF, as determined in Section 2, are summarized below. The low flow rates are used to verify that anticipated reuse demands can be met while the high flow rates are used to evaluate storage and equipment needs.

Table 5-1: South WWTF Projected Influent Flows

	2019 AAD Flows (MGD)			2025 AAD Flows (MGD)			2040 AAD Flows (MGD)		
WWTF	Low	Median	High	Low	Median	High	Low	Median	High
South	0.71	0.71	0.71	0.59	0.72	0.83	1.68	1.94	2.16

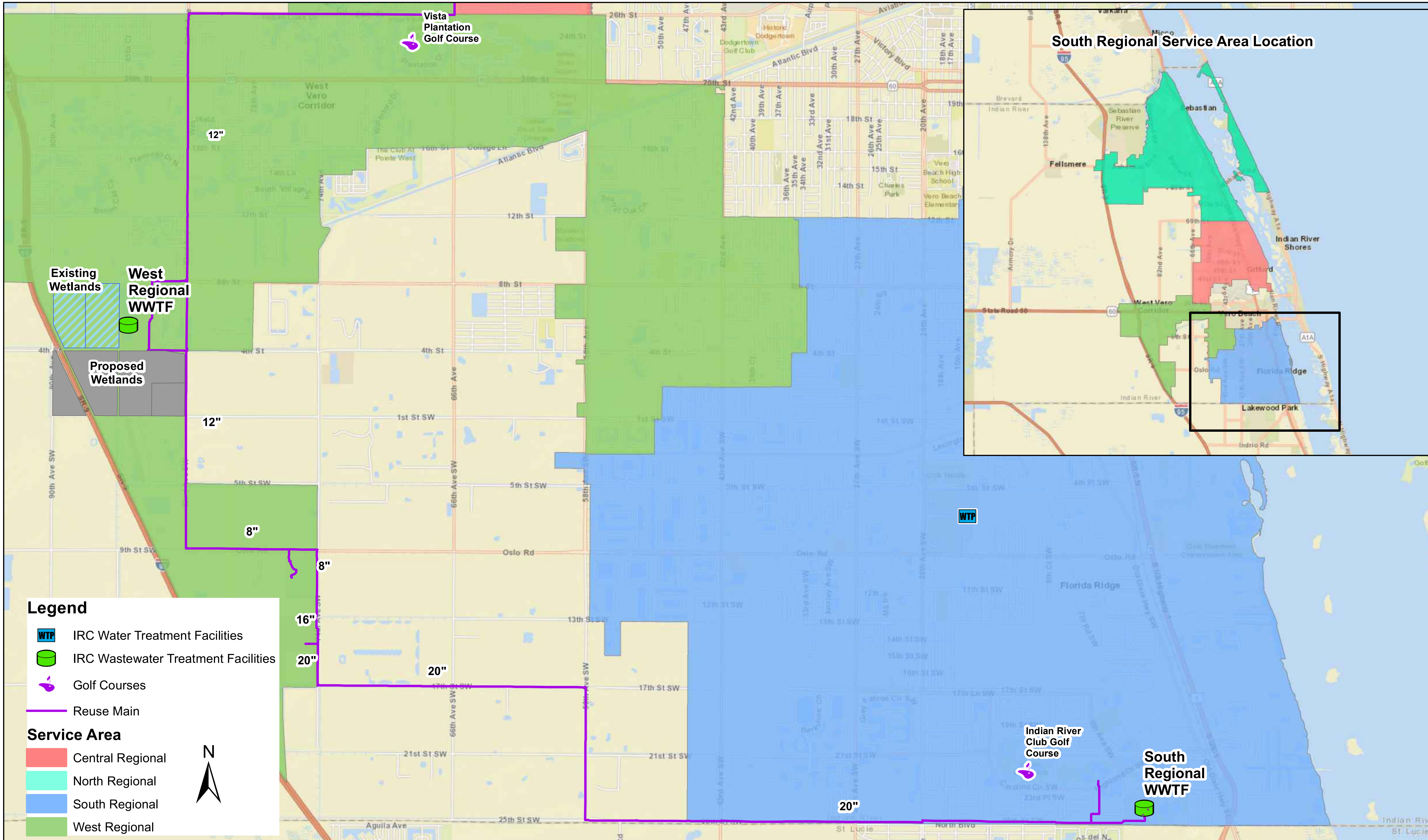


Figure 5-1 South Regional Reclaimed Water System

Table 5-2: South WWTF Projected Reclaimed Water Demands

	AAD Demand (MGD)		
WWTF	**2019**	**2025**	**2040**
South	0.38	0.38	0.74

Evaluation of the existing system in comparison to projected flow rates and wet weather requirements are discussed below and culminate in recommendations for improvements that may be needed at the South WWTF or in the associated distribution system through 2040.

5.1 Existing System

The reclaimed water assets associated with the South WWTF include three reclaimed water pumps, the transmission main from the plant to the West WWTF, and the valves and appurtenances associated with these assets. The transmission main includes the existing reclaimed water distribution pipe feeding the stormwater pond at Indian River Country Club and Golf Course. Table 5-3 summarizes the assets associated with the South WWTF reclaimed water system.

Table 5-3: South WWTF Reclaimed Water Assets

Reclaimed Water Pumps	
Type	Vertical Turbine
Quantity	3
Design Flow (gpm)	1,800
Design Flow (MGD)	2.6
Design Head (ft TDH)	242
Max. Actual Flow (gpm) – 2 pumps	1,200
Max. Actual Flow (MGD) – 2 pumps	1.7
Motor Size (hp)	100
Drive Type	Constant Speed
Year of Install	1999
Transmission Piping	
Pipe Diameter Range (in)	8–20
Pipe Material	PVC
Max Velocity per LOS Criteria (fps)	10
Max Recommended Flow* (gpm)	1,500
Max Recommended Flow* (MGD)	2.2

* Based on smallest-diameter pipe in the transmission line

The reclaimed water pumps were installed in 1999, rebuilt in 2014, and are currently in the process of being retrofitted with variable frequency drives (VFDs). Although the existing reclaimed water pumps are designed for 1,800 gpm (2.6 MGD), they are limited to a discharge flow 990 gpm (1.4 MGD) when one pump is running. Operations Staff noted that there is very little capacity gained through the use of a second pump and this was validated through hydraulic modeling. This is due to the hydraulic limitation caused by the high head loss in the 8-inch transmission main and by the increase in the water levels at the West WWTF Intermediate Pump Station from a low elevation of 31.25 feet to a high water elevation of 33.85 feet during peak hour flow events. The results of the hydraulic modeling of the operational scenarios for the existing South WWTF reclaimed water pumps are summarized in Table 5-4.

Table 5-4: South WWTF Existing Pumping Scenarios

South WWTF Reclaimed Water Pump Station Operation	West WWTF Intermediate Pump Station Water Elevation[1]	South WWTF Transfer Basin Water Elevation[2]	South WWTF Reclaimed Water Pump Station Flow and Pressure
1 Pump On	31.25	13	990 gpm @ 218 ft
1 Pump On	33.85	13	983 gpm @ 218 ft
2 Pumps On	31.25	13	1,253 gpm @ 230 ft
2 Pumps On	33.85	13	1,139 gpm @ 228 ft
1 Pump On	31.25	15	985 gpm @ 218 ft
1 Pump On	33.85	15	978 gpm @ 218 ft
2 Pumps On	31.25	15	1,205 gpm @ 230 ft
2 Pumps On	33.85	15	1,140 gpm @ 228 ft

[1] Water elevation at the West WWTF of 31.25 occurs during average daily flows and 33.85 feet during peak hour flows.
[2] Water elevation at the South WWTF of 13 feet occurs during average daily flows and of 15 feet during peak hour flows.
[3] Water elevation of 13 feet at the South WWTF occurs during average day and peak hour flows.

5.2 South WWTF Reclaimed Water Storage Capacity

Per FDEP, wastewater treatment plants are required to maintain storage/disposal capacity equivalent to three days of the high range of the AAD effluent volume, assuming no reuse demands. This allows for management of wastewater treatment effluent during wet weather events. Currently, the South WWTF has a small on-site RIB (0.45 MG) for disposal of reject water that can be utilized as wet weather storage. The remainder of the storage and disposal capacity is at the wetlands adjacent to the West WWTF or at Bent Pine RIBs. Both of these options require transfer of reclaimed water to the West WWTF where it is either directed to the wetlands or repumped to the Bent Pine RIBs site. **Table 5-5** below summarizes the available disposal options, the reclaimed water storage requirements and the surplus storage available in the system.

Table 5-5: South WWTF Reclaimed Water Storage/Disposal

	South WWTF Effluent Storage (MG)			
	2019	2025	2040	Notes
On-Site RIBs	0.45	0.45	0.45	
Wetlands at West WWTF	2.00	2.00	2.00	Capacity shared with West WWTF
Bent Pine RIBs	14.00	14.00	14.00	Capacity shared with other WWTFs
Total Permitted Storage	16.45	16.45	16.45	
Storage Required	2.13	2.48	6.49	3 days x AADF flows (high range)
Surplus Storage	**14.32**	**13.97**	**9.96**	

5.3 Comparison of Existing System to Projected Needs

Although no additional storage is required through 2040 to meet the FDEP regulation, the majority of the storage/disposal capacity for the effluent flow from the South WWTF is dependent on transferring the effluent to the West WWTF. Figure 5-2 shows a comparison of the anticipated reclaimed water flows to the existing pump capacity.

This graph shows that the existing pump capacity is sufficient to meet the projected high flows through 2030. However, that does not take into consideration the management of peak hour or wet weather events.

Since the South WWTF does not currently have on-site storage to attenuate peak flow, all of the flow must be transferred to the West WWTF for disposal or further transfer to reuse customers.

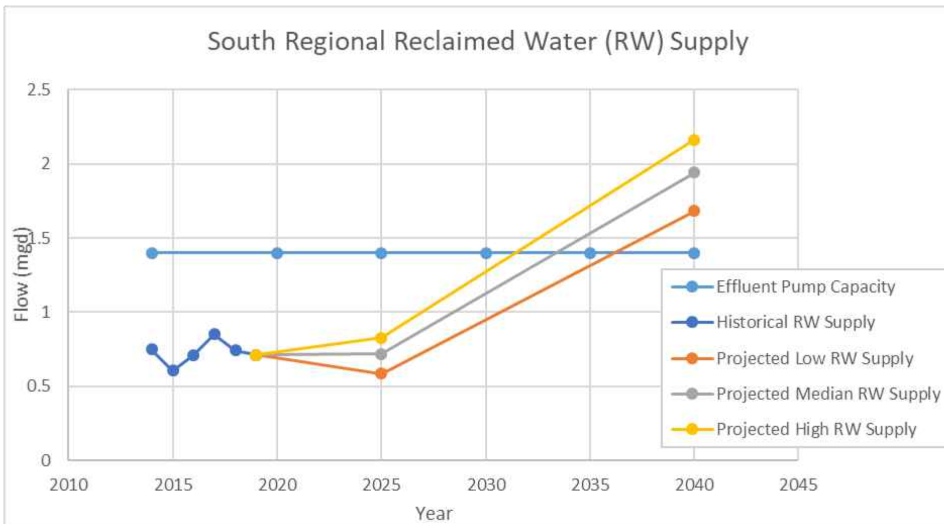


Figure 5-2: South WWTF Reclaimed Water Supply Projections versus Pump Capacity

Peak hour flows (as determined in Section 2) range from 1,900 gpm to almost 5,800 gpm in 2040. However, the existing reclaimed water pumps have an average capacity of 1.6 MGD (1,100 gpm). This results in an excess of flow at the South WWTF during peak hour as shown below in Table 5-6. Note that the excess volumes are based on the capacity of the existing pumps and will change based on future pump capacities. The results for 2019 have been verified through discussions with IRC Staff.

Table 5-6: South WWTF Surplus Volume During Peak Hour

	2019	2025	2040
Peak Hour Flows (gpm)	1,902	2,212	5,781
Average Flow to West WWTF	1,100	1,100	1,100
Remaining Peak Hour Flow (gpm)	802	1,112	4,681
Volume Accumulated over 1 hour (gal)	48,109	66,719	280,852

The challenges associated with managing projected AAD flows and peak hour flows at the South WWTF are exacerbated during a wet weather event. Therefore, the evaluation of options for meeting wet weather events, as discussed below, also provides solutions for managing projected daily flows and peak hour flows.

5.4 Results of Wet Weather Event Analysis

Wet weather events are typically managed through hydraulic equalization in which excess flows are stored until pump capacity is available. This practice allows for consistent effluent flows, reducing the need to size pumps for temporary peak flow conditions, and lessens the chance of negative downstream events, such as overloading treatment processes and equipment or overflowing existing structures or ponds. In this case, providing consistent flow rates from the South WWTF to the West WWTF reduces the operational concerns and equipment requirements at the West WWTF.

To ensure that storage and pumping needs for a wet weather event are fully addressed, the following assumptions were made:

- On-site RIB is full and not available for use
- There is no reuse demand during this period

Prior to looking at options for storage or disposal of flows during wet weather events, an evaluation of the use of the existing pumps for equalization was conducted as pump capacity is directly related to storage requirements. Independent of how the excess flow during a 4-hour peak flow event is stored, the pumps will need to have enough excess capacity to transfer the stored flows over a set amount of time and the higher the pump capacity, the less storage volume of storage. Because of the diurnal nature of wastewater treatment facilities, there are typically 6 to 8 hours of low flows between 11 pm and 7 am each night. During this period, the reclaimed water pumps have surplus capacity that can be utilized to transfer stored flow to the West WWTF.

To ensure that there is storage available for future storm events, to maintain reclaimed water quality and to ensure reuse demands can be met, it is assumed that the stored reclaimed water will need to be transferred within 48 hours. Therefore, there must be sufficient pump capacity beyond the plant AADF levels to transfer the stored reclaimed water over a period of 6 hours over two nights for 12 hours total. (Note that this is a very conservative number as the low flow periods are typically well below the AADF.)

Below in Table 5-7 are results of this analysis. Storage requirements are based on peak hour volumes as defined in Section 2.

Table 5-7: South WWTF Pump Capacity for Equalization

	2019	2025	2040
Storage Required for 4-hour event (gal)	192,436	266,876	1,123,406
Average Pumping Capacity (gpm)	1,100	1,100	1,100
AAD High Flows (gpm)	494	575	1,502
Remaining Pumping Capacity (gpm)	606	525	
Time to empty storage tank (hr)	5.29	8.46	

Table 5-7 shows that there is currently sufficient surplus pumping capacity to provide transfer for stored peak hour flows within a 12-hour period through 2025. However, by 2040, the existing AAD flow rates will exceed the existing pump capacity and alternative options for managing wet weather events will be required.

Implementing wet weather management options will take time to design, permit, and construct. Therefore, it was important to determine the flow rate for which AADF into the South WWTF would be beyond the capacity of the existing pumps to transfer excess peak hour volumes within 12 hours as discussed above. This flow rate, or "Threshold Capacity," is presented in Table 5-8. Utilization of the threshold capacity assists in determining the time remaining for implementation of alternatives.

Table 5-8: South WWTF Peak Hour Threshold Capacity for Wet Weather Management Options

	2019	2025	Threshold Capacity	2040
High AAD Flow (MGD)	0.71	0.83	0.90	2.16
Peak Hour at PF = 3.85 (MGD)	2.74	3.19	3.47	8.32

	2019	2025	Threshold Capacity	2040
Peak Hour Flows (gpm)	1,902	2,212	2,406	5,781
Average Flow to West	1,100	1,100	1,100	2,700
Remaining Peak Hour Flow (gpm)	802	1,112	1,306	3,081
Volume Accumulated over 1 hour	**48,109**	**66,719**	**78,366**	**184,852**

	2019	2025	Threshold Capacity	2040
Storage Required for 4-hour event (gal)	192,436	266,876	313,463	739,406
Pump Capacity (gpm)	1,100	1,100	1,100	2,700
High Flows (gpm)	494	575	625	1,502
Remaining Pump Capacity (gpm)	606	525	475	1,198
Time to empty storage tank (hr)*	5.29	8.46	11	10.28

*Limited to 12 hours

Table 5-8 shows that the threshold capacity for instituting improvements to existing assets at the South WWTF is at 0.9 MGD AADF. As shown in Figure 5-2, this capacity is anticipated to be reached between 2029 and 2033 depending on growth in the South WWTF service area. The increase in capacity of the existing pumps to 2,700 gpm in 2029 sets the storage requirement for a wet weather event in 2040 at ~750,000 gallons (0.75 MG).

5.4.1 Analysis of Wet Weather Management Alternatives

Multiple options for the management of wet weather events at the South WWTF were evaluated. Table 5-9 summarizes the most viable options along with the benefits and challenges of each. Although it is not listed, a storage facility will be required for equalization. As previously discussed, storage requirements are directly related to the final choice of management options and are, therefore, based on the final recommendation for management of wet weather events.

Table 5-9: South WWTF Wet Weather Management Options

				Increased Capacity	
Option	**Description**	**Benefit**	**Challenge**	**gpm**	**MGD**
1	Increase pump capacity to maximum allowable flow in existing transmission main.	Utilizes existing infrastructure. Provides time to upgrade transmission line or negotiate DPR.	Existing transmission main restricts flow to 1,500 gpm. Does not provide sufficient flow past 2027.	420	0.6
2	Increase size of 8" transmission main	Increase pump station capacity to as design intended.	Requires construction of ~10,000 LF of new main. All 8" diameter pipe must be replaced to meet capacity requirements.	3,500	5.0
3	Create direct potable reuse system by transferring reclaimed water to nearby WTP.	Reduces quantity of water transferred to West WWTF. Provides opportunity to showcase technical expertise. Potential alternative funding source available.	Legislation is not currently in place. Requires ~2 miles of new transmission main. High probability that upgrades to WTP will be necessary. May require additional storage during low potable water demand periods.	1,400	2.0
4	Construct deep injection well	FDEP has been reluctant to permit deep injection wells but upcoming regulatory actions and discussions on aquifer recharge are making stronger case for use of deep injection wells. Reduces/removes disposal concerns during wet weather events. Provides most flexibility for operations.	Wells must be taken off-line every five years to conduct mechanical integrity tests. Alternative storage is required for at least a 5 day period at that time. Monitoring wells are required. High capital costs.	694	1.0

Although Option 1 could provide additional time to implement other Options, it does not provide the pump capacity required through 2040. Therefore, Option 1 was is not recommended. At the request of IRC, further analysis of Option 2 was performed, and the results were favorable as summarized in the next section.

It is important to keep in mind that all reclaimed water leaving the South WWTF will transfer to the West WWTF during a wet weather event as existing South Service Area reuse customers may not be capable of accepting reuse. This additional flow will need to be addressed at the West WWTF. Therefore, Options 3 and 4 may become critical following the evaluation of the West WWTF reclaimed water system. For this reason, a more-comprehensive review was made.

Options 3 and 4, as listed in Table 5-9, although viable, also have challenges. Although the costs for Option 3 (create direct potable reuse system) are associated with transmission mains and pump station modifications, Option 3 has hidden costs such as long-term wet weather storage requirements and water and wastewater treatment plant process improvements. However, if an agreement can be reached that ensures that the reclaimed water is the first option for raw water supply and the existing treatment processes are sufficient to treat reclaimed water, Option 3 is a viable option for reducing the amount of re-pumping required in the County's reclaimed water system. In addition, FDEP may allocate alternative funding for this option as part of their mandate under the Clean Waterway Act as discussed in Section 3.

Option 4 (deep well injection) has the highest capital costs of these two options due to the depth of the well, the need for a pilot well and potential need for monitoring wells. The return on investment for the small disposal requirement of 1 MGD would not be viable. However, this option does provide the most flexibility for operations. Should there be an increase in reuse demands, the amount disposed into the well can be reduced and vice versa. The permitted quantity of reclaimed water injected into the well will be set at an average annual daily flow rate, which would allow for injection at higher rates during storm events.

5.5 Hydraulic Analysis of Improvements to the Reclaimed Water Transmission System

As mentioned previously, the transmission main between the South WWTF and the West WWTF consists of 8-inch to 20-inch-diameter pipe. A 20-inch reclaimed transmission main leaves the South WWTF and continues until turning into a 16-inch then an 8-inch transmission main for approximately 11,000 linear feet. The 8-inch pipe was previously a wastewater force main that was exchanged with an existing 16-inch reclaimed water main. The 16-inch-diameter pipe was needed to alleviate lift station issues in the wastewater collection system. Since the capacity was not required for the reclaimed system at the time, the County opted for a time and cost savings approach and repurposed the 16-inch main.

The 8-inch transmission main poses a hydraulic limitation in the future modeling scenarios simulated. There is extensive headloss in the system and it limits the existing pumps to a 1,186 gpm total pumping capacity with two pumps running. The pump station has a design capacity of 1,800 gpm and would be capable of performing at a higher capacity if the hydraulic limitation was removed. Hydraulic calculations modeled the existing 8-inch transmission main as well as increasing the line size to 12-inch- or 16-inch-diameter. Modeling results are presented in Table 5-10.

Table 5-10: South WWTF Transmission Main Hydraulic Analysis

South WWTF Transmission Main Replacement Sizes	Existing South WWTF Reclaimed Water Pump Station Flow and Pressure [1, 2]	Transmission Main Velocity (fps)	Transmission Main Headloss (feet)
8-inch	1,186 gpm @ 229'	7.6	186
12-inch	2,150 gpm @ 215'	6.1	103
16-inch	2,800 gpm @ 201'	4.4	41

[1] Two reclaimed water pumps in operation at the South WWTF reclaimed water pump station.
[2] High Water Level (33.85) set at the West WWTF Intermediate Pump Station.

The model scenarios concluded that increasing the 8-inch line to a 16-inch-diameter transmission main increased the pumping capacity of the existing pump from approximately 1,186 gpm to 2,800 gpm (two pumps in operation), while decreasing the energy loss in the system. This also allows the pumping capacity to provide transfer for stored wet weather flows within a 12-hour period through 2040. However, the existing pumps are approaching the end of their useful life and should be fully assessed for reliability to minimize interruption in service.

5.6 Storage Requirements

Assuming that IRC implements Option 2, replacing the 8-inch transmission line with a 16-inch line, the existing pumps can provide a combined flow of 2,800 gpm. If the intent is to provide sufficient storage to ensure that the pumping capacity in 2040 is sufficient to transfer stored flows over a 12-hour period, a 739,000-gallon storage tank is required as shown in Table 5-11.

To ensure sufficient storage, a 750,000-gallon tank is recommended. The 750,000 gallon tank can be located below grade in an area adjacent to the existing Administration Building (as shown in Figure 5-3). By placing the tank below grade, reclaimed water can flow by gravity from the existing chlorine contact tank to the new storage tank, removing the need for transfer pumps. The existing vertical turbine pumps can be relocated to the new storage tank to pump to the West WWTF. Projected equalized flow rates from the South WWTF to the West WWTF are shown in Table 5-12.

Table 5-11: Wet Weather Storage Requirements at South WWTF

	2019	2025	2040
Storage Required for 4-hour event (gal)	192,436	266,876	739,406
Pump Capacity (gpm)	1,100	1,100	2,700
High Flows (gpm)	494	575	1,502
Remaining Pump Capacity (gpm)	606	525	1,198
Time to empty storage tank (hr)	5.29	8.46	10.25

Table 5-12: Equalized Flows from South WWTF to West WWTF

	2019	2025	2040
Pump Capacity (MGD)	1.58	1.58	4.03

5.7 Summary of Recommendations

The hydraulic and alternative analysis and findings for the South WWTF culminate in the following recommendations:

- A new storage tank is required today for equalization of flows during wet weather events. The tank should have a minimum capacity of 750,000 gallons in order to meet projected 2040 wet weather equalization requirements.
- Management of projected flows, peak hour flows and wet weather events requires modifications to the plant and several options were evaluated. The recommendation is to increase the 8-inch piping bottleneck in the transmission system to a 16-inch-diameter pipeline by 2029. This will allow the existing pumps to operate at their intended pumping capacity of 2,700 gpm through 2040.
- All reclaimed water leaving the South WWTF must be transferred to the West WWTF during wet weather events. If that additional flow cannot be managed at the West WWTF, other disposal alternatives at the South WWTF, such as direct potable reuse or a deep injection well, will need to be pursued.

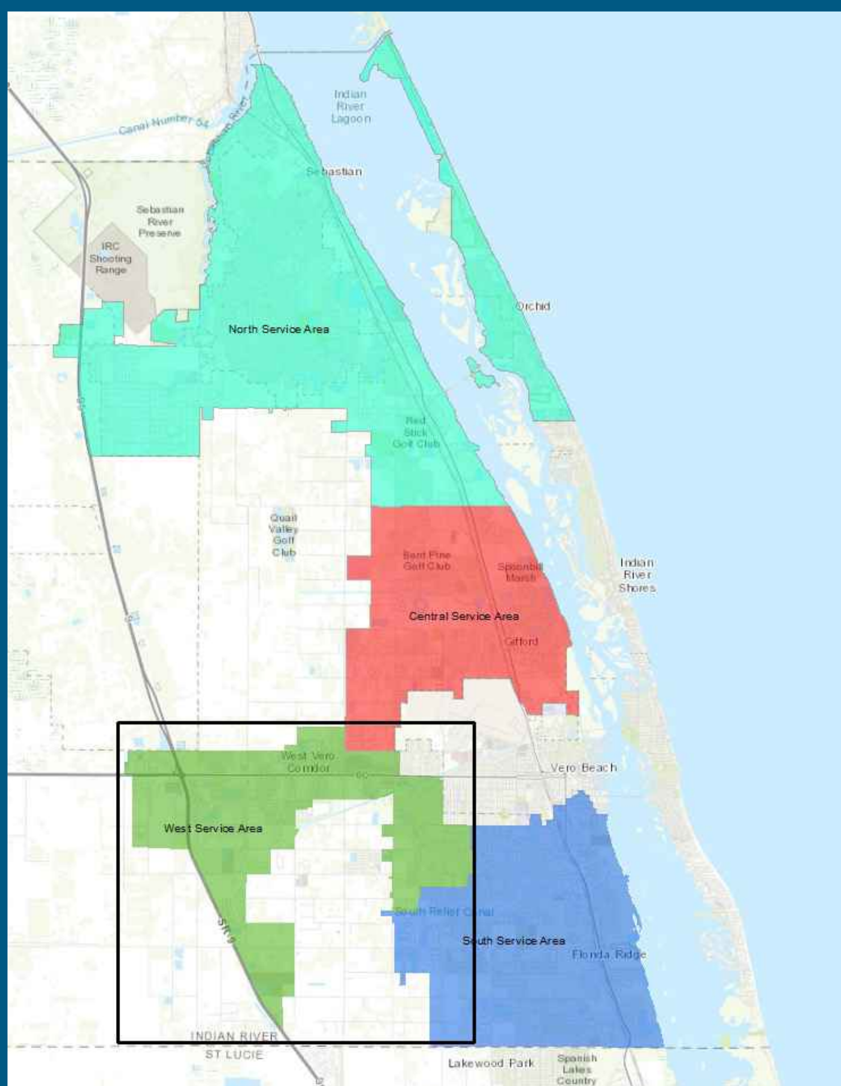
Recommended Capital Improvement Projects for the South WWTF are listed **Table 5-13**.

Table 5-13: Recommended South WWTF System Improvements

Year	Project Number	Component	Current Deficiency	Correction
Current	IRC-SRRW-1	Install 0.75 MG on-site storage tank.	No storage to attenuate peak flows causing disposal and transfer issues.	Install storage to attenuate peak flows and wet weather events. Allows for smoother transfer of reclaimed water to the West WWTF.
~2029 (Threshold Capacity of 0.9 MGD)	IRC-SRRW -2	Upgrade 8-inch transmission main to 16-inch	The existing 1,800 gpm pumps are limited to 1,200 gpm due to the hydraulic constraints in the system.	Upgrade to a 16-inch transmission main, which will significantly decrease energy loss and allow pumps to operate as designed, meeting transfer requirements through 2040.

Figure 5-3 South WWTF Equalization Tank Site

West Regional Wastewater Treatment Facility Projected Flows and Alternatives Analysis



Section 6: West Regional Wastewater Treatment Facility Projected Flows and Alternatives Analysis

Section 6 provides information and alternatives analysis associated with the West Regional WWTF (West WWTF). This Section is organized as follows:

- **Existing System**: Review of existing assets, including hydraulic capacities of pumps and transmission mains
- **Storage Capacity**: Review of available reclaimed water storage capacity
- **Analysis of Existing System to Meet Projected Influent and Wet Weather Flows**: Review of the ability of the WWTF to meet projected influent flows and wet weather flows
- **Reclaimed Water Management Alternatives**: An analysis of alternatives for operational management of combined influent flows
- **Transmission System Review**: Results of hydraulic analysis of the existing transmission system, determining and defining hydraulic constraints, and providing options for improvements
- **Summary and Recommendations**: Summary of options and final recommendations for capital improvement projects associated with the West WWTF

The West WWTF is located at 8405 8th Street, Vero Beach, Florida. The plant has a permitted capacity of 6.0 million gallons per day (MGD) annual average daily flow (AADF) under FDEP Permit Number FL0041637. The service area for the West WWTF is shown in Figure 6-1.

As previously discussed, reclaimed water from the South WWTF is pumped to the West WWTF Intermediate Pump Station where it is combined with the West WWTF reclaimed water. There are currently three options at the West WWTF that are utilized, either individually or in combination, for management of the combined reclaimed water flows:

- Dispose of reclaimed water at on-site wetlands
- Transfer reclaimed water to supplement reuse system feeding Central WWTF customers and North Reuse Facility storage tank
- Transfer reclaimed water to Bent Pine RIBs site for disposal

Projected influent flows to the West WWTF, as determined in Section 2, are summarized. The only reclaimed water required in the West Service Area is associated with the West WWTF Wetlands, which needs a maintenance flow of 0.7 MGD.

Table 6-1: West WWTF Projected Influent Flows

	2019 AAD Flows (MGD)			2025 AAD Flows (MGD)			2040 AAD Flows (MGD)		
WWTF	Low	Median	High	Low	Median	High	Low	Median	High
West	2.22	2.22	2.22	2.11	2.18	2.22	3.30	3.38	3.75

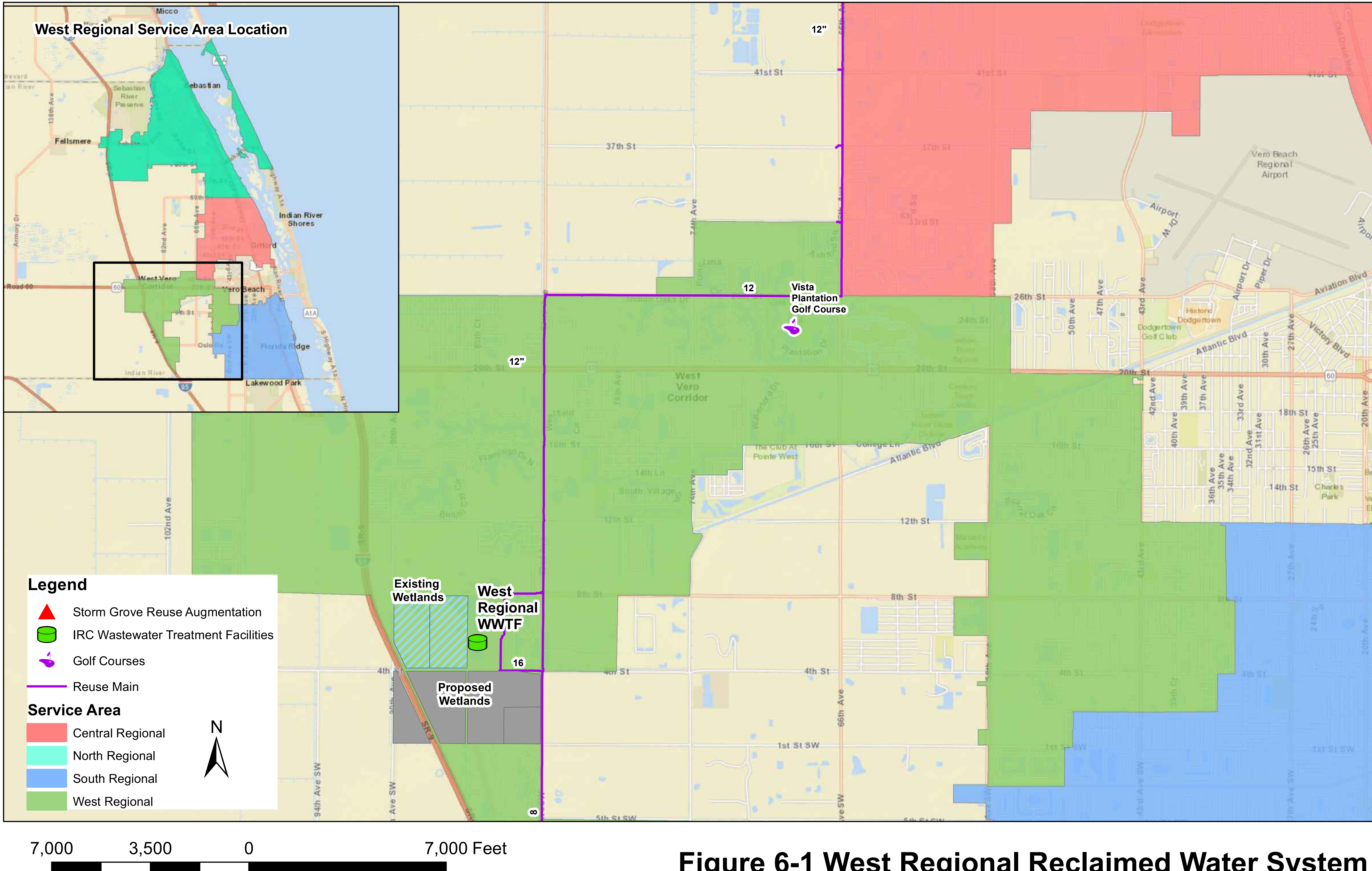


Figure 6-1 West Regional Reclaimed Water System

Evaluation of the existing system in comparison to projected flow rates and wet weather requirements are discussed below and culminate in recommendations for any improvements that may be needed at the West WWTF or in the associated distribution system through 2040.

6.1 Existing System

The reclaimed water assets associated with the West WWTF include two vertical turbine reclaimed water pumps, the transmission main from the plant to the transmission main joining with Central WWTF, and the valves and appurtenances associated with these assets. These assets are summarized in Table 6-2.

Table 6-2: West WWTF Reclaimed Water Assets

Reclaimed Water Pumps	
Type	Vertical Turbine
Quantity	2
Design Flow (gpm)	1,400
Design Flow (MGD)	2.0
Design Head (ft TDH)	242
Max Flow (gpm) - 2 pumps	1,500
Max Flow (MGD) - 2 pumps	2.1
Motor Size (hp)	100
Drive Type	Constant Speed
Year of Install	2010
Transmission Piping	
Pipe Diameter Range (in)	12 - 16
Pipe Material	PVC
Max Velocity per LOS Criteria (fps)	10
Maximum Flow* (gpm)	3,500
Maximum Flow* (MGD)	5

* Based on smallest-diameter pipe in the transmission line.

The reclaimed water pumps were installed in 2009 and have a design capacity of 1,400 gpm (2.0 MGD) at 242 feet total dynamic head (TDH) each. The disposal options for the reclaimed water at the West WWTF includes transferring reclaimed water to customers in the Central Service Area or to the storage tank at the North Reuse Facility. The storage tank has a maximum potential water elevation of 54.25 feet, which is the highest hydraulic elevation for the West WWTF reclaimed water pumps. The current operation for filling the storage tank, as verified in May 2020 SCADA output, shows a water elevation fluctuating between a minimum of 30.1 feet and a maximum of 44.6 feet. Multiple pumping scenarios of the West WWTF were created and evaluated through the use of the updated hydraulic model of the system. The model results are shown in Table 6-3.

As shown in Table 6-3, the existing West WWTF reclaimed water pumps are operating as designed with one pump in operation. However, the pump station flow capacity with two pumps running is around 1,500 gpm when directing flow to the North Reuse Facility storage tank. This is significantly lower than what had been anticipated but has been verified by IRC Staff. Further investigation through hydraulic modeling showed that the head loss in the 12-inch-diameter transmission piping is significant. Therefore, the pumps are limited to approximately 1,500 gpm capacity when transferring reclaimed water to the North Reclaimed water Facility storage tank and a maximum of 1,800 gpm to the Bent Pine RIBs with two pumps running.

Table 6-3: West WWTF Existing Pumping Scenarios

West WWTF Reclaimed Pump Station Operation	WEST WWTF Intermediate Pump Station Water Elevation[1]	North Reuse Storage Tank Elevation[2-3]	WEST WWTF Reclaimed Pump Station Flow and Pressure
1 Pump On	31.25	54.25	1,378 gpm @ 245'
1 Pump On	31.25	44.6	1,400 @ 244'
1 Pump On	31.25	30.1	1,432 gpm @ 241'
2 Pumps On	31.25	54.25	1,509 gpm @ 277'
2 Pumps On	31.25	44.6	1,532 gpm @ 277'
2 Pumps On	31.25	30.1	1,567 @ 276'

[1] Water elevation of 31.25 feet at the WEST WWTF occurs during peak hour flows.
[2] Water elevation of 30.10 feet at the North Reuse Facility Tank is the minimum water elevation operation.
[3] Water elevation of 54.25 feet at the North Reuse Facility Tank is the maximum potential water elevation operation.

6.2 West WWTF Reclaimed Water Storage Capacity

Per FDEP, wastewater treatment plants are required to maintain storage/disposal capacity equivalent to three days of the high range of the AAD effluent volume, assuming no reuse demands, which is 11.26 MGD in 2040 for the West WWTF (not including flows from the South WWTF). This allows for management of wastewater treated effluent during wet weather events. Currently, the West WWTF has a small on-site RIBS (0.10 MG) for disposal of reject water that can be utilized as wet weather overflow. The wet weather permitted storage and disposal capacity is at the wetlands adjacent to the West WWTF or at Bent Pine RIBs as shown in Table 6-4.

Table 6-4: WEST WWTF Reclaimed Water Storage/Disposal - ***PERMITTED***

	West WWTF Permitted Effluent Storage (MG)			
	2019	2025	2040	Notes
On-Site RIBs	0.10	0.10	0.10	
Wetlands at West WWTF	4.00	4.00	4.00	Capacity shared with South WWTF
Bent Pine RIBs	14.00	14.00	14.00	Capacity shared with other WWTFs
Permitted Storage	*18.10*	*18.10*	*18.10*	
Storage Required (West WWTF only)	6.66	6.66	11.26	3 Days x Effluent Flow
Surplus Storage	11.44	11.44	6.84	

Although Table 6-4 shows a surplus of permitted storage, the actual storage capacity is substantially less. FDEP modified the existing wetlands permit and the permitted discharge concentrations now limit flows from the wetlands to a maintenance flow of 0.7 MGD as measured at the discharge to the canal. This discharge flow rate correlates to 1.8 MGD at the head of the wetlands. (During wet weather events, the wetlands are strategically boarded up to create storage areas and stored flows are slowly released over time.) In addition, the maximum flow to Bent Pine RIBs is limited to 1,800 gpm (2.6 MGD) with the existing pumps.

Table 6-5 below summarizes the actual available disposal options, the reclaimed water storage requirements and the wet weather storage deficit in the system. As shown in the table, the West WWTF requires additional disposal/storage capacity of 2.16 MGD in the existing scenario and an additional capacity of approximately 4.66 MGD in the 2040 scenario, which does not include the South WWTF flows directed to the West WWTF.

*Table 6-5: WEST WWTF Reclaimed Water Storage/Disposal - **ACTUAL***

	West WWTF Effluent Actual Storage (MG)			
	2019	2025	2040	Notes
On-Site RIBs	0.10	0.10	0.10	
Wetlands at West WWTF	1.80	1.80	1.80	Due to discharge limits
Bent Pine RIBs	2.60	2.60	2.60	Existing pump capacity
Permitted Storage	*4.50*	*4.50*	*4.50*	
Storage Required	6.66	6.66	11.26	3 Days x Effluent Flow
Surplus/(Deficit) of Storage Capacity	(2.16)	(2.16)	(6.76)	

6.3 Analysis of Existing System to Meet Projected Influent and Wet Weather Flows

A comparison of the high range of the AADF flows in 2040 (3.75 MGD) at the West WWTF to the reclaimed water pump capacity (2 MGD) and wetlands disposal (1.8 MGD) shows that the existing pump and wetlands capacity are sufficient to meet 2040 needs. However, that does not take into consideration the management of peak hour or wet weather events at the West WWTF or the reclaimed water transferred from the South WWTF.

The volume of peak hour and wet weather events at West WWTF, as discussed in Section 2, are shown in Table 6-6.

Table 6-6: Volume From a Wet Weather Event at West WWTF

	2019	2025	2040
Peak Hour Flow (MGD)	5.55	5.55	9.38
Volume of Peak Hour Flow (MG)	0.23	0.23	0.39
Volume of 4 hour Wet Weather Event (MG)	**0.93**	**0.93**	**1.56**

When combined with the West AAD high flows and the equalized flow from the South WWTF, the potential volume of reclaimed water that needs to be managed at West WWTF is shown in Table 6-7.

Table 6-7: Daily Transfer and Disposal Needs (MG) at West WWTF

	2019	2025	2040
Volume from Wet Weather Event at West WWTF	0.93	0.93	1.56
Equalized Flow from South WWTF	1.58	1.58	3.89
West WWTF AAD High Flows	2.22	2.22	3.75
Total Daily Volume (MG)	**4.73**	**4.73**	**9.21**

Options for managing these flows are discussed in the next Section. However, due to the quantity of water (1.56 MG) accumulated in a potential wet weather event in 2040 and the addition of the flow from the South WWTF, it is recommended that a 2.0 MG reclaimed water equalization tank be constructed at the West WWTF. This tank will provide a location to equalize flows prior to either transferring off-site or disposing on-site as discussed in the next section. A conceptual design is included in Appendix A.

6.4 Analysis of Reclaimed Water Management Alternatives

Multiple options for meeting the daily transfer and disposal needs at West WWTF were evaluated. The most viable options, along with the benefits and challenges of each, are summarized in Table 6-8. As previously discussed, a storage tank of 2 MG is needed for equalization of wet weather volumes and South WWTF influent flows and is not included in these options.

Although modification of the existing wetlands permit is included in Table 6-8 as Option 3, the current flow rates dictate the immediate need for the wetlands. IRC is aware of the need and is presently working with FDEP on options for permit modifications. It remains on this list of alternatives as it provides documentation of the need for 4 MGD of on-site disposal and the repercussions of not having the full capacity of the wetlands available for IRC's use.

During review of these options, it was determined that the recommendations would focus on two scenarios – increased transfer from the Plant (Option Package 1) or increased on-site disposal (Option Package 2). This was based on the following conclusions:

- An extensive amount of time is required for design and implementation for each of these options and concurrent implementation could overburden County Staff and resources.
- Based on review of the previous Report regarding the IRC reclaimed water system (see Section 2.2), it appears that the costs for transferring the reclaimed water off-site and the costs of creating on-site disposal are similar and it would not be economically viable to do both.
- Implementation of all of the options would create redundant management options.

One of the disposal options reviewed and listed below is the installation of a deep injection well. Although this has been difficult to permit in the past, there has been recent regulatory focus on limiting surface water discharge, specifically in Water Caution Areas such as the Indian River Lagoon. In addition, reclaimed water has been acknowledged in Florida's 2020 Clean Waterway Act as a potable water supply source. This acknowledgement provides an option for reclaimed water to be used as aquifer recharge through deep injection wells as discussed in Section 3 of this Master Plan. A comprehensive report on the potential size, cost, depth and schedule for the permitting and construction of a deep injection well for IRC was prepared by JLA Geosciences and is included in Appendix F.

Table 6-8: West WWTF Potential Daily Transfer and Disposal Alternatives

Option	Description	Benefits	Challenges	Increased Capacity	
				gpm	mgd
1	Increase pump capacity (Phase 1)	Can be timed to match DOT Roadway Improvements. Provides 1 mgd additional capacity to Bent Pines RIBS or 0.5 mgd of additional capacity to North Tank. Reduces disposal needs at West WWTF. Provides redundancy for half of the transmission main between West and Central.	Limited capacity gains. Requires construction of ~30,000 LF of new main. Does not provide sufficient capacity to meet Central and North needs in 2040. System is still restricted by remaining 12-inch transmission main.	350 - 700	0.5 - 1
2	Increase pump capacity (Phase 2)	Increases max flow to 3,500 gpm (5 mgd). Provides sufficient capacity to meet reuse deficits for Central and North customers in 2040. Reduces disposal needs at West WWTF.	Requires construction of ~11,000 LF of new main (or replacement of existing main) beyond what is constructed in Phase 1.	2,100	3
3	Modify permit for existing wetlands	Wetlands exists and is permitted. Permitted capacity of the wetlands is 4 mgd. Minimal costs associated with rehab. Infrastructure is already in place. O&M costs are negligible.	FDEP is reluctant to modify concentration limits due to Indian River Lagoon Basin Management Plan. Due to inability to utilize the wetlands as originally designed and permitted, some rehab/replacement of existing wetlands vegetation may be required.	2,300	3.3
4	Proposed New Wetlands/RIBs Site	Site exists: 248 acres of adjacent property is owned by IRC. Alternative funding may be available for new wetlands. Ability to create educational facility similar to Orange County's Conserv II. O&M costs are negligible.	Concentration loadings may be highly restrictive as seen in the existing wetlands permit. High capital costs for wetlands. RIBs sites can fill during wet weather events, reducing available disposal volumes.	2,800	4.0

Option	Description	Benefits	Challenges	Increased Capacity	
				gpm	mgd
5	Construct ASR well(s)	Site exists: 248 acres of adjacent property is owned by IRC. Property boundaries are sufficient to ensure proper monitoring. Provides long-term storage for wet weather events. Potential to get up to 2 mgd of injection in one well. Relatively low capital costs when compared to wetlands. Does not preclude addition of wetlands in the future. No interface with Indian River Lagoon.	Cycling of ASR wells is required; must prove that wells are not used for disposal. Requires transfer of recovered water; Option 2 may be required. Monitoring wells are required. O&M costs are higher than wetlands/RIBs sites.	1,400	2.0
8	Construct deep injection well(s)	Site exists: 248 acres of adjacent property is owned by IRC. Property boundaries are sufficient to ensure proper monitoring. FDEP has been reluctant to permit deep injection wells but upcoming regulatory actions and discussions on aquifer recharge are making better/stronger case for use of deep injection wells. Reduces/removes disposal concerns during wet weather events. Potential to get up to 10 mgd of injection in one well. Cost is comparable to wetlands. Does not preclude addition of wetlands in the future. No interface with Indian River Lagoon. Long-term maintenance costs are significantly lower that other disposal options.	Wells must be taken off-line every five years to conduct mechanical integrity tests. Alternative storage is required for at least a 5 day period at that time. Monitoring wells are required. High capital costs.	2,800 - 9,000	5 - 10

The transfer capacity improvements for Options 1 and the associated with transmission main upgrades in Table 8-8 are based on the results of the hydraulic analysis. The analysis is summarized in Section 8.6 Summary and Recommendations.

6.5 Hydraulic Analysis of Improvements to the Reclaimed Water Transmission System

As mentioned previously, the West WWTF reclaimed water pumps are limited to approximately 1,500 gpm capacity when transferring reclaimed water to the North Reuse Facility storage tank and a maximum of 1,800 gpm to the Bent Pine RIBs with two pumps running. This is due to headloss through the existing 12-inch transmission main.

In review of upcoming FDOT projects in the vicinity of the West WWTF, it was determined that a parallel transmission main can be timed with the roadway projects for 82nd Avenue and 53rd Street planned for 2031-2040 to take advantage of the cost savings applied to the roadway restoration. Figure 6-2 shows the location of the project.

The hydraulic analysis of the construction of a parallel 16-inch transmission main along 82nd Avenue and 53rd Street determined that an additional flow of 0.5–1.0 MGD could be gained. However, a significant hydraulic constraint in the remaining 12-inch transmission main leaving the West WWTF will remain.

Phase 2 of the transmission main improvements would include a parallel 16-inch transmission main leaving the West WWTF and continuing to 26th Street. The hydraulic modeling indicated that installing a parallel 16-inch main at this location in addition to Phase 1 will allow 3 MGD to be transferred to the Central Service Area.

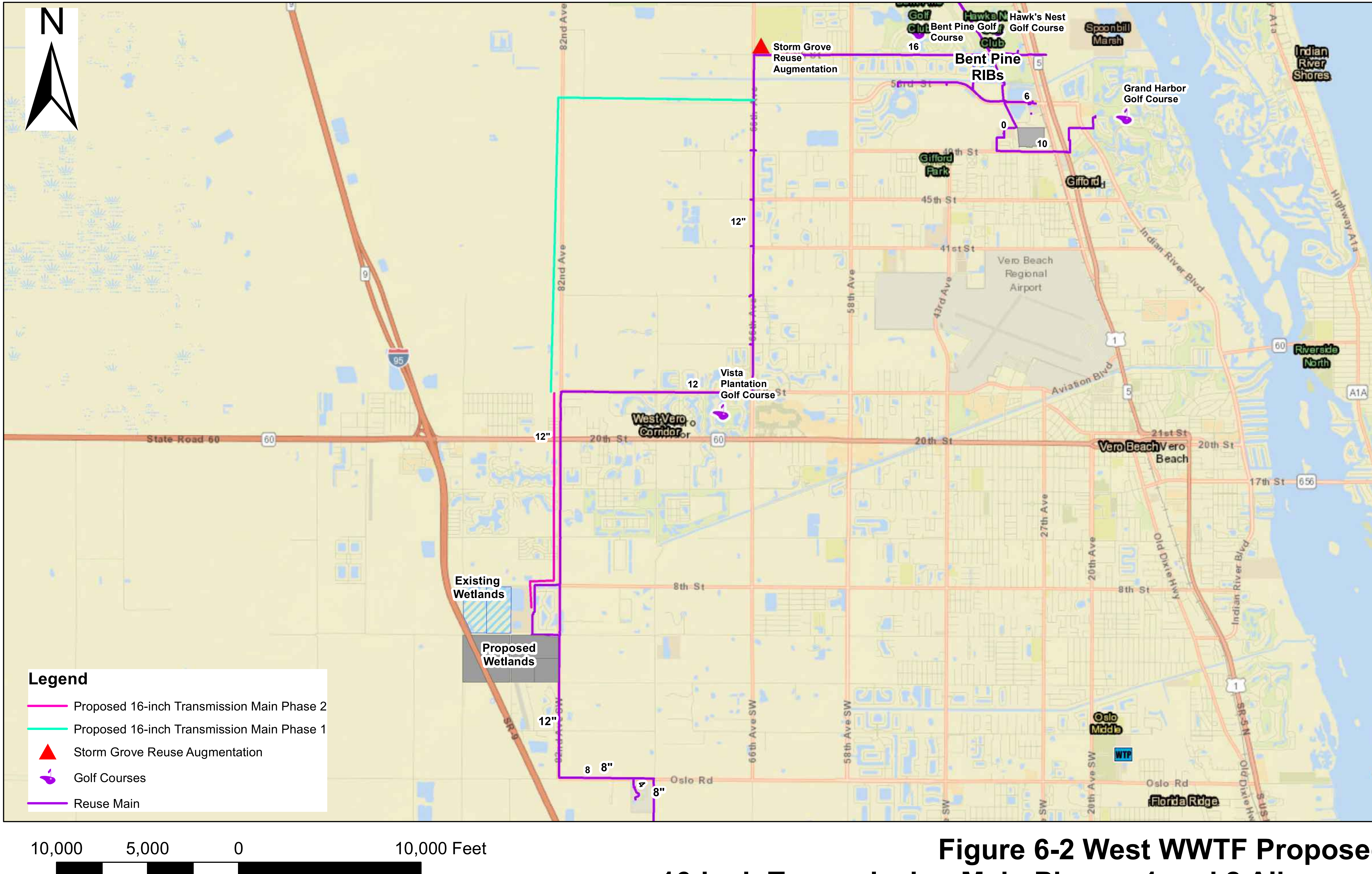


Figure 6-2 West WWTF Proposed 16-inch Transmission Main Phases 1 and 2 Alignment

6.6 Summary and Recommendations

The results of the hydraulic modeling of the transfer options as well as the on-site disposal options were utilized to create two distinct packages of daily transfer and disposal alternatives. These packages are as described below with results summarized in Table 6-9.

Option Package 1: Transfer Off-Site through implementation of Options 1, 2, and 3 with potential addition of Aquifer Storage and Recovery (ASR) Wells, if needed

Option Package 2: On-Site Disposal Options through implementation of Options 3 and 4 with potential addition of ASR Wells if needed

Table 6-9: Capacity of Daily Transfer and Disposal Options (MGD) for West WWTF

	Option 1 - Transfer			Option 2 - Disposal		
Transfer Options	**2019**	**2025**	**2040**	**2019**	**2025**	**2040**
Existing Pump Capacity	2.00	2.00	2.00	2.00	2.00	2.00
Main & Pump Capacity Upgrades - Phase 1	0.00	0.00	1.00	0.00	0.00	0.00
Main & Pump Capacity Upgrades - Phase 2	0.00	0.00	2.00	0.00	0.00	0.00
Total Transfer Flows	**2.00**	**2.00**	**5.00**	**2.00**	**2.00**	**2.00**
On-Site Disposal Options[1]	**2019**	**2025**	**2040**	**2019**	**2025**	**2040**
Existing Wetlands Maintenance	0.70	0.70	0.70	0.70	0.70	0.70
Existing Wetlands Emergency Overflow	1.10	0.00	0.00	1.10	0.00	0.00
Existing Wetlands Permit Updated	0.00	3.30	3.30	0.00	3.30	3.30
Proposed Wetlands/RIBs Site/DIW	0.00	0.00	0.00	0.00	0.00	4.00
ASR Wells	0.00	0.00	1.00	0.00	0.00	0.00
Total Disposal Capacity	**1.80**	**4.00**	**5.00**	**1.80**	**4.00**	**8.00**
[1]New 2.0 MG storage tank is not considered a disposal option - only EQ storage and distribution balancing						
Flows into West WWTF[2]	4.73	4.73	9.35	4.73	4.73	9.35
Total Transfer Flows	2.00	2.00	5.00	2.00	2.00	2.00
Total Disposal Capacity	1.80	4.00	5.00	1.80	4.00	8.00
Surplus/(Deficit) of Transfer/ Disposal Capacity	**(0.93)**	**1.27**	**0.65**	**(0.93)**	**1.27**	**0.65**

[2]From Table 6-7

As seen in Table 6-9, IRC can benefit equally from either Option. Since IRC owns approximately 248 acres adjacent to the West WWTF, Option 2 to add on-site disposal is recommended for management of daily flows at the West WWTF. The current pumps can be utilized to transfer reclaimed water to disposal at Bent Pine RIBs or transfer to the Central WWTF reuse customers.

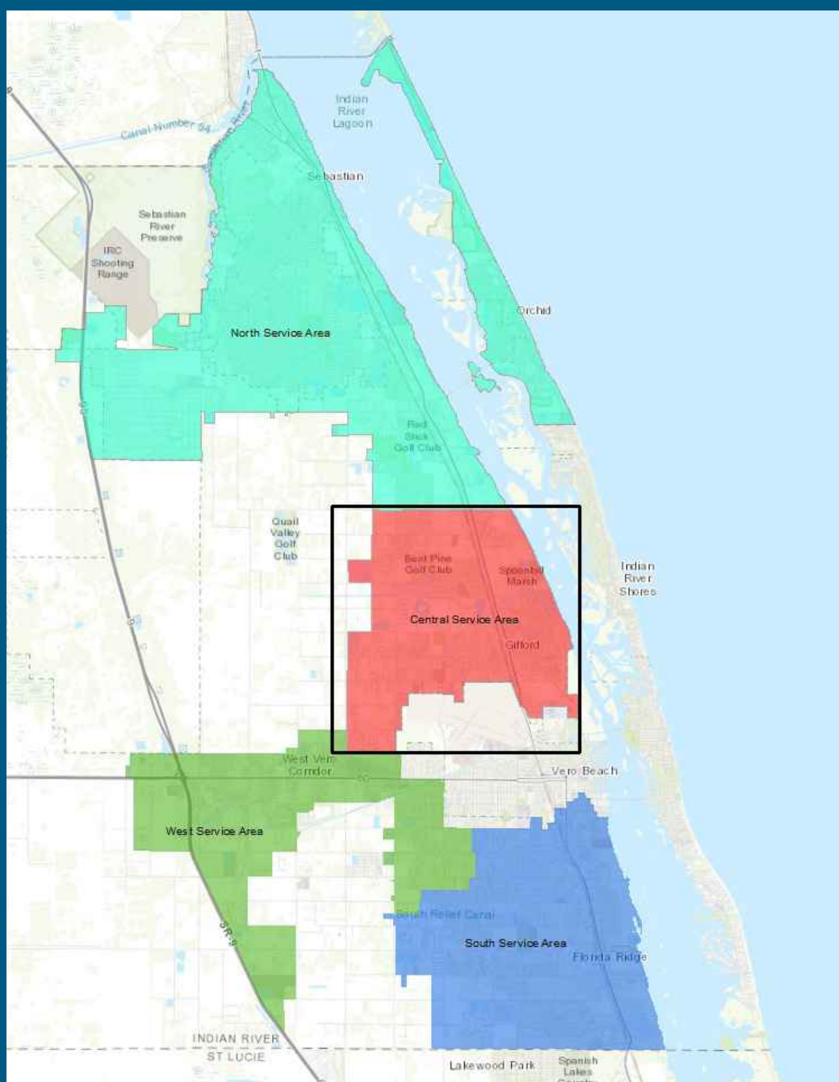
Recommended Capital Improvement Projects for the West WWTF are listed in Table 6-10.

Table 6-10: Recommended West WWTF System Improvements

Year	Project Number	Component	Current Deficiency	Correction
Current	IRC-WRRW-1	West WWTF Wetlands at Design Capacity of 4.0 MGD	Peak wet weather disposal options are limited on at the West WWTF due to FDEP modifications to the wetlands permit.	Continue negotiations with regulatory agencies to return to wetlands discharge concentrations that allow full use of the wetlands permitted capacity of 4.0 MGD.
Current	IRC-WRRW-2	2 MG West WWTF Reclaimed Water Storage and Pump Station	Currently there is no equalization storage in the system to use for demands.	Installing a 2 MG storage tank at the West WWTF will equalize peak flows transferred from the South and West WWTFs.
~2030 At Threshold Capacity of 6.0 MGD *total* influent	IRC-WRRW-3	Proposed Wetlands or Deep Injection Well(s)	Additional wet weather disposal options are required at the West WWTF.	Install new wetlands or deep injection wells with a minimum capacity of 4.0 MGD on the County-owned parcel at the West WWTF.

Central Wastewater Treatment Facility Projected Flows and Alternatives Analysis

Section 7



Section 7: Central Wastewater Treatment Facility Projected Flows and Alternatives Analysis

Section 7 provides information and alternatives analysis associated with the Central (Gifford) WWTF. This Section is organized as follows:

- **Existing System**: Review of existing assets, including hydraulic capacities of pumps and transmission mains
- **Storage Capacity**: Review of available reclaimed water storage capacity
- **Management of Reclaimed Water Quantities**: Review of the ability of the WWTF to meet projected influent flows and wet weather flows
- **Hydraulic Analysis of Reclaimed Water Transfer**: An analysis of hydraulics associated with filling the North Reuse Facility storage tank while meeting customer demands
- **Reclaimed Water Supply and Demand Balance**: Analysis of the ability of the combined flows from Central and West WWTFs to meet the reclaimed water demands of both customers in both the Central and North Service Areas
- **Summary and Recommendations**: Summary of options and final recommendations for capital improvement projects associated with the Central WWTF

The Central WWTF is located at 3550 49th Street, Vero Beach, Florida. The plant has a permitted capacity of 4.0 million gallons per day (MGD) annual average daily flow (AADF) under FDEP Permit Number FLA010431. The service area for the Central WWTF is shown in Figure 7-1.

There are currently three options for disposal of the reclaimed water produced at the Central WWTF:

- Storage of reclaimed water in on-site storage tanks
- Transfer reclaimed water to reuse customers and North Reuse Facility Tank
- Transfer reclaimed water to Bent Pine RIBs site for disposal

Projected supply and demands for the Central WWTF, as determined in Section 2, are summarized below. The low influent flow rates are used to verify that anticipated reuse demands can be met while the high influent flow rates are used to evaluate storage and equipment needs.

Table 7-1: Central WWTF Projected Influent Flows

	2019 Influent Flows (MGD)			2025 Influent Flows (MGD)			2040 Influent Flows (MGD)		
WWTF	Low	Median	High	Low	Median	High	Low	Median	High
Central	2.17	2.17	2.17	2.39	2.62	2.73	3.54	3.91	4.35

Table 7-2: Central WWTF Projected Reclaimed Water Demands

	AAD Demand (MGD)		
WWTF	2019	2025	2040
Central	2.21	4.21	4.21

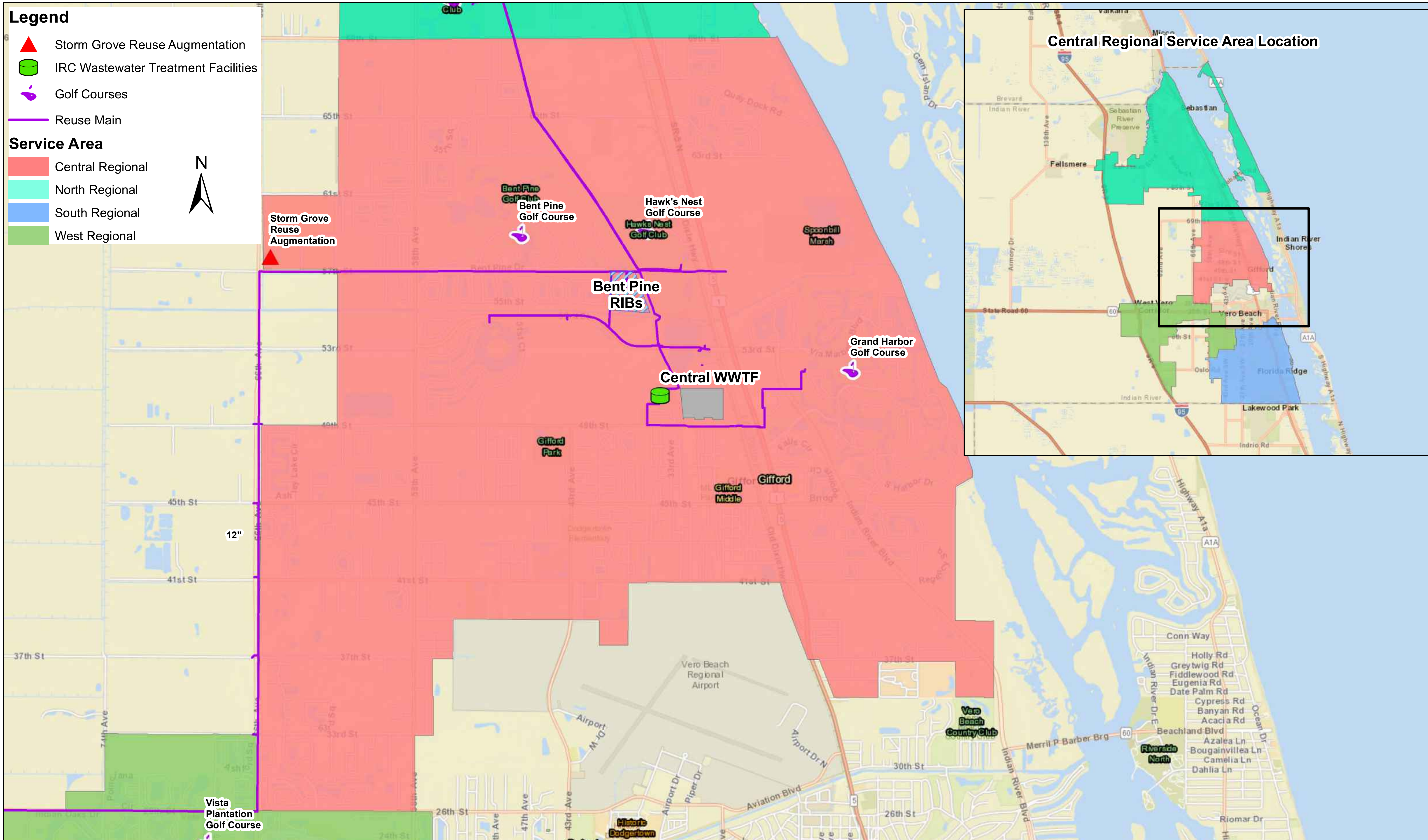


Figure 7-1 Central WWTF Reclaimed Water System

Evaluation of the existing system in comparison to projected flow rates and wet weather requirements are discussed below and culminate in recommendations for any improvements that may be needed at the Central WWTF or in the associated distribution system through 2040. These evaluations take into account the supplemental reclaimed water transferred from the West WWTF to the Central WWTF transmission mains.

7.1 Existing System

The reclaimed water assets associated with the Central WWTF include four vertical turbine reclaimed water pumps with variable frequency drives (VFDs) and one jockey pump, the transmission main from the plant to reclaimed water customers, Bent Pine RIBs, and the North Reuse Facility storage tank, and the valves and appurtenances associated with these assets.

The reclaimed water pumps were installed in 2004 and have a design capacity of 2,800 gpm (4.0 MGD) at 113 feet total dynamic head (TDH) each with variable frequency drives. The pump station currently operates with one pump running with a flow capacity of 2,100 gpm with VFD pressure setpoint of 45 psi. During, peak wet weather events two pumps will operate to transfer flows, however, this does not happen often. The transfer/disposal options for the reclaimed water from Central WWTF are transmitting reclaimed water to the North Reuse Facility storage tank for reuse demands, or to the Bent Pine RIBs, or supplying irrigation demands at golf courses within the service area.

High water level in the North storage tank has the highest reclaimed water elevation in the Central WWTF reclaimed water distribution system with a maximum potential water elevation of 54.25 feet). The current operation allows the operators to either fill the North Reuse Facility storage tank or direct water to the golf course ponds. This is possible as there is currently no pressure control on the pond customers. The customers connected to the Central reclaimed water system are listed in Table 7-3 and include Grand Harbor, Hawks Nest, Sandridge Dunes, Sandridge Lakes, John's Island West and Redstick Golf Courses for a total AADD of 1.46 MGD. Reclaimed water is delivered to the stormwater ponds system at the golf course sites and then re-pumped for irrigational purposes by the golf courses. Currently, Grand Harbor Golf Course is accepting reclaimed water from the County, however their usage has been sporadic in the past. .

The transmission main between the Central WWTF and the North Storage tank consists of 16-inch and a parallel 12-inch-diameter pipe. Reclaimed water from the West WWTF is transferred into the 16-inch transmission main, just east of the Bent Pine RIBs site.

Table 7-3 summarizes the assets associated with the Central WWTF reclaimed water system discussed above.

Table 7-3: Central WWTF Reclaimed Water Assets

Reclaimed Water Pumps	
Type	Vertical Turbine
Quantity	4
Design Flow (gpm)	2,800
Design Flow (mgd)	3.0
Design Head (ft TDH)	113
Max Flow (gpm) - 3 pumps	3,500
Max Flow (mgd) - 3 pumps	5.0
Motor Size (hp)	100
Drive Type	Variable Frequency Drive
Year of Install Pumps 1, 2 and 3	2000
Year of Install Pump 4	2004
Jockey Pump	
Type	Vertical Turbine
Quantity	1
Design Flow (gpm)	1,125
Design Flow (mgd)	1.6
Design Head (ft TDH)	52
Motor Size (hp)	25
Drive Type	Variable Frequency Drive
Year of Install	2000
Transmission Piping	
Pipe Diameter Range (in)	12 and 16 (parallel)
Pipe Material	PVC
Maximum Velocity (fps)	10
Maximum Flow* (gpm)	6,000
Maximum Flow* (mgd)	8.6

* Based on 16-inch-diameter pipe leaving Central WWTF.

As shown in Table 7-4, the existing Central WWTF reclaimed water pumps are operating as expected and provide sufficient capacity for future expansions.

Table 7-4: Central WWTF Existing Pumping Scenarios

Central Reclaimed Water Pump Station Operation	North Reuse Facility Storage Tank Elevation [2]	Central Reclaimed Water Pump Station Flow and Pressure
1 Pump On [1]	54.25	2,100 gpm @ 104'
2 Pumps On[3]	54.25	3,200 gpm @ 154'
3 Pumps On[3]	54.25	3,500 gpm @ 166'
1 Pump On [1]	44.6	2,300 gpm @ 104'
2 Pumps On[3]	44.6	3,300 gpm @ 152'
3 Pumps On[3]	44.6	3,600 gpm @ 165'
1 Pump On [1]	30.1	2,600 gpm @ 104'
2 Pumps On[3]	30.1	3,500 gpm @ 149'
3 Pumps On[3]	30.1	3,750 gpm @ 163'

[1] VFD setpoint of 45 psi for current operations.

[2] Max water elevation at North Tank = 54.25'; Avg. water elevation in North Tank = 44.6'; Min water elevation in North Tank = 30.1'.

[3] VFD control off to determine maximum flow for wet weather event.

7.2 Central Reclaimed Water Storage Capacity

The Central WWTF has equalization/storage tanks with a storage volume of (0.74 MG). The tanks are intended for disposal of reject water but can be utilized as wet weather storage under emergency conditions. The remainder of the storage and disposal capacity is at the North storage tank and Bent Pine RIBs. Table 7-5 below summarizes the available storage/disposal options, the reclaimed water storage requirements and the surplus storage available in the system.

Table 7-5: Central WWTF Reclaimed Water Storage/Disposal - PERMITTED

	Central Effluent Storage (MG)			
	2019	2025	2040	Notes
On-Site Equalization/Storage Tank	0.74	0.74	0.74	
North Tank	3.00	3.00	3.00	
Bent Pine RIBs*	11.40	11.40	11.40	Capacity shared with other WWTFs
Permitted Storage	15.14	15.14	15.14	
Storage Required	6.51	8.20	13.05	3 Days x Effluent Flow
Surplus Storage	8.63	6.94	2.09	

As shown in Table 7-5 above, there is a surplus of storage in the system through the 2040 planning period. The Central WWTF does not currently use the 0.74 MG storage/equalization tank and primarily depends on the North Reuse Facility storage tank and Bent Pine RIBs for wet weather disposal needs.

7.3 Management of Projected Reclaimed Water Quantities

The Central WWTF currently pumps all of its reclaimed water to either the North Reuse Facility storage tank or the regional golf course customers. The current firm pumping capacity at the Central WWTF is 5.4 MGD with three pumps in operation. Figure 7-2 shows a comparison of the anticipated reclaimed water flows to the existing pump capacity.

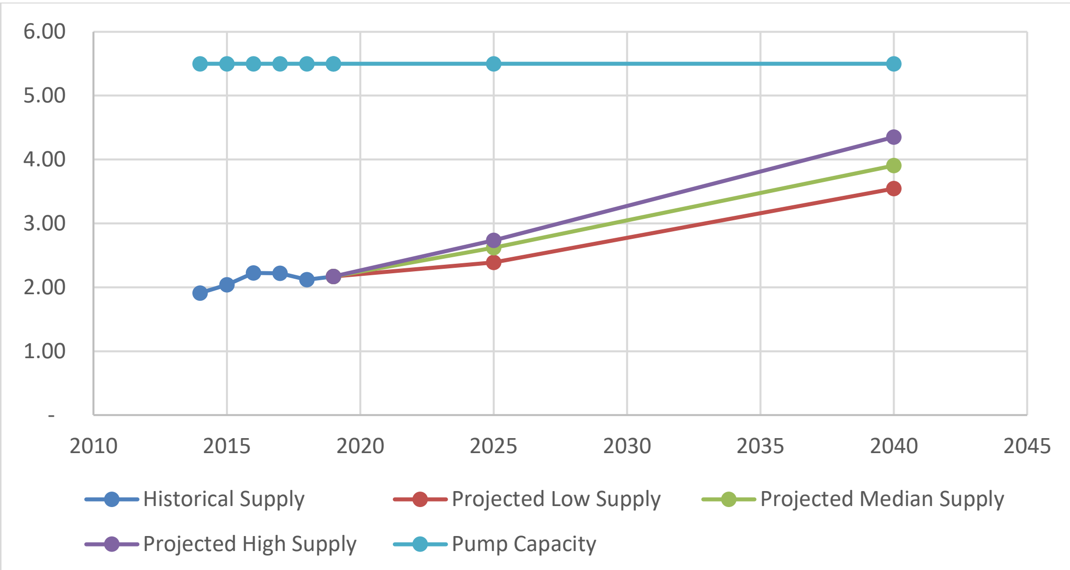


Figure 7-2: Central WWTF Reclaimed Water Supply Projections versus Pump Capacity

This graph shows that the existing pump capacity is sufficient to meet the projected AAD high flows at the Central WWTF through 2040. However, that does not take into consideration the management of peak hour or wet weather events at the Central WWTF.

Peak hour flows (as determined in Section 2) range from 2,600 gpm to just over 5,200 gpm in 2040. However, the existing reclaimed water pumps have the capacity through 2025 but are insufficient to handle the 2040 peak hour flows. This results in an excess of flow at the Central WWTF during peak hour as shown below in 5-4.

Table 7-6: Central WWTF Surplus Volume During Peak Hour

	2019	2025	2040
Peak Hour Flows (gpm)	2,600	3,275	5,227
Max Flow to North Storage Tank (gpm)	3,100	3,500	3,750
Remaining Peak Hour Flow (gpm)	0	0	1,477
Volume Accumulated over 1 hour (gal)			88,640

The challenges associated with managing projected AAD flows and peak hour flows at the Central WWTF are exacerbated during a wet weather event (4-hour peak hour event). Therefore, the evaluation of options for meeting wet weather events, as discussed below, also provides solutions for managing projected daily flows and peak hour flows.

7.3.1 Results of Wet Weather Event Analysis

Wet weather events are typically managed through the practice of hydraulic equalization in which excess flows are stored until pump capacity is available. This practice allows for consistent effluent flows, reducing the need to size pumps for temporary peak flow conditions, and lessens the chance of negative downstream events, such as overloading treatment processes and equipment or overflowing existing structures or ponds.

To ensure that storage and pumping needs for a wet weather event are fully addressed, the following assumptions were made:

- On-site substandard storage tank is full and not available for use
- There is no reuse demand during this period

Prior to looking at options for storage or disposal of flows during wet weather events, an evaluation of the use of the existing pumps for equalization was conducted as pump capacity is directly related to storage requirements. Independent of how the excess flow during a 4-hour peak flow event is stored, the pumps will need to have enough excess capacity to transfer the stored flows over a set amount of time, and the higher the pump capacity, the less volume of storage is necessary. Because of the diurnal nature of wastewater treatment facilities, there are typically 6 to 8 hours of low flows between 11 pm and 7 am each night. During this period, the reclaimed water pumps have surplus capacity that can be utilized to transfer stored flow to the North Reuse Facility storage tank or to the Bent Pine RIBs site.

To ensure that there is storage available for future storm events, to maintain reclaimed water quality and to ensure reuse demands can be met, it is assumed that the stored reclaimed water will need to be transferred within 48 hours. Therefore, there must be sufficient pump capacity beyond the plant AADF levels to transfer the stored reclaimed water over a period of 6 hours over two nights for 12 hours total. (Note that this is a very conservative number as the low flow periods are typically well below the AADF.)

Below are results of this analysis. As noted in Table 7-7, there is sufficient pump capacity to meet the peak hour flow rates through 2025. Storage requirements are based on peak hour volumes as defined in Section 2.

Table 7-7: Central WWTF Pump Capacity for Equalization

	2019	2025	2040
Storage Required for 4-hour event (gal)	0	0	354,561
Average Pumping Capacity (gpm)	-	-	3,750
AAD High Flows (gpm)	-	-	3,022
Remaining Pumping Capacity (gpm)	-	-	728
Time to empty storage tank (hr)	-	-	8.11

Table 7-7 shows that there is sufficient surplus pumping capacity to provide transfer for stored peak hour flows within a 12-hour period through 2025.

Implementing wet weather management options will take time to design, permit and construct. Therefore, it was important to determine the threshold capacity for which AADF into the Central WWTF would require equalization. This would assist in determining the time remaining for implementation of storage alternatives. Threshold capacity calculations are shown in Table 7-8.

Table 7-8: Central WWTF Peak Hour Threshold Capacity for Wet Weather Management Options

	2025	Threshold Capacity	2040
High AAD Flow (MGD)	2.73	3.15	4.35
Peak Hour at PF = 1.73 (MGD)	4.73	5.45	7.53
	2025	**Threshold Capacity**	**2040**
Peak Hour Flows (gpm)	3,284	3,784	5,227
Max Pump Flows (gpm)	3,500	3,750	3,750
Remaining Peak Hour Flow (gpm)	0	34	1,477
Volume Accumulated over 1 hour		**2,048**	**88,640**
	2025	**Threshold Capacity**	**2040**
Storage Required for 4-hour event (gal)		8,192	354,561
Pump Capacity (gpm)		3,750	3,750
High Flows (gpm)		2,187	3,022
Remaining Pump Capacity (gpm)		1,563	728
Time to empty storage tank (hr)		0.09	8.11

Table 7-8 shows a threshold capacity of 3.15 MGD AADF for which equalization storage at Central WWTF is required. As shown on Figure 7-1, this capacity is anticipated to be reached between 2029 and 2035 depending on growth and septic to sewer conversions in the Central WWTF service area.

There is currently a 0.35 MG pre-stressed concrete tank located at the Central WWTF that was once used for sludge dewatering filtrate storage prior to pumping to the head of the Plant. However, the dewatering process has been removed from service and this tank is available for potential use for reclaimed water equalization. This tank will require hydrostatic testing to ensure tank integrity. If the tank is stable, it can be utilized for equalization with modifications to yard piping and pumping. Note that the existing 0.35 MG storage tank does not provide sufficient storage after 2040.

7.4 Hydraulic Analysis of Reclaimed Water Transfer to North Tank

With the re-purposing of the abandoned sludge storage tank at the Central WWTF, equalization of a wet weather event can be addressed at the Central WWTF through the use of the existing pumps. However, transferring flows to the North Reuse Facility storage tank has been an ongoing issue for Operations. Due to system hydraulics, the North Reuse Facility storage tank cannot be filled when also supplying reuse water to regional golf course pond customers. This creates operational issues and results in manual operation when filling the North Reuse Facility storage tank.

A 24-hour extended period hydraulic model of the system was developed to determine whether the addition of backpressure sustaining valves at the pond customer sites would allow for simultaneously filling the North Reuse Facility storage tank. Under this scenario, the model proved that simultaneous operation was viable. Table 7-9 provides the preliminary pressure setpoints for each golf course.

Table 7-9: Central WWTF Pressure Sustaining Valve Setpoints

Pressure Sustaining Valve Site	Pressure Setting (psi)
North Reuse Facility Storage Tank Fill Line	40
Redstick Golf Course	35
John's Island Golf Course	40
Sandridge Dunes Golf Course	39
Sandridge Lakes Golf Course	41
Hawk's Nest Golf Course	40

7.5 Central WWTF Reclaimed Water Supply and Demand Balance

As discussed earlier, the Central WWTF, West WWTF, and the North Reuse Facility are interdependent. To determine the water supply and demand balance for these systems, each of these systems were evaluated to determine whether there is sufficient supply from West and Central WWTFs to meet the demands of Central WWTF reuse customers. Any surplus reclaimed water would be used to meet reuse demands of the North Reuse Facility.

Projected supply and demands for the Central WWTF, as determined in Section 2, are summarized in Table 7-10. This summary shows that the reclaimed water available from Central WWTF is not sufficient to meet the reuse demands of the customers. However, the addition of reclaimed water from West WWTF provides surplus that can be directed to the North Reuse Facility storage tank to meet the demands of customers on the Barrier Island.

Table 7-10: Central WWTF Supply and Demand Balance

	Flow Rates (MGD)		
	2019	2025	2040
Central WWTF Reclaimed Water[1]	2.17	2.39	3.54
Reuse Demand	2.21	4.21	4.21
Surplus/(Deficit) of Reuse Demand	**(0.04)**	**(1.82)**	**(0.67)**
West WWTF Supply to Central[2]	2.0	2.0	2.0
Surplus/(Deficit) of Reuse Demand	**1.96**	**0.18**	**1.33**

[1] Based on anticipated low flow rates into Central WWTF
[2] Max pump capacity at West WWTF

Table 7-11 presents the North Reuse Facility Supply and Demand Balance. As shown, the existing demands are being met. However, in the near future. as additional customers are added to the Indian River County reuse system, there is insufficient supply to meet the reuse demands of the

North Reuse Facility customers. In order to meet future demands, reclaimed water augmentation is required.

Table 7-11: North Reuse Facility Supply and Demand Balance

	Flow Rates (MGD)		
	2019	2025	2040
North Reuse Facility Demands	0.16	0.36	2.37
Available from Central and West WWTFs	1.96	0.18	1.33
Surplus/(Deficit) of Reuse Demands	**1.80**	**(0.18)**	**(1.04)**
Reuse Augmentation System	0.00	1.50	1.50
Surplus/(Deficit) of Reuse Demands	**1.80**	**1.32**	**0.46**

A design project was completed previously for Indian River County that would treat stormwater pulled from Lateral A Canal for reuse water augmentation. The project, Storm Grove Reuse Augmentation Facility, will provide approximately 1.5 MGD of reclaimed water to meet reuse customer demands. As shown in Table 7-11, the Storm Grove Reuse Augmentation Facility is needed in 2025 and will provide a surplus of reclaimed water to be stored and used in the system. The plans are included in Appendix B.

As discussed in the evaluation of the West WWTF reclaimed water system, there are multiple options to meet the disposal requirements for the combined West and South WWTFs. For this evaluation, the recommendation for on-site disposal at West WWTF, as opposed to transmission main and pump station upgrades to the West WWTF, was utilized in this evaluation. However, should IRC determine that transmission main and pump upgrades at the West WWTF are preferred and complete construction by 2025, the need for the Storm Grove Reclaimed Water Augmentation system could be postponed past 2040.

7.6 Summary and Recommendations

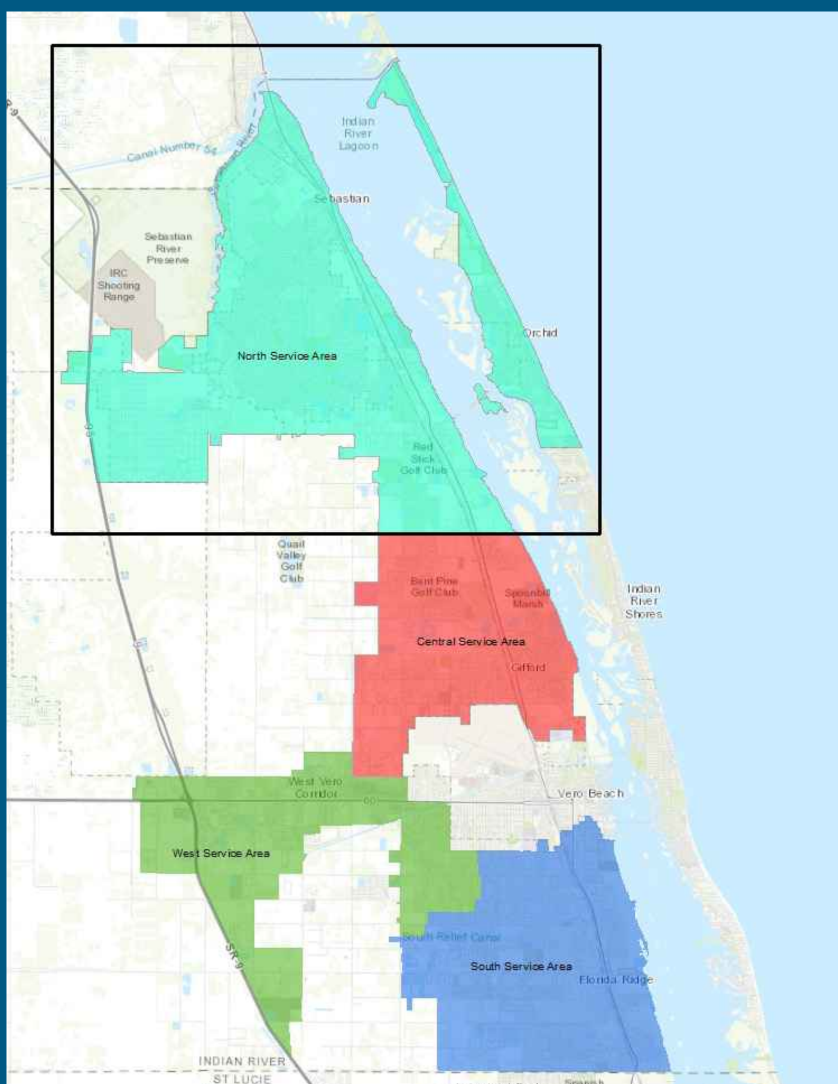
Wet weather events at the Central WWTF will require the re-purposing of the existing abandoned sludge holding tank for equalization. However, the pumping capacity and the transmission main capacities can meet the projected reuse demands for the Central WWTF through the 2040 planning period. Therefore, based on the hydraulic analysis, no improvements are required for the pump station or transmission mains through the 2040 planning period.

The operational issues present in the Central system include system operation hydraulics and the supply deficit for the North reclaimed water customers. Recommendations moving forward include installing pressure sustaining valves at the golf course ponds and construction of the reclaimed water augmentation system. Table 7-12 summarizes the recommendations for the Central Reuse System.

Table 7-12: Recommended Central WWTF Reclaimed Water System Improvements

Year	Project Number	Component	Current Deficiency	Correction
Current	IRC-CRW-1	Pressure Sustaining Valves	Operational issues require simultaneously filling storage tank and golf course stormwater ponds.	Install pressure sustaining valves at each of the Central pond customer sites and the North Reuse Facility storage tank fill line.
2025	IRC-CRW-2	Storm Grove Reuse Augmentation Facility	As future customer demands increase, reuse augmentation is required	Install Storm Grove Reuse Augmentation Facility, with a capacity of 1.5 MGD, to meet future demands.
~2029 At a Threshold Capacity of 3.15 MGD	IRC-CRW-3	0.5 MG Central WWTF Reuse Storage Capacity Conversion	Wet weather equalization storage at the Central WWTF required as early as 2029.	Re-purpose existing abandoned 0.5 MG concrete tank for use as a wet weather equalization tank.

North Reuse Storage and Repump Facility Evaluation



Section 8

Section 8: North Reuse Storage and Repump Facility

Section 8 provides information and alternatives analysis associated with the North Reuse Storage and Repump Facility (North Reuse Facility). This Section is organized as follows:

- **Existing System**: Review of existing assets, including hydraulic capacities of pumps and transmission mains
- **Demand Evaluations**: Analysis of the North Reuse Facility to meet the reclaimed water demands of customers on the Barrier Island
- **Summary and Recommendations**: Summary of options and final recommendations for capital improvement projects associated with the North Reuse Facility.

The North Reuse Storage and Repump Facility (North Reuse Facility is located at 5150 77th St, Vero Beach, FL, 32967. In order to meet the reclaimed water demands on the Barrier Island, IRC utilized existing infrastructure at the off-line North Regional WWTF to create the North Reuse Facility. Surplus reclaimed water from the West and Central WWTFs is transferred to the on-site storage tank and re-pumped to customers on the Barrier Island. Although seldom utilized, this Facility also provides redundancy to multiple Central WWTF customers on the north end of the reuse system through valving at the North Reuse Facility site. The reclaimed water system associated with the North Reuse Facility is the only segment of IRC's reclaimed water system that is considered a pressurized system. The service area for the North service area is shown in Figure *8-1*.

Project demands for the North Reuse Facility, as determined in Section 2, are summarized below:

Table 8-1: North Reuse Facility Demands

	AAD Demand (MGD)		
WWTF	**2019**	**2025**	**2040**
North	0.16	0.36	1.37

Evaluations of the existing system are discussed below and culminate in recommendations for any improvements that may be needed at the North Reuse Facility or in the associated distribution system through 2040.

8.1 Existing System

The existing North Reuse Facility contains a 3 MG storage tank, three (pumps with variable frequency drives (VFDs) each rated at 850 gpm at 195 feet of total dynamic head (TDH) and a jockey pump. The original design included piping, structural, and electrical provisions to accommodate two future pumps each rated at 1,700 gpm at 195 feet of TDH with VFD controls.

The North Reuse Facility supplies demands to the Barrier Island. The existing demands include the Bermuda Club, Disney Vero Beach, and Sea Oaks Phase 1, which equates to approximately 0.18 MGD, average day demands. There is a 16-inch transmission main leaving the facility and directing flows to the causeway, which then turns into a parallel 12-inch transmission main across the causeway. After crossing the causeway, the parallel 12-inch becomes a 16-inch transmission main directing reclaimed water to the 8-inch pipe that runs north and south along Highway A1A.

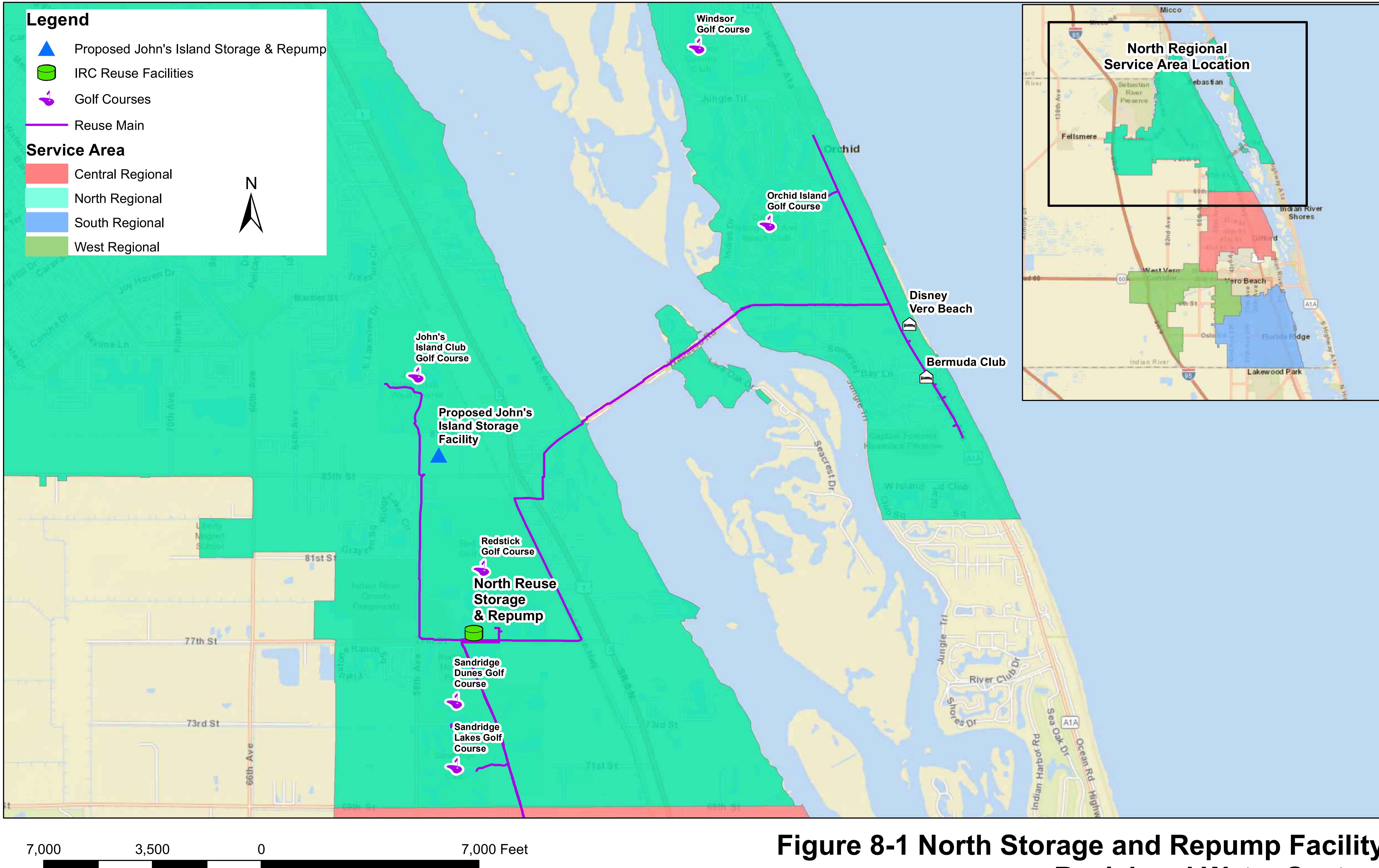


Figure 8-1 North Storage and Repump Facility Reclaimed Water System

Table 8-2: North Reuse Facility Assets

Reclaimed Water Storage Tank	
Type	Pre-Cast Concrete
Quantity	1
Volume (MG)	3
Reclaimed Water Pumps	
Type	Vertical Turbine
Quantity	3
Design Flow (gpm)	850
Design Flow (MGD)	1.2
Design Head (ft TDH)	195
Max Flow (gpm) - 2 pumps	1,700
Max Flow (MGD) - 2 pumps	2.4
Motor Size (hp)	60
Drive Type	Variable Frequency Drives
Year of Install	2010
Jockey Pump	
Type	Vertical Turbine
Quantity	1
Design Flow (gpm)	250
Design Flow (MGD)	0.4
Design Head (ft TDH)	195
Motor Size (hp)	25
Drive Type	Variable Frequency Drive
Transmission Piping	
Pipe Diameter Range (in)	16
Pipe Material	PVC
Maximum Velocity (fps)	10
Maximum Flow* (gpm)	6,000
Maximum Flow* (MGD)	8.6
Distribution Piping	
Pipe Diameter Range (in)	8
Pipe Material	PVC
Maximum Velocity (fps)	10
Maximum Flow* (gpm)	1,500
Maximum Flow* (MGD)	2.2

*Based on smallest-diameter pipe in the transmission line

8.2 North Reuse Facility Demand Evaluations

Table 8-3 lists the existing and future reuse customers for the North Reuse Facility reclaimed water system. The Sea Oaks Phase 2 customer is slated to come online in 2025, while the majority of the future customers are planned for 2040. It is assumed that the Windsor Golf Course and Orchid Island Golf Course will be pressurized customers in the future, since the St. John's River Water Management District will not allow discharge of reclaimed water into the stormwater pond system on site due to insufficient capacity to treat the nutrient load of the reclaimed water, as explained previously in Technical Memorandum No. 1.

Additionally, Orchid Island and Windsor Golf Courses are considered large users and an agreement between IRC and each customer will be required. The agreement should stipulate irrigation schedules for each golf course, which would prohibit irrigation at the same time. This will reduce the peak pumping capacity required to support instantaneous system demands and conservatively address system needs. Subsequent paragraphs below discuss the peaking factor required for this portion of the system.

Table 8-3: North Reuse Facility Customers

Customer	2019	2025	2040
Bermuda Club	0.09	0.09	0.09
Disney Vero Beach Resort Club	0.05	0.05	0.05
Sea Oaks Phase 1	0.02	0.02	0.02
Sea Oaks Phase 2		0.2	0.2
Orchid Island Golf Course			0.42
Sea Oaks Phase 3			0.28
Windsor Golf Course			0.31
Total Reuse Demand	**0.16**	**0.36**	**1.37**

The customers located in the North Service Area are the only customers in IRC's reclaimed water system that are connected as pressurized customers. Since irrigation is typically performed at certain times of the day, either in the early morning or evening, and occurs simultaneously, a peaking factor is required to be applied to the demands to adequately size the pumping capacity requirement to supply instantaneous demands on the pressurized system. A peaking factor of 2.2 was determined to be the hourly peaking factor to be applied to average day demands to simulate peak pumping requirements of the North Reuse Facility.

Table 8-4 presents the pump capacity required to deliver existing and future demands. As shown in the table, the existing pumps have sufficient capacity to supply demands through the 2025 planning period and upgrades are not required. The firm pump capacity is slightly less than the requirement in 2040; however, if additional capacity is needed during this peak demand, the third pump could be operated to supply demands in this scenario. Since the demand is less than 150 gpm, additional pumping capacity is not recommended in this scenario.

Table 8-4: North Reuse Facility Pump Station Evaluation

	2019	2025	2040
Firm Pump Capacity (gpm)	1,950	1,950	1,950
Demands (gpm)	242	545	2,074
Surplus/(Deficit) of Pump Capacity (gpm)	**1,708**	**1,405**	**(124)**

8.2.1 John's Island Development Reuse Demands

In June 2020, John's Island Water Management (John's Island) approached IRC with a request for an additional 2 MGD of reuse water. That demand is in addition to the 1.0 MGD request for the John's Island East Golf Course that was already agreed to between IRC and John's Island for 2040. An evaluation of the ability of IRC to provide this quantity of reclaimed water was conducted by Atkins and presented to IRC Staff and John's Island Staff on July 16, 2020. The understanding of the project was as follows:

John's Island intends to construct a Reuse Storage and Repump Station at CR 510 and 58th Avenue to transfer 3 MGD of reuse water to John's Island East Golf Course and John's Island property association customers on the Barrier Island. The 2 MGD will start in 2025 and 1.0 MGD following in 2040.

John's Island would transfer the reclaimed water through an existing 16-inch pipe owned by John's Island, pending condition assessment of the pipeline.

IRC will deliver reuse water to a lined pond or storage tank at the proposed John's Island Repump Station as shown in Figure 8-1.

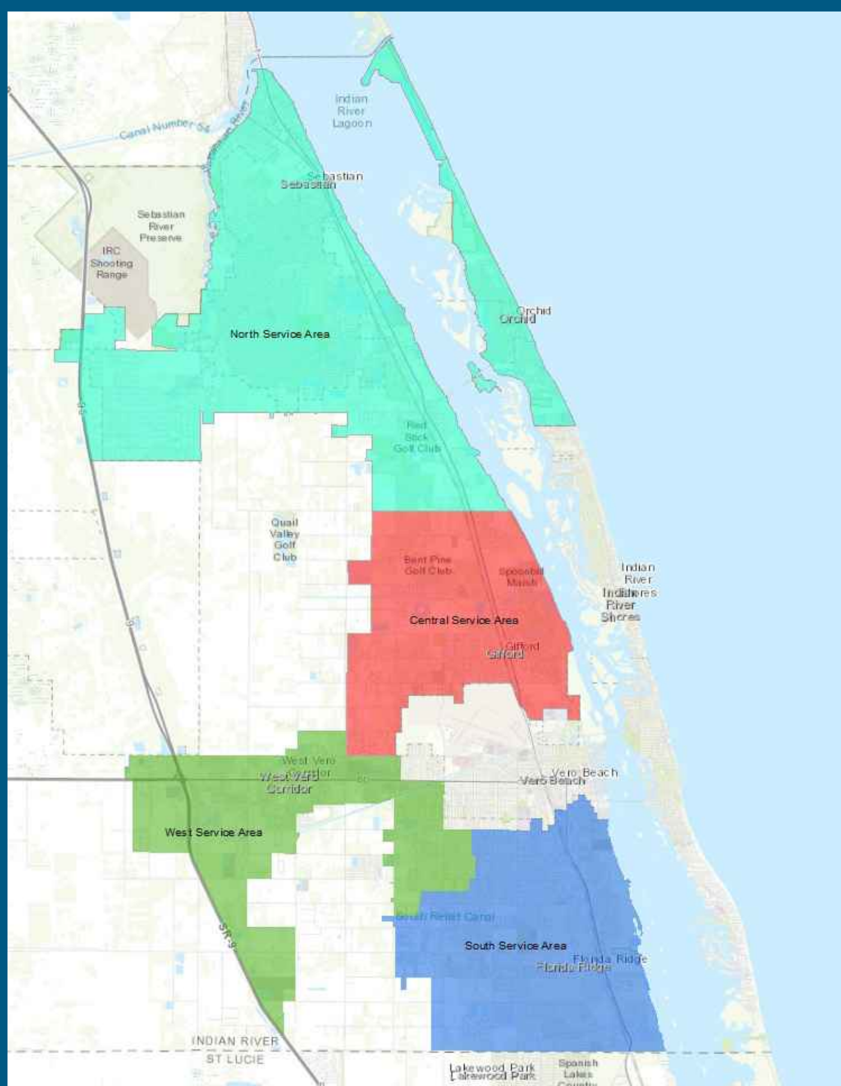
The Atkins evaluation showed that there currently is sufficient reclaimed water supply including the proposed augmentation source to meet the request. However, the existing infrastructure does not allow for transfer from the North Reuse Facility as the pumps cannot meet the demands and, although, there is sufficient capacity in the Central WWTF reclaimed water pumps, there is insufficient head for an elevated tank. At the time of this Master Plan, no decision had been made by John's Island regarding the type of storage facility as the condition assessment of the transfer pipe had not been performed. For the purposes of planning, the 2 MGD request is included in the Central WWTF demands for 2025 and the additional 1 MGD is included in the Central WWTF demands for 2040. After plans are completed for the John's Island Reuse Storage Tank, modeling will be needed to confirm pumping requirements that the Central WWTF and/or the proposed Storm Grove Reuse Augmentation Facility.

8.3 Summary and Recommendations

The proposed John's Island Reuse Storage and Repump Station reduces the need for expansion and/or improvements of the existing North Reuse Facility pumps and transmission piping. Furthermore, the Storm Grove Reuse Augmentation Facility is recommended and will be required to be online prior to 2025 to meet this future demand. However, that assumes that the John's Island facility will be built as planned. If the facility does not come online and the 3 MGD demand is not required, then augmentation is not necessary to support existing and future system demands.

For the purposes of this Master Plan, the requested reuse water supply for John's Island of 3 MGD has been included in the Central WWTF demands for 2025 and 2040. In both cases, Atkins has assumed that the reclaimed water will be supplied to the John's Island facility and will not require transfer to the Barrier Island customers through the use of IRC assets.

Overall Reclaimed Water System Evaluation



Section 9: Overall Reclaimed Water System Evaluation

9.1 Introduction

This section will review and evaluate the overall reuse system to determine if any improvements are necessary for comprehensive facilities operation and, if so, make recommendations for potential capital improvement projects.

As discussed in the previous sections, Indian River County's (IRC) reuse system consists of an interconnected reclaimed water transmission system from the County's three WWTFs:

- South WWTF
- West WWTF
- Central WWTF

In addition, to these three facilities, the reuse system also includes the North Reuse Facility where reclaimed water is stored and repumped to the Barrier Island customers. These four facilities were evaluated independently to determine what improvements may be needed and how those improvements would affect the downstream facilities.

9.2 Review of Overall Supply and Demand Balance

The projected supply and demands for the overall reclaimed water system, as determined in Section 2, are shown in Figure 9-1 below. This graph appears to show that there is sufficient supply to meet the reuse demands in the IRC's system until 2035. However, there are hydraulic restrictions that limit the transfer of reclaimed water between the WWTFs, particularly from the West WWTF. These restrictions and recommended improvements were discussed in detail in the previous sections and resulted in the recommendation in Section 7.5 to construct the Storm Grove Reuse Augmentation Facility.

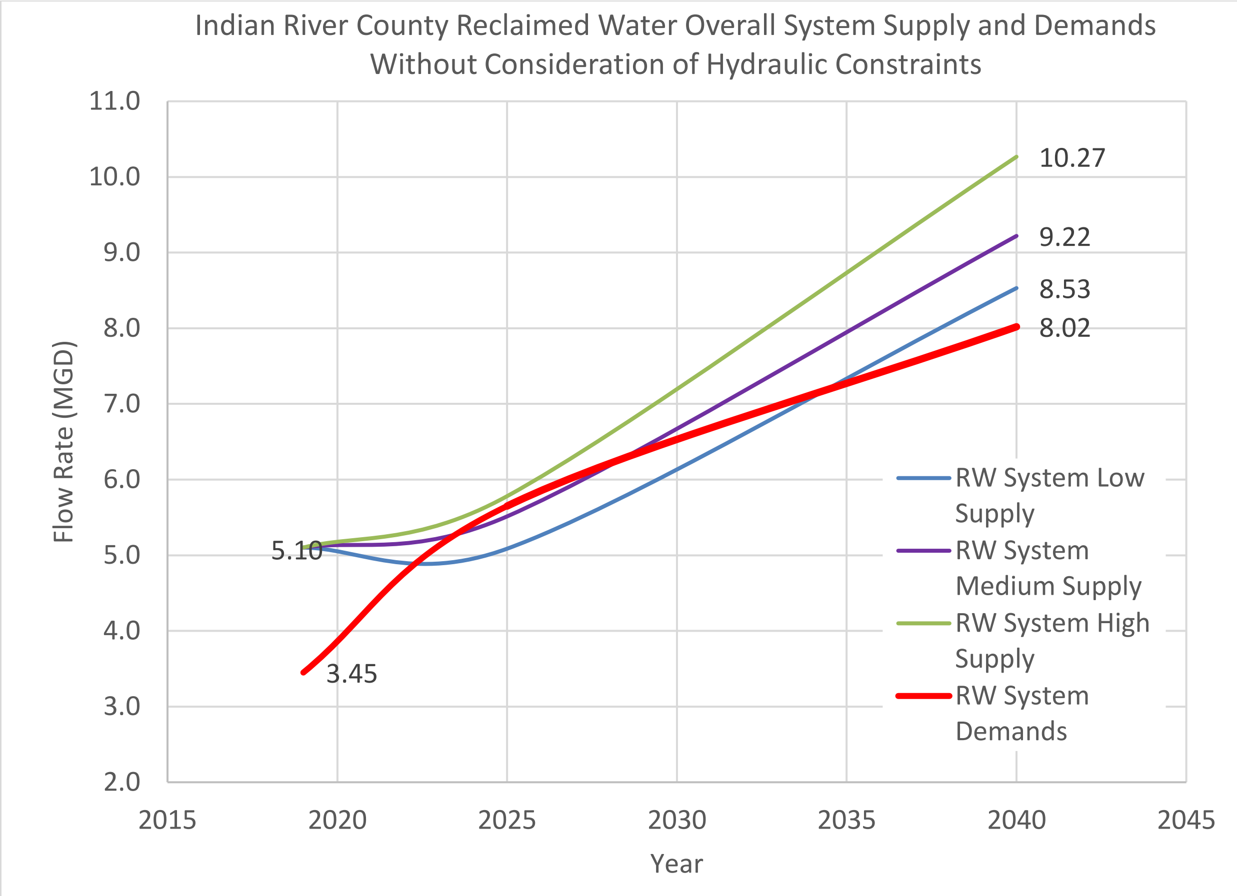


Figure 9-1: IRC Overall Reclaimed Water Balance Prior to Considering Hydraulic Constraints

When looked at holistically, there are actually two major components of the supply and demand balance for the overall system that require further review: the request for reclaimed water from the John's Island Water Management (John's Island) and the need for the Storm Grove Reuse Augmentation Facility. These two components are interrelated and must be discussed in unison.

In the case of John's Island, the assumption is that eventually there will be a request for an additional 3 MGD of reuse water from the Central WWTF, 2 MGD in 2025 and an additional 1 MGD by 2040. The intent is to deliver the reclaimed water to an easily accessed storage and repump facility, owned and operated by John's Island located near the North Reuse Facility. This is favorable to the County as infrastructure updates will not be required for the transfer of the reclaimed water demand and the demands can be met through the addition of the Storm Grove Reuse Augmentation Facility. However, there are factors that directly affect the recommendations that are included in this Master Plan: if and when John's Island builds their repump facility, as no agreement has been executed at this time.

The decision regarding the construction of the John's Island facility is dependent on a condition assessment of an existing 16-inch transmission main owned by John's Island and, as of December 2020, this assessment had not been scheduled. Assuming that the assessment is positive, it is recommended that the construction of the Storm Grove Reuse Augmentation Facility occur simultaneously with the construction of John's Island Reuse Storage and Repump Facility.

If the pipeline condition assessment is not positive and extensive pipeline repairs are required, it is anticipated that John's Island will not build their facility and they will not require the 2 MGD in 2025 and the Storm Grove Reuse Augmentation Facility will not be needed. However, John's Island has stated in the past that they would anticipate a reclaimed water demand of 1 MGD at John's Island East Golf Course by 2040. In that case, improvements to the pumps and south Barrier Island distribution main associated with the North Reuse Facility will be needed as summarized in the *Preliminary Engineering Report for the North Indian River County Barrier Island Reuse Water Storage and Pumping Facilities* (Schulke, Bittle, & Stoddard, LLC, April 2019).

9.3 Storage and Disposal Evaluation

When looked at individually, no additional storage is required to meet the FDEP regulation for plant effluent at each WWTF. This is due to the permitted disposal quantities for individual WWTFs, which does not consider that some disposal sites are shared by all of the County's WWTFs. Therefore, a review of the potential storage requirements for the overall system was completed. A list of available storage through 2040, including recommended storage and disposal additions as discussed in previous sections, is shown in Table 9-1.

Table 9-1: Indian River County Reclaimed Water Storage and Disposal (MG)

	2019	2025	2040	
On-Site RIBs	0.55	0.55	0.55	Existing at South and West WWTFs
Reject Storage Tank at Central	0.74	0.74	0.74	Existing at Central WWTF
Bent Pine RIBs (Cell 1)	1.46	1.46	1.46	Backup to Central WWTF On-Site Reject Tank
Bent Pine RIBs (Cells 2 - 7)	14.00	14.00	14.00	Existing Disposal
North Reuse Facility Tank	3.00	3.00	3.00	Existing Storage
West WWTF Existing Wetlands	0.70	4.00	4.00	Existing Disposal
Central WWTF Storage Tank	0.00	0.00	0.35	Re-purposed existing sludge tank
South WWTF Storage Tank	0.00	0.75	0.75	New Storage
West WWTF Storage Tank	0.00	2.00	2.00	New Storage
ASR/New Wetlands	0.00	0.00	4.00	New Disposal
Total Storage Available	**20.45**	**26.50**	**30.85**	

For purposes of ensuring that there is sufficient storage for IRC's entire reclaimed water system, the evaluation considered the requirements of FAC 62-610.464 Storage Requirements, which states the following:

> "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."

The regulation goes on to state that this reclaimed water wet weather storage requirement shall be separate from the reject water storage/disposal systems. However, the current WWTF permits include the on-site RIBs or substandard storage tanks as reclaimed water storage and the County has used these storage systems for surplus reclaimed water during past wet weather events.

Therefore, for purposes of this evaluation, the storage assessment was performed both with the substandard storage and without.

For IRC, alternative disposal sites include Bent Pine RIBs Cells 2 - 7 and the West WWTF wetlands. As previously discussed, the wetlands are currently restricted by effluent discharge nutrient concentration limits and both the on-site RIBs and Bent Pine RIBs are often limited in volume during wet weather events such as hurricanes. For these reasons, these alternative disposal sites were not deducted from the AADFs from the WWTFs prior to determining the storage volume required for the system. Therefore, the volume required for three days of storage is considered conservatively high. The final projected storage volume requirements for 3 days based on the high range of the AADFs are as shown in Table 9-2.

Table 9-2: Indian River County Reclaimed Water Storage Volumes

	2019	2025	2040
Total High AADF Influent Flows (MGD)	5.10	5.78	10.27
Storage Required For 3 Days (MG)	**15.31**	**17.34**	**30.80**

When compared to Table 9-1, there is sufficient storage to meet the wet weather storage requirements for the overall system through 2040. However, if the volume of reject water storage is removed from the calculation for available wet weather storage, there is insufficient storage available for the entire system by 2040 as shown in Table 9-3.

Table 9-3: Indian River County Reclaimed Water Storage With Reject Sites Excluded (MG)

Storage	2019	2025	2040	Description
Bent Pine RIBs (Cells 2 - 7)	14.00	14.00	14.00	Existing Disposal
North Reclaimed Water Facility Tank	3.00	3.00	3.00	Existing Storage
West WWTF Existing Wetlands	0.70	4.00	4.00	Existing Disposal (currently limited)
Central WWTF Storage Tank	0.00	0.00	0.35	Re-purposed existing sludge tank
South WWTF Storage Tank	0.00	0.75	0.75	New Storage
West WWTF Storage Tank	0.00	2.00	2.00	New Storage
ASR/New Wetlands	0.00	0.00	4.00	New Disposal
Total Storage Available	**17.70**	**23.75**	**28.10**	
Storage Required For 3 Days	15.31	17.34	30.80	From Table 9-2
Surplus/(Deficit) of Available Storage	**2.39**	**6.41**	**(2.70)**	

Table 9-3 shows that there will be a deficit of wet weather storage of 2.70 MG for IRC's reclaimed water system by 2040. Although options for managing this deficit were evaluated and are discussed below, it should be noted that this is a very conservative calculation as the following assumptions were made:

- Projected high AADF values for all three WWTFs were used to determine the required volume of storage
- The wetlands and Bent Pine RIBs volumes were not removed from the AADF flows prior to calculating the required storage volumes.

9.3.1 Storage/Disposal Criteria and Recommendation

To meet the anticipated storage deficit in 2040, several options were reviewed, including increasing the storage at the WWTFs, reducing reclaimed water disposal needs from South WWTF through DPR, and/or increasing the disposal capacity at the West WWTF through implementation of a new ASR/ Wetlands. However, through the discussions of these options, it became apparent that the final storage/disposal recommendation(s) would need to keep the following considerations in mind:

- Creating the storage/disposal volume at multiple locations would likely be inefficient and more costly than one facility
- Any storage facility would eventually need to be discharged to the reuse system or to a disposal site
- The location of the future storage/disposal facility would need to be accessible to both Central and West WWTFs
- The hydraulic constraints for transfer from the West WWTF will need to be taken into consideration

With this in mind, it was determined that a 3 MG storage and repump facilities at Bent Pine RIBs site would be the best option for the new storage location. This location addresses all of the above considerations while also including the following additional benefits:

- Disposal through tank draining is available at the site as RIBs water levels drop
- This site provides easy access to transmission mains for the Central reclaimed water customers and North Reuse Facility storage tank
- Capacity of the existing West WWTF reclaimed water pumps would be increased by 0.6 MGD, thus transferring more reclaimed water to potential reuse customer
- The new booster pumps can be sized to create a pressurized system for present and future customers associated with the Central WWTF

The threshold capacity for the addition of the Bent Pine RIBs Storage and Repump Facility was calculated to be needed when the AADF influent flows for all three WWTFs reached 9.3 MGD (AADF), which is anticipated to occur ~2037.

Should the site constraints at Bent Pine RIBS restrict the size of the storage tank, IRC could consider the option of locating the storage and repump facility at the City owned property adjacent to the Central WWTF. This location would also require additional transmission piping between Bent Pine RIBs and Central WWTF for transfer of reclaimed water from the West WWTF. IRC should investigate converting 4,000 linear feet (LF) of 16-inch pipeline previously constructed to supply the Waterway Village development that is currently not in use to transmission piping to the new Central storage and repump facility.

9.4 Summary and Recommendations

When reviewing the supply and demands for the overall system, it appears that there is sufficient supply to meet the reuse demands in the IRC's system. However, hydraulic constraints reduce the availability to transfer reclaimed water and, for this reason, the Storm Grove Reuse Augmentation Facility will be required as discussed in Section 7 and listed in the Table 7-12 Recommended Central WWTF System Improvements. However, the need for this system is dependent on if and when the John's Island reuse repump facility comes online. If the reuse facility is not constructed, the augmentation system will not be needed; however, both the pump capacity at the North Reuse Facility and the size of the distribution main on the Barrier Island will need to be increased. For the purposes of this Master Plan, the assumption remains that the John's Island storage tank and repump facility will be constructed.

Currently, the permits for each of the IRC WWTFs do not consider that some of the permitted storage is also shared storage, Therefore, when looked at individually, no additional storage is required to meet the FDEP regulation for reclaimed water wet weather disposal. However, when reviewed as an entire system, a conservative estimate shows that additional storage of approximately 3 MG will be required by 2040. The recommendation is to provide a 3 MG storage tank and repump station at Bent Pine RIBs.

Table 9-4: Recommended Overall Reclaimed Water System Improvements

Year	Project Number	Component	Current Deficiency	Correction
~2037 At a Threshold Capacity of total system effluent of 9.3 MGD	IRC-ORW-1	Bent Pine Reuse Storage and Repump Facilities	Storage for entire IRC reclaimed water system requires an additional 3 MG storage/disposal.	Provide a new storage and repump facility, centrally located between West and Central WWTFs at Bent Pine RIBs site.

Section 10: Capital Improvements

10.1 Introduction

This section summarizes the capital projects and anticipated costs associated with Indian River County's (IRC) reclaimed water system as discussed in previous sections. These capital projects fall into two categories: improvements to the existing reclaimed water infrastructure and alternative disposal methods. A discussion on prioritization of capital projects follows the list of projects and costs. The final chapter in this section includes a quick discussion on capital improvements that, although not related to the scope of this project, were noticed during the creation of the Reclaimed Water Master Plan.

10.2 Capital Improvement Projects

A comprehensive discussion on IRC's reclaimed water system resulted in a list of options from which final capital projects were recommended. The Capital Improvement Projects, shown in Table 10-1 below, are compiled from the final recommendations provided in sections 5–9. The entire list of improvement options is provided in Appendix C.

Table 10-1: IRC Capital Improvement Projects Compiled

Facility	Project Number	Component	Current Deficiency	Correction
South WWTF	IRC-SRRW-1	Install 0.75 MG on-site storage tank	No storage to attenuate peak flows causing disposal and transfer issues.	Install storage to attenuate peak flows and wet weather events. Allows for smoother transfer of reclaimed water to the West WWTF.
South WWTF	IRC-SRRW -2	Upgrade 8-inch transmission main to 16-inch – timed with DOT projects	The existing 1,800 gpm pumps are limited to 1,200 gpm due to the hydraulic constraints in the system.	Upgrade to a 16-inch transmission main, which will significantly decrease energy loss and allow pumps to operate as designed, meeting transfer requirements through 2040.
West WWTF	IRC-WRRW-1	West WWTF Wetlands at Design Capacity of 4.0 MGD	Peak wet weather disposal options are limited at the West WWTF due to modifications to the wetlands permit.	Continue negotiations with regulatory agencies to revise wetlands discharge concentrations to allow for full use of the wetlands permitted capacity of 4.0 MGD.
West WWTF	IRC-WRRW-2	2 MG West WWTF Reuse Storage Capacity and Pump Station	Currently there is no equalization storage in the system to use for demands.	Installing a 2 MG storage tank at the West WWTF will equalize peak flows transferred from the South and West WWTFs.
West WWTF	IRC-WRRW-3	Proposed Wetlands or Deep Injection Well	Additional wet weather disposal options are required at the West WWTF.	Install new wetlands or deep injection well with a minimum capacity of 4.0 MGD on the County-owned parcel at the West WWTF.

Facility	Project Number	Component	Current Deficiency	Correction
Central WWTF	IRC-CRW-1	Backpressure Sustaining Valves	Operational issues require simultaneously filling storage tank and golf course stormwater ponds.	Install pressure sustaining valves at each of the Central pond customer sites and the North Reuse Facility storage tank fill line.
Central WWTF	IRC-CRW-2	Storm Grove Reuse Augmentation System	As future customer demands increase, reuse augmentation is required	Install Storm Grove Augmentation System, with a capacity of 1.5 MGD, to meet future demands.
Central WWTF	IRC-CRW-3	0.35 MG Central WWTF Reuse Storage Capacity Conversion	Wet weather equalization storage at the Central WWTF required as early as 2029.	Re-purpose existing abandoned 0.35 MG concrete tank for use as a wet weather equalization tank.
Overall Reuse System	IRC-ORW-1	Bent Pine Reuse Storage and Repump Facilities	Storage for entire IRC reclaimed water system requires an additional 3 MG storage/disposal.	Provide a new storage and repump facility, centrally located between West and Central WWTFs at Bent Pine RIBs site.

10.3 Prioritization

Capital projects take time to design, permit and construct. Therefore, it was important to determine the threshold capacity for the flow rates, either supply or demand, that would be beyond the capacity of the existing system. These threshold capacities, as determined in sections 5–9, created a timeline and prioritized the capital projects as shown in Table 10-2.

Table 10-2: Anticipated Threshold Capacities for IRC Capital Improvement Projects

Facility	Threshold Capacity	Project Number	Description
South WWTF	*Current*	IRC-SRRW-1	Install 0.75 MG on-site storage tank
West WWTF	*Current*	IRC-WRRW-1	West WWTF Wetlands at Design Capacity of 4.0 MGD
West WWTF	*Current*	IRC-WRRW-2	2 MG West WWTF Reuse Storage Capacity and Pump Station
Central WWTF	*Current*	IRC-CRW-1	Pressure Sustaining Valves
Central WWTF	In ~2025[1]	IRC-CRW-2	Storm Grove Reuse Augmentation System
South WWTF	0.9 MGD into South WWTF. In ~2029	IRC-SRRW -2	Upgrade 8-inch transmission main to 16-inch – timed with DOT projects
Central WWTF	3.15 MGD into Central WWTF. In ~2029	IRC-CRW-3	0.35 MG Central WWTF Reuse Storage Capacity Conversion
West WWTF	6.0 MGD *combined* West influent and South transfer flows. In ~2030	IRC-WRRW-3	Proposed Wetlands or Deep Injection Wells
Overall Reuse System	9.3 MGD combined influent to all IRC WWTFs. In ~2037	IRC-ORW-1	Bent Pine Reuse Storage and Repump Facilities

[1] Dependent on timing of John's Island RW Storage and Repump Facility

10.4 Capital Costs

The estimated capital costs for each of the capital projects listed above is shown in Table 10-3. This cost includes 20% of overall construction costs for engineering, design and permitting. See Appendix D for project cost details.

Table 10-3: Anticipated Costs for IRC Capital Improvement Projects

			Anticipated Year of Operational Need				
Capital Project	CIP Project No.	Capital Costs	2020	2025	2029	2030	2038
South WWTF RW Storage Tank	IRC-SRRW-1	$4,428,000	X				
West WWTF RW Storage Tank	IRC-WRRW-2	$6,300,000	X				
West WWTF Existing Wetlands Permit Update	IRC-WRRW-1	$80,000	X				
Backpressure Valves for Central Customers	IRC-CRW-1	$252,000	X				
Storm Grove Augmentation System*	IRC-CRW-2	$3,324,000		X			
South WWTF Transmission Main Improvements	IRC-SRRW-2	$1,680,000			X		
Central WWTF RW Storage Tank	IRC-CRW-3	$996,000			X		
West WWTF Proposed Wetlands or DIWs	IRC-WRRW-3	$15,084,000				X	
Bent Pine Reuse Storage and Repump Facility	IRC-ORW-1	$8,136,000					X
Total Capital Costs		$40,280,000	$11,060,000	$3,324,000	$2,676,000	$15,084,000	$8,136,000

*Dependent on timing of John's Island RW Storage and Repump Facility.

10.5 General Observations

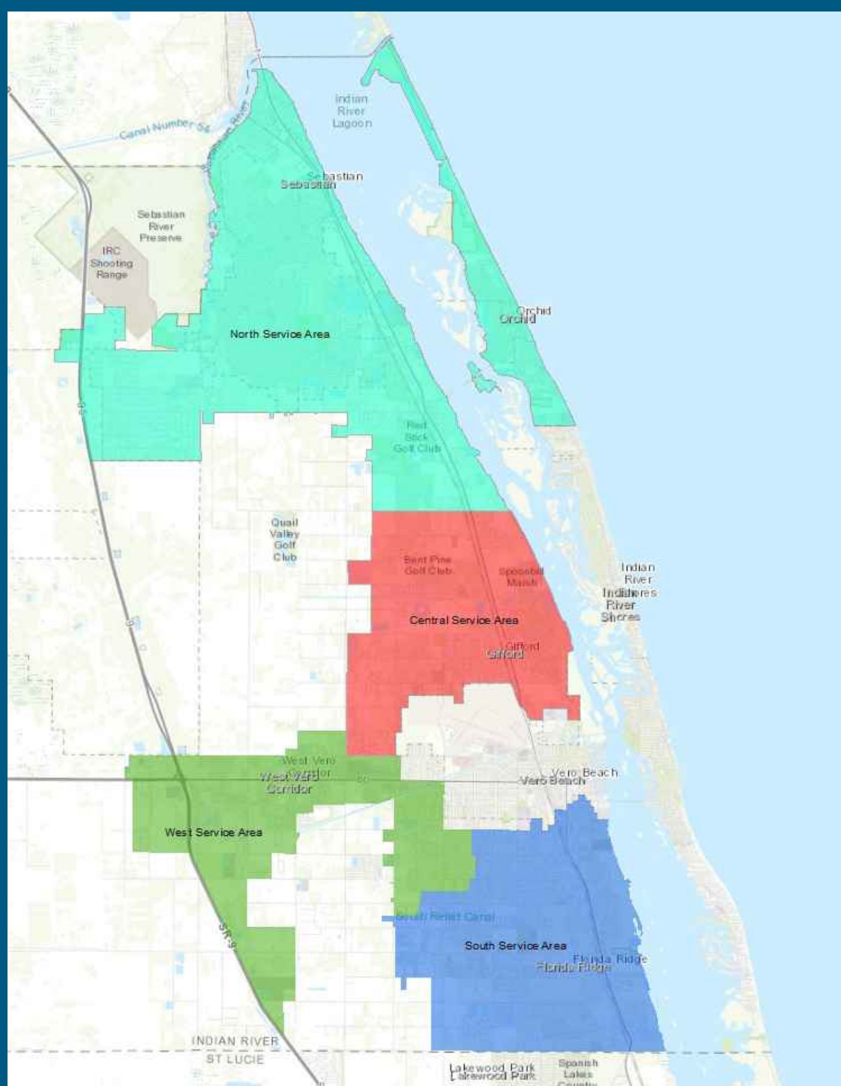
Although outside of the scope of this project, three distinct projects were recognized and are listed below for IRC Staff knowledge.

Upgrade of Central WWTF to AWT Standards: As reclaimed water quality becomes more scrutinized and regulated, it may become more difficult to dispose of reclaimed water that does not meet the phosphorus and nitrogen levels of AWT. Currently, Central WWTF is the only IRC treatment facility that is not designed to meet AWT levels.

Influent Equalization Tanks for South WWTF: The peaking factor for the South WWTF is 3.85 due to peak hour flows from Lift Station 89 and possibly from I&I issues. This peaking factor can create issues with operations and treatment during peak hour and wet weather events. Therefore, it is recommended that equalization tanks and systems be constructed.

Landfill Reuse Water System: During discussions with IRC Staff regarding potential reuse customers, it was suggested that the County Landfill Facility could utilize reuse water. Although there is the infrastructure to get reclaimed water to an existing storage tank, the repump/transfer system from the tank to locations throughout the landfill does not yet exist. Currently, the landfill reuse demand is shown as a 2040 demand of 0.20 MGD but it may be possible to provide reuse water as soon as 2025 if the transfer system could be put in place.

Appendices

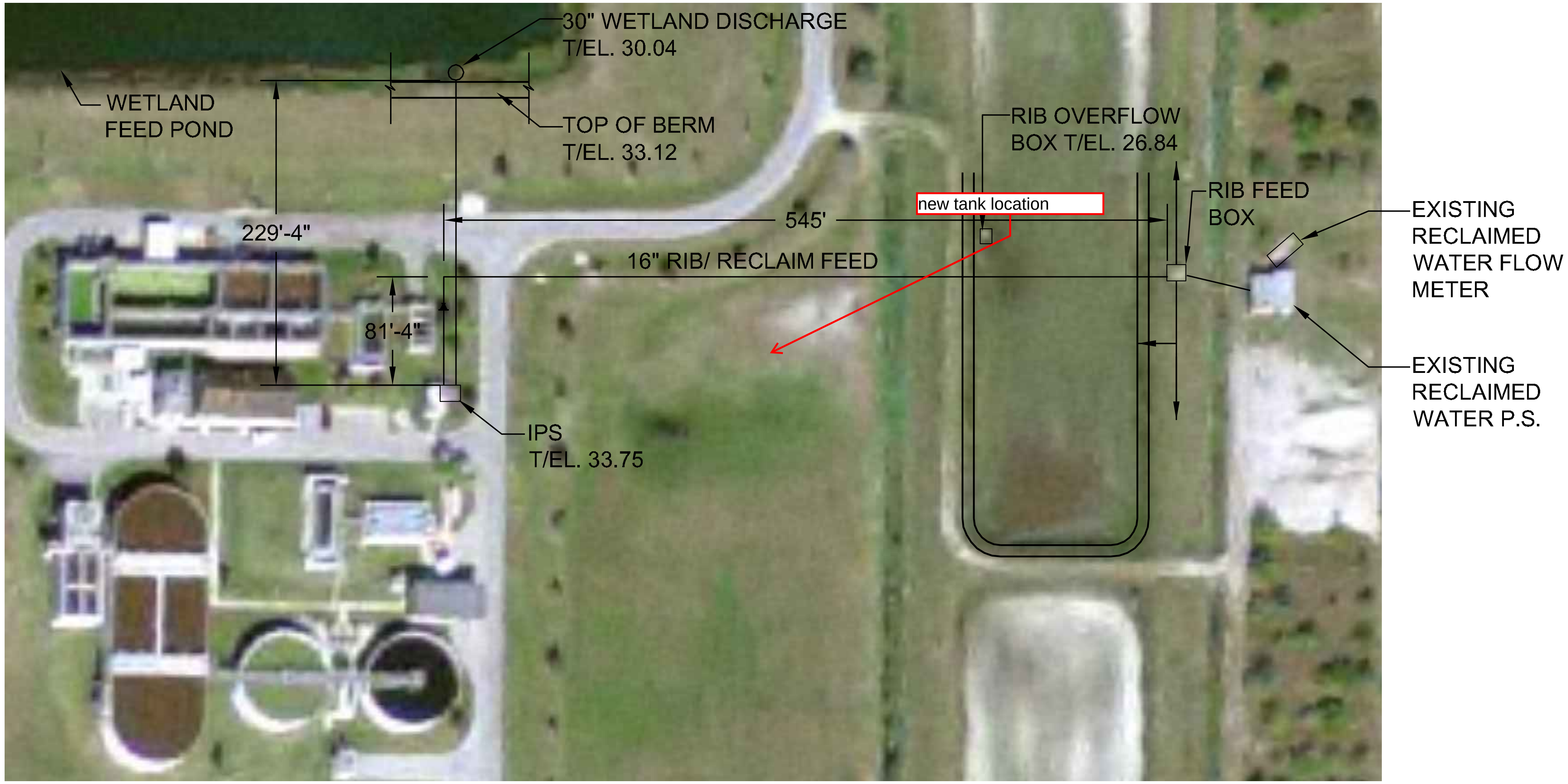

Indian River Lagoon
Sebastian
Sebastian River Preserve
IRC Shooting Range
North Service Area
Orchid
Red Stick Golf Club
Quail Valley Golf Club
Bent Pine Golf Club
Indian River Shores
Central Service Area
Gifford
West Vero Corridor
Vero Beach
West Service Area
South Service Area
Florida Ridge
INDIAN RIVER
ST LUCIE
Lakewood Park
Spanish Lakes Country Club

Appendix A

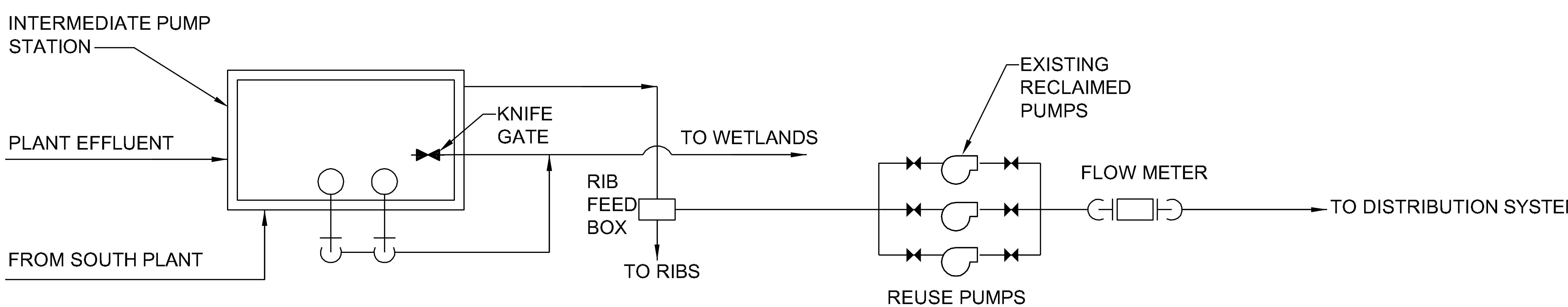
Conceptual Design – West Regional Storage and Pump Station

FIGURE 1

EXISTING REUSE SYSTEM SCHEMATICS AND PLAN

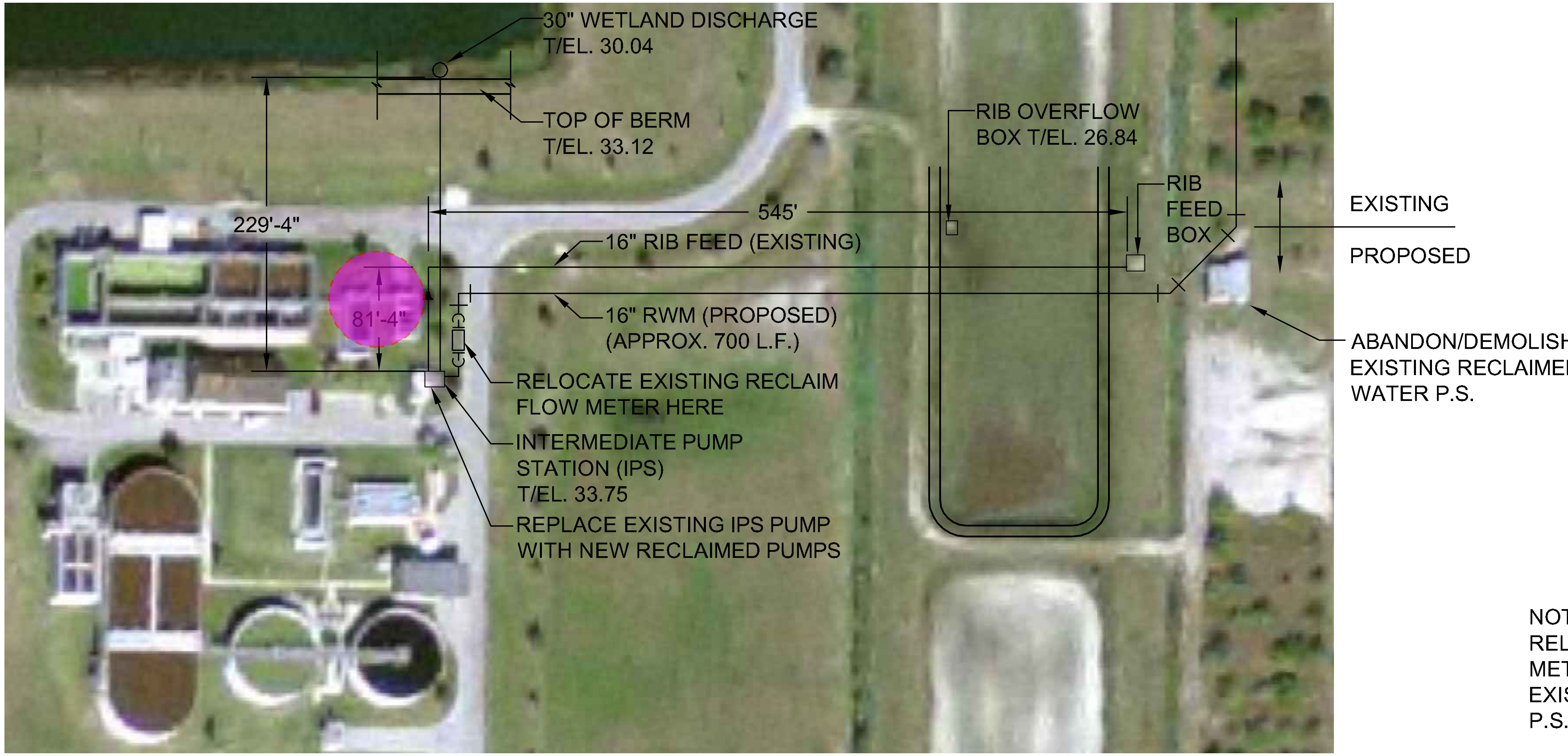


EXISTING SYSTEM PLAN



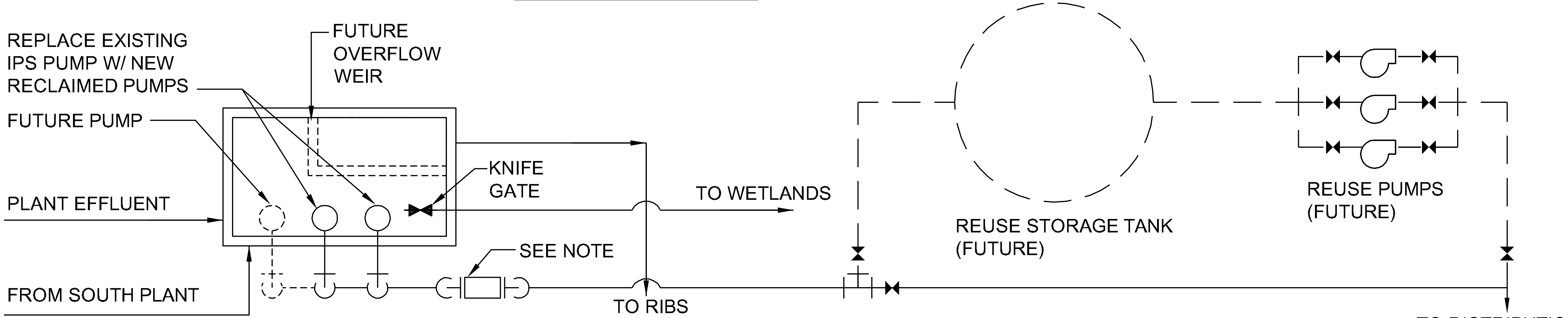
EXISTING SYSTEM SCHEMATIC

PBS&J



NOTE:
RELOCATE EXISTING FLOW METER HERE FROM D/S OF EXISTING RECLAIMED WATER P.S.

PROPOSED SYSTEM PLAN



PROPOSED SYSTEM SCHEMATIC

FIGURE 2

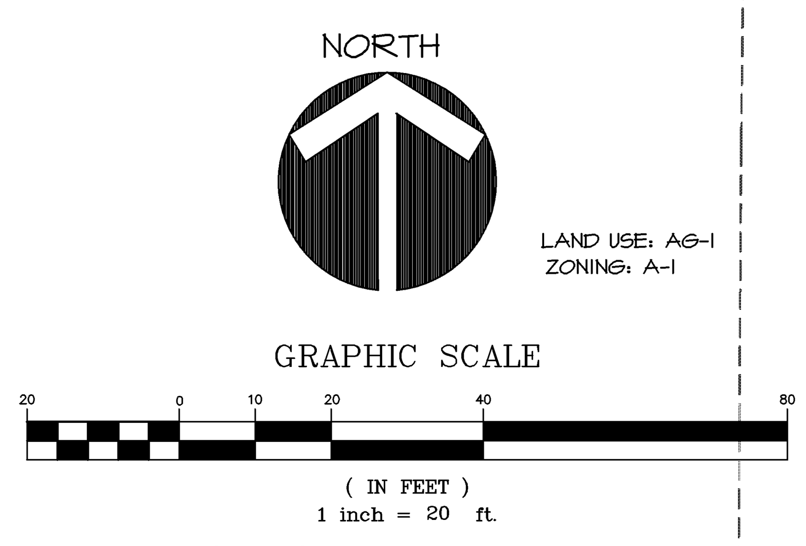
PROPOSED REUSE SYSTEM SCHEMATICS AND PLAN

PBS&J

U:\WO\Projects\IRC_W_WW2004\WOXX WestWRF\15_Plans\Design\Effluent Structure Modifications\effluent struct mod_FIG2.dwg Sep29,2008 - 4:05pm Plotted By: 11361

Appendix B

Storm Grove Reuse Augmentation Design Plans



Administrative Permit Criteria Compliance:

1– SEE I.R.C. LAND DEVELOPMENT CODE CHAPTER 901 FOR DEFINITION OF UTILITIES, PUBLIC AND PRIVATE–LIMITED.

2– BETWEEN ALL ABOVE GROUND FACILITIES (EXCEPT DISTRIBUTION AND COLLECTION FACILITIES) AND ADJACENT PROPERTY HAVING A RESIDENTIAL LAND USE DESIGNATION, A TYPE "B" BUFFER (REDUCED TO A TYPE "C" WHERE ABUTTING A LOCAL OR THOROUGHFARE PLAN ROADWAY) WITH SIX–FOOT OPAQUE SCREEN AS SPECIFIED IN CHAPTER 926, LANDSCAPING, SHALL BE PROVIDED.
(NOT APPLICABLE: NO ADJACENT RESIDENTIAL LAND USE DESIGNATIONS)

3– ALL BELOW–GROUND HIGH VOLTAGE CABLES WITHIN THE RIGHT–OF–WAY SHALL BE MADE KNOWN TO THE PUBLIC THROUGH THE USE OF SIGNS POSTED.

4– IN ALL ZONING DISTRICTS EXCEPT THE INDUSTRIAL DISTRICTS, ALL EQUIPMENT, MACHINERY, AND FACILITIES WHICH CANNOT BY THEIR SIZE OR NATURE, BE LOCATED WITHIN AN ENCLOSED BUILDING SHALL BE SEPARATED FROM ADJACENT PROPERTIES HAVING A RESIDENTIAL LAND USE DESIGNATION BY A TYPE "C" BUFFER (WITH SIX–FOOT OPAQUE SCREENING) AS SPECIFIED IN CHAPTER 926, LANDSCAPING.
(NOT APPLICABLE: NO ADJACENT RESIDENTIAL LAND USE DESIGNATIONS)

5– DRIVEWAYS LOCATED IN CLOSE PROXIMITY TO ADJACENT PROPERTIES HAVING A RESIDENTIAL LAND USE DESIGNATION SHALL PROVIDE A SIX–FOOT OPAQUE SCREENING BETWEEN THE DRIVEWAY AND THE ADJACENT PROPERTY. AN EIGHT–FOOT OPAQUE SCREEN MAY BE REQUIRED IF DEEMED NECESSARY TO MITIGATE NOISE AND VISUAL IMPACTS.
(NOT APPLICABLE: NO ADJACENT RESIDENTIAL LAND USE DESIGNATIONS)

Site Plan Notes:

1– ALL OUTDOOR LIGHTING SHALL BE SHIELDED FROM ADJACENT PROPERTIES AND ROADWAYS.

2– ALL NUISANCE EXOTIC VEGETATION SHALL BE REMOVED IN CONJUNCTION WITH SITE DEVELOPMENT.

3– COMMERCIAL BUILDINGS SHALL POST A MINIMUM 6" NUMERICAL ADDRESS

4– BUILDING COLOR TO BE CONSISTENT WITH THE RECENTLY APPROVED I.R.C. REUSE WATER STORAGE & PUMPING FACILITY BUILDING.

5– ALL HANDICAPPED PARKING SPACES SHALL BE PROPERLY SIGNED AND STRIPED ACCORDANCE WITH THE FDOT STANDARD INDEX 17346, 2010 EDITION AS SHOWN IN THESE PLANS.

6– ALL NATIVE UPLAND VEGETATION CONTRIBUTING TO THE STABILIZATION OF BANKS OF EXISTING CANALS, DITCHES, OR WATER COURSES SHALL BE RETAINED.

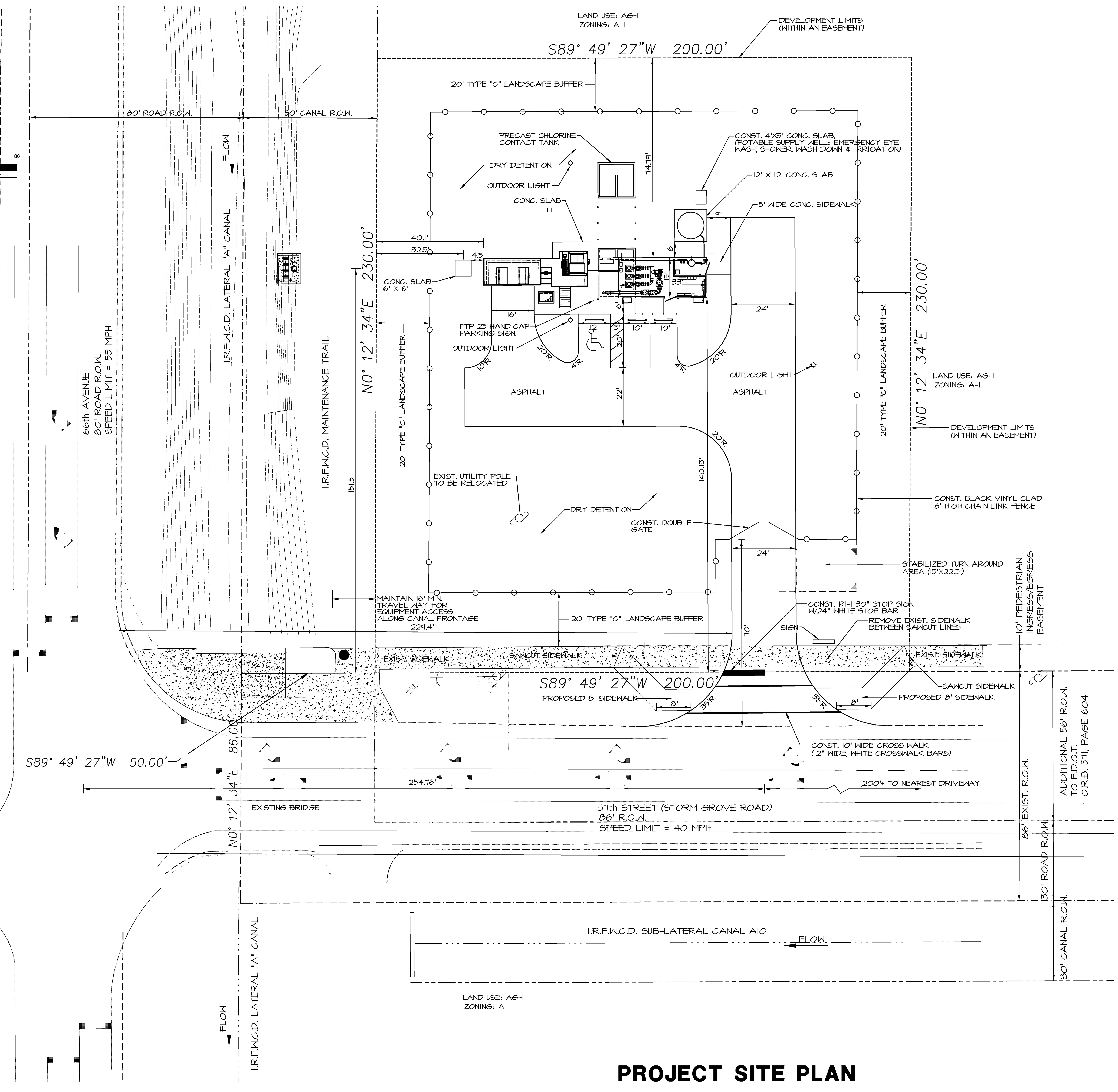
CONSTRUCTION NOTE:

INDIAN RIVER COUNTY TRAFFIC ENGINEERING HAS UNDERGROUND CONDUIT FOR TRAFFIC SIGNAL INTERCONNECTIONS IN THIS AREA AS WELL AS OTHER TRAFFIC SIGNAL EQUIPMENT. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT SUNSHINE STATE ONE CALL SYSTEM AT 1–800–432–4770 FOR LOCATIONS OF THIS EQUIPMENT AT LEAST 72 HOURS PRIOR TO ANY CONSTRUCTION.

JURISDICTIONAL PERMITS

INDIAN RIVER COUNTY:	MAJOR SITE PLAN/ADMINISTRATIVE PERMIT
INDIAN RIVER COUNTY:	LAND CLEARING PERMIT
INDIAN RIVER COUNTY:	TREE REMOVAL PERMIT
INDIAN RIVER COUNTY:	TYPE "B" STORM WATER
INDIAN RIVER COUNTY:	UTILITY CONSTRUCTION PERMIT
S.J.R.W.M.D.:	E.R.P.
FLORIDA D.E.P. :	POTABLE WATER PERMIT
FLORIDA D.E.P. :	REUSE PERMIT
FLORIDA D.E.P. :	N.O.I. PERMIT*

* TO BE SECURED BY THE PROJECT CONTRACTOR.



SITE DATA

GENERAL STATEMENT

THIS PROJECT PROPOSES A LIMITED UTILITY (WATER TREATMENT PLANT) FOR TREATING STORM WATER FOR THE PURPOSE OF SUPPLEMENTING INDIAN RIVER COUNTY UTILITIES DEPARTMENT RECLAIMED WATER SUPPLY.

OWNER

INDIAN RIVER COUNTY SCHOOL DISTRICT
1990 25TH STREET
VERO BEACH, FLORIDA 32960
Ph. (772) 564–3000

ENGINEER

MASTELLER & MOLER, INC.
1655 27TH STREET. SUITE 2
VERO BEACH , FLORIDA 32960
Ph. (772) 567–5300

APPLICANT

INDIAN RIVER COUNTY UTILITIES
1801 27TH STREET, BUILDING A
VERO BEACH, FLORIDA 32960
Ph. (772) 567–8000

SURVEYOR

MASTELLER, MOLER, REED & TAYLOR INC.
1655 27TH STREET. SUITE 2
VERO BEACH , FLORIDA 32960
Ph. (772) 564–8050

TAX PARCEL

TAX I.D. # 32–39–17–0000–1003–000001.0

SCHEDULE

PROJECT COMMENCEMENT:	OCTOBER 2013
PROJECT COMPLETION:	FEBRUARY 2013

SITE ADDRESS

6590 57TH STREET, VERO BEACH, FL 32967

FULL PARCEL LEGAL DESCRIPTION

DESCRIPTION: PBS 2–12 A PARCEL OF LAND LYING IN SECTION 17, TOWNSHIP 32 S, RANGE 39 E, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: TRACTS 3, 4, 5, AND 6, LESS THAT DESCRIBED PORTION OF TRACT 5 BEING DESCRIBED AS FOLLOWS: THE SOUTH 86.00 OF THE EAST 690.00 FEET OF THE WEST 740.00 FT AND SOUTH 81.00 FEET OF THE EAST 588.01 FT AND LESS THAT PORTION OF TRACT 6 BEING DESCRIBED AS FOLLOWS: THE SOUTH 81.00 FT AS DESCRIBED IN O.R. BOOK 571, PAGE 604; LESS THAT ADDITIONAL ROAD RIGHT–OF–WAY FOR 62nd AVENUE AS DESCRIBED IN O.R. BOOK 2358, PAGE 1149.

EASEMENT LEGAL DESCRIPTION

A PARCEL OF LAND LOCATED IN TRACT 5, SECTION 17, TOWNSHIP 32 SOUTH, RANGE 39 EAST ACCORDING TO THE LAST GENERAL PLAT OF THE LANDS OF THE INDIAN RIVER FARMS DRAINAGE DISTRICT AS RECORDED IN PLAT BOOK 2, PAGE 25 OF THE PUBLIC RECORDS OF ST. LUCIE COUNTY, FLORIDA, SAID LANDS NOW LYING IN INDIAN RIVER COUNTY, FLORIDA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION 17; THENCE S00 12'34"W ALONG THE WEST LINE OF SAID SECTION 17 A DISTANCE OF 2571.60 FEET TO A POINT, SAID POINT BEING 86.00 FEET NORTH OF, AS MEASURED PERPENDICULAR TO, THE SOUTH LINE OF SAID TRACT 5; THENCE N89 49'27"E AND PARALLEL WITH THE SAID SOUTH LINE OF TRACT 5 A DISTANCE OF 50.00 FEET TO AN INTERSECTION WITH THE EAST RIGHT OF WAY LINE OF THE LATERAL "A" CANAL AS SHOWN ON THE SAID PLAT OF INDIAN RIVER FARMS COMPANY AND THE NORTH LINE OF THE RIGHT OF WAY LINE AS DEEDED TO THE FLORIDA DEPARTMENT OF TRANSPORTATION IN OFFICIAL RECORD BOOK 571, PAGE 604 OF THE PUBLIC RECORDS OF INDIAN RIVER COUNTY FLORIDA AND THE POINT OF BEGINNING OF THE HEREON DESCRIBED PARCEL OF LAND;
THENCE CONTINUE N89 49'27"E ALONG SAID NORTH RIGHT OF WAY LINE A DISTANCE OF 200.00 FEET; THENCE N00 12'34"E AND PARALLEL WITH THE SAID WEST LINE OF SECTION 17 A DISTANCE OF 230.00 FEET; THENCE S89 49'27"W AND PARALLEL WITH THE SAID NORTH RIGHT OF WAY LINE A DISTANCE OF 200.00 FEET TO AN INTERSECTION WITH THE SAID EAST RIGHT OF WAY LINE OF THE LATERAL "A" CANAL; THENCE S00 12'34"W ALONG THE SAID EAST RIGHT OF WAY LINE A DISTANCE OF 230.00 FEET TO THE POINT OF BEGINNING; CONTAINING 46,000 SQUARE FEET OR 1.06 ACRES MORE OR LESS.

EXISTING SOILS: PINEDA FINE SAND (100%)

FLOOD ZONE: ZONE "AE–22.3" PER F.I.R.M. NO. 12061C0089 F DATED DEC 4, 2012 (=20.9 NAVD)

ZONING / LAND USE: ZONING: A–1 LAND USE: AG–1

PROPOSED USE: LIMITED UTILITY

ZONING INFORMATION

GROSS AREA	145.79 ACRES
EASEMENT AREA	1.06 ACRES
DEVELOPMENT AREA	0.94 ACRES
PROPOSED USE:	UTILITY

CRTERIA	REQUIRED	PROPOSED
BUILDING HEIGHT:	35' MAX.	35' MAX.
MINIMUM LOT SIZE:	200,000 SF	6,350,612 SF
MINIMUM LOT WIDTH:	150'	2,459'
MAXIMUM BLDG. COVERAGE:	20%	1.1% (OF EASEMENT)
OPEN SPACE:	60%	78.6% (OF EASEMENT)

SETBACK CRITERIA	REQUIRED	PROPOSED
FRONT:	30'	140.13'
SIDE:	30'	40.1'
REAR:	30'	2,386.1'

POTABLE WATER:	POTABLE SUPPLY WELL
SANITARY SEWER:	N/A

PROJECT TABULATIONS

PROPOSED DEVELOPMENT

PROPOSED PAVING/SLABS:	8,823 SF
PROPOSED BUILDING/STRUCTURE ADDITIONS:	1,066 SF
TOTAL PROPOSED NEW IMPERVIOUS:	9,889 SF

TRAFFIC COMPUTATIONS

THE TREATMENT AND PUMP FACILITIES ON THE GATED SITE WILL BE UNMANNED BUT SERVICED PERIODICALLY BY AUTHORIZED COUNTY PERSONNEL. TRAFFIC IS ESTIMATED AT 5 TRIPS PER DAY, MORE OR LESS.

PARKING TABULATIONS

REQUIRED: UNMANNED WATER PLANT– TWO (2) SPACES TOTAL
TOTAL PROPOSED PARKING SPACES: 3 SPACES (1 HANDICAP ACCESSIBLE)

ACCESSIBLE SPACES:

UP TO 25 SPACES:	1 ACCESSIBLE REQUIRED
NO. OF REQUIRED SPACES:	5 SPACES
REQUIRED ACCESSIBLE:	1 SPACE
TOTAL REQUIRED:	1 SPACE
TOTAL PROVIDED:	1 SPACE

PROJECT SITE PLAN

NO.	DATE	DESCRIPTION	DR/APP
2.	4/30/13	REVISED PER IRC & IRFWCD COMMENT LETTERS	SH/EHM
1.	1/11/13	REVISED PER FDEP & SJRWMD COMMENT LETTERS	SH/EHM

REVISIONS

MASTELLER & MOLER, INC.
CONSULTING ENGINEERS
CERTIFICATE OF AUTHORIZATION NUMBER 4204
1655 27th STREET, SUITE #2, VERO BEACH, FLORIDA, 32960
(772) 567–5300 / FAX (772) 794–1106

INDIAN RIVER COUNTY

STORMWATER REUSE TREATMENT & PUMPING SYSTEM at STORM GROVE ROAD & 66th AVENUE

INDIAN RIVER COUNTY FLORIDA

EARL H. MASTELLER, P.E. FL#26658

DRAWN	SH
DESIGNED	EHM
CHECKED	EHM
DATE	JUNE 2012
SCALE	1"=20'
SHEET	4 OF 18
DWG NO	1154

Appendix C

Cumulative Options

Cumulative Summary of Options/Alternatives

WWTF - Option No.	Designation	Project Number	Description	Benefit	Challenge	Threshold Capacity/Year
South - 1	Alternate		Increase pump capacity to maximum allowable flow in existing transmission main.	Utilizes existing infrastructure. Provides time to upgrade transmission line or negotiate DPR.	Existing transmission main restricts flow to 1,500 gpm. Does not provide sufficient flow past 2031.	
South - 2	Recommended	IRC-SRRW -2	Increase 8,500 LF of transmission main from 8-inch to 16-inch diameter.	Increases max flow to 3,500 gpm (5 mgd). Allows for use of existing pumps through 2040.	Requires construction of 8,500 LF of new main.	0.9 mgd (AADF) at South WWRF in ~2029
South - 3	Alternate		Create direct potable reuse system by transferring reclaimed water to nearby WTP.	Reduces quantity of water transferred to West WWTF. Provides opportunity to showcase technical expertise. Potential alternative funding source available.	Legislation is not currently in place. Requires ~2 miles of new transmission main. High probability that upgrades to WTP will be necessary. May require additional storage during low potable water demand periods.	
South - 4	Alternate		Construct deep injection well.	Potential to create saltwater intrusion barrier. Can be used intermittently. Provides most flexibility for operations.	Difficult to permit. Requires pilot study to verify use as intrusion barrier. Permit may require significant monitoring, including new monitoring wells.	
South - 5	Required	IRC-SRRW-1	Install 0.75 MG on-site storage tank	No storage to attenuate peak flows causing disposal and transfer issues.	Install storage to attenuate peak flows and wet weather events. Allows for smoother transfer of reclaimed water to the West WWTF.	*Current*
West - 1	Alternate		Increase pump capacity (Phase 1)	Can be timed to match DOT Roadway Improvements. Provides 1 mgd additional capacity to Bent Pines RIBS or 0.5 mgd of additional capacity to North Tank. Reduces disposal needs at West WWTF. Provides redundancy for half of the transmission main between West and Central.	Limited capacity gains. Requires construction of ~30,000 LF of new main. Does not provide sufficient capacity to meet Central and North needs in 2040.	
West - 2	Alternate		Increase pump capacity (Phase 2)	Increases max flow to 3,500 gpm (5 mgd). Provides sufficient capacity to meet reuse deficits for Central and North customers in 2040. Reduces disposal needs at West WWTF.	Requires construction of ~12,000 LF of new main (or replacement of existing main) beyond what is constructed in Phase 1.	

WWTF - Option No.	Designation	Project Number	Description	Benefit	Challenge	Threshold Capacity/Year
West - 3	Required	IRC-WRRW-1	Modify permit for existing wetlands	Wetlands exists and permitted. Permitted capacity of the wetlands is 4 mgd. Minimal costs associated with rehab. Infrastructure is already in place. O&M costs are known and included in current annual budgets.	FDEP is reluctant to modify concentration limits due to Indian River Lagoon Basin Management Plan. Due to inability to utilize the wetlands as originally designed, some rehab/replacement of existing wetlands vegetation may be required.	*Current*
West - 4	Alternate		Proposed New Wetlands/RIBs Site	Site exists: 248 acres of adjacent property is owned by IRC. Alternative funding may be available for new wetlands. Ability to create educational facility similar to Orange County's Conserv II. O&M costs are neglible.	Concentration loadings may be highly restrictive as seen in the existing wetlands permit. High capital costs for wetlands. RIBs sites can fill during wet weather events, reducing available disposal volumes.	
West - 5	Alternate		Construct ASR well(s)	Site exists: 248 acres of adjacent property is owned by IRC. Property boundaries are sufficient to ensure proper monitoring. FDEP has done testing of ASR wells for reclaimed water and are amenable to idea (unlike deep injection wells). Provides long-term storage for wet weather events. Potential to get up to 2 mgd of injection in one well. Relatively low capital costs when compared to wetlands. Does not preclude addition of wetlands in the future. No interface with Indian River Lagoon.	Cycling of ASR wells is required; must prove that wells are not used for disposal. Requires transfer of recovered water; Option 2 may be required. Monitoring wells are required. O&M costs are higher than wetlands/RIBs sites.	
West - 6	Required	IRC-WRRW-2	2 MG West WWTF Reuse Storage Capacity	Currently there is no equalization storage in the system to use for demands.	Installing a 2 MG storage tank at the West WWTF will equalize peak flows transferred from the South and West WWTFs.	*Current*

WWTF - Option No.	Designation	Project Number	Description	Benefit	Challenge	Threshold Capacity/Year
West -7	Recommended	IRC-WRRW-3	Install new Deep Injection Well	Site exists: 248 acres of adjacent property is owned by IRC. Property boundaries are sufficient to ensure proper monitoring. FDEP has been reluctant to permit deep injection wells but upcoming regulatory actions and discussions on aquifer recharge are making better/stronger case for use of deep injection wells. Reduces/removes disposal concerns during wet weather events. Potential to get up to 10 mgd of injection in one well. Cost is comparable to wetlands. Does not preclude addition of wetlands in the future. No interface with Indian River Lagoon. Long-term maintenance costs are significantly lower that other disposal options.	Wells must be taken off-line every five years to conduct mechanical integrity tests. Alternative storage is required for at least a 5 day period at that time. Monitoring wells are required. High capital costs.	6.0 mgd (AADF) combination of reclaimed water from both South and West WWRFs in ~2030
Central - 1	Required	IRC-CRW-1	Install Pressure Sustaining Valves at Central pond customer sites and the North Reuse Facility storage tank fill line.	Allows for simultaneously filling of storage tank and golf course stormwater ponds.	Requires installation of aboveground backpressure sustaining valves which customers may find aesthetically displeasing	*Current*
Central - 2	Recommended	IRC-CRW-2	Storm Grove Reuse Augmentation System	Provides flexible reuse augmentation - can be turned off when not needed. Conveniently located. Preliminary construction has been completed. FDEP Permit is in place.	Should be coordinated with the construction of John's Island Storage and Repump Facility and associated request for additional 2 MGD reuse demand.	2025
Central - 3	Required	IRC-CRW-3	0.35 MG Central WWTF Reuse Storage Capacity Conversion	Provides equalization storage in the system to use for demands. Existing abandoned 0.35 MG concrete tank could be used.	Condition of existing tank is unknown. Yard piping modifications will be required.	*Threshold Capacity of 3.15 MGD in ~2029*
Overall -1	Recommended	IRC-ORW-1	Bent Pine Reuse Storage and Repump Facilities	Provides a new 3 MG storage and repump facility, centrally located between West and Central WWTFs. Reduces head requirements on West WWTF pumps, thus increasing transfer flow rates. Provides opportunity to create a pressurized system in the Central Service Area. Ease of disposal into RIBs if needed.	Requires geotechnical evaluation of site. Central WWTF Reuse Pumps may require pump control valves or pump replacement. Additional flow from West WWTF is not sufficient to meet deficit reuse needs - Storm Grove Augmentation System will still be required.	Threshold Capacity of total system effluent of 9.3 MGD in ~2038

WWTF - Option No.	Designation	Project Number	Description	Benefit	Challenge	Threshold Capacity/Year
Overall - 2	Alternate	IRC-ORW-2	Increase storage at WWTFs	Can incorporate increased storage into proposed construction of equalization storage tank at West WWTF for use by West and South WWTFs. Can utilize County owned parcel adjacent to Central to create new storage and repump facility.	Does not provide centralized storage. Requires new pumping systems at both West and Central WWTFs. Does not address hydraulic constraints associated with West WWTF transmission main.	Threshold Capacity of total system effluent of 9.3 MGD in ~2038

Appendix D

Capital Improvement Project Cost Estimation

This Appendix contains construction costs only. For an estimate of the costs of technical services associated with these Projects, multiply the construction costs by 20%.

			Anticipated Year of Operational Need				
CIP Project No.	Capital Project	Capital Costs	2020	2025	2029	2030	2038
IRC-SRRW-1	South WWTF RW Storage Tank	$3,690,000	X				
IRC-WRRW-2	West WWTF RW Storage Tank	$5,250,000	X				
IRC-WRRW-1	West WWTF Existing Wetlands Permit Update	$80,000	X				
IRC-CRW-1	Backpressure Valves for Central Customers	$210,000	X				
IRC-CRW-2	Storm Grove Augmentation System*	$2,770,000		X			
IRC-SRRW-2	South WWTF Transmission Main Improvements	$1,400,000			X		
IRC-CRW-3	Central WWTF RW Storage Tank	$830,000			X		
IRC-WRRW-3	West WWTF New Wetlands	$12,570,000				X	
IRC-ORW-1	Bent Pine Reuse Storage and Repump Facility	$6,780,000					X
	Total Capital Costs	**$33,580,000.00**	**$9,230,000.00**	**$2,770,000.00**	**$2,230,000.00**	**$12,570,000.00**	**$6,780,000.00**

* Dependent on timing of John's Island RW Storage and Repump Facility

South Regional Capital Improvement Projects

Project ID No.	Project Description	Responsibility	Installation Year	CIP Cost
IRC -SRRW-1	2.0 MG Reuse Storage Tank	County	Current	$2,288,073
IRC -SRRW-2	Tranmssion Main Upgrades	County	2025	$1,392,808

South Regional 2.0 MG Storage Tank

	Unit	Quantity	Unit Price	Total
Mobilization	LS	1	$115,144	$115,144
SWPPP	LS	1	$5,100	$5,100
Testing	LS	1	$10,200	$10,200
Construction Stake As-Built	LS	1	$15,300	$15,300
2.0 MG Tank & Foundation	LS	1	$1,300,000	$1,300,000
Site Clearing & Preparation	LS	1	$1,256	$1,256
Yard Piping	LS	1	$151,266	$151,266
Drainage System & Final Grading	LS	1	$42,290	$42,290
Electrical	LS	1	$27,800	$27,800
Monitoring and Control	LS	1	$33,900	$33,900
Paved Driveway	LS	1	$52,700	$52,700
Project Closeout	LS	1	$5,100	$5,100
Contingency 30%			$528,017	$528,017
Project Total				$2,288,073

Transmission Main Upgrade

	Unit	Quantity	Unit Price	Total
Mobilization / Demobilization	LS	1	$89,187	$89,187
8-inch to 16-inch Upgrade	LS	11000	$115	$1,265,000
Project Closeout	LS	1	$9,100	$9,100
Contingency 30%			$29,521	$29,521
Project Total				$1,392,808

West Regional Capital Improvement Projects

Project ID No.	Project Description	Responsibility	Installation Year	CIP Cost
IRC - WRRW-1	Wetland Petition to Increase Discharge Capacity/Loading Rate to Wetland Design Capacity	County	Current	$75,000
IRC -WRRW-2	2.0 MG Reuse EQ/Storage Tank and Pump Station	County	Current	$5,247,842
IRC - WRRW-3	West WWTF New Wetlands	County	2030	$12,564,667

West Regional 2.0 MG Storage Tank

	Unit	Quantity	Unit Price	Total
Mobilization /Demobilization	LS	1	$164,144	$164,144
SWPPP	LS	1	$5,100	$5,100
Testing	LS	1	$10,200	$10,200
Construction Stake As-Built	LS	1	$15,300	$15,300
2.0 MG Tank & Foundation	LS	1	$2,000,000	$2,000,000
Site Clearing & Preparation	LS	1	$1,256	$1,256
Yard Piping	LS	1	$151,266	$151,266
Drainage System & Final Grading	LS	1	$42,290	$42,290
Electrical	LS	1	$27,800	$27,800
Monitoring and Control	LS	1	$33,900	$33,900
Paved Driveway	LS	1	$52,700	$52,700
Project Closeout	LS	1	$5,100	$5,100
Contingency 30%			$752,717	$752,717
Project Total				$3,261,773

West Regional Pump Station

	Unit	Quantity	Unit Price	Total
Mobilization /Demobilization	LS	1	$99,946	$99,946
Pump Station	LS	1	$1,295,000	$1,295,000
VFD Controls	LS	1	$20,000	$20,000
Yard Piping	LS	1	$30,000	$30,000
Drainage System & Final Grading	LS	1	$12,000	$12,000
Electrical	LS	1	$27,800	$27,800
Monitoring and Control	LS	1	$33,900	$33,900
Project Closeout	LS	1	$9,100	$9,100
Contingency 30%			$458,324	$458,324
Project Total				$1,986,070

Central Regional Capital Improvement Projects

Project ID No.	Project Description	Responsibility	Installation Year	CIP Cost
IRC-CRW-1	Pressure Sustaining Valves @ Sandlake Ridge Golf Course, Sandlake Dunes Golf Course, Hawk's Nest Golf Course, and Redstick Golf Course	County	Current	$206,351
IRC-CRW-2	0.5 MG Central WWTF Reuse Storage Capacity Conversion	County	2029	$827,523

Pressure Sustaining Valves

	Unit	Quantity	Unit Price	Total
Mobilization /Demobilization	LS	1	$12,550	$12,550
SWPPP	LS	5	$2,000	$10,000
8" Pressure Sustaining Valve	LS	5	$6,000	$30,000
Anticavitation Device	LS	5	$6,000	$30,000
Site Clearing & Preparation	LS	5	$1,256	$6,280
Electrical	LS	5	$2,500	$12,500
Monitoring and Control	LS	5	$4,000	$20,000
Paved Driveway	LS	5	$12,000	$60,000
Project Closeout	LS	5	$2,100	$10,500
Contingency 30%			$14,522	$14,522
Project Total				$206,351

0.5 Storage Tank Assessment/Rehab & Piping Upgrade

	Unit	Quantity	Unit Price	Total
Mobilization /Demobilization	LS	1	$41,644	$41,644
SWPPP	LS	1	$5,100	$5,100
Testing	LS	1	$10,200	$10,200
Construction Stake As-Built	LS	1	$15,300	$15,300
Tank Assessment	LS	1	$250,000	$250,000
Site Clearing & Preparation	LS	1	$1,256	$1,256
Yard Piping	LS	1	$151,266	$151,266
Drainage System & Final Grading	LS	1	$42,290	$42,290
Electrical	LS	1	$27,800	$27,800
Monitoring and Control	LS	1	$33,900	$33,900
Paved Driveway	LS	1	$52,700	$52,700
Project Closeout	LS	1	$5,100	$5,100
Contingency 30%			$190,967	$190,967
Project Total				$827,523

Project ID No.	Project Description	Responsibility	Installation Year	CIP Cost[2]
IRC-ORW-1	Stormwater Augmentation Pump Station & Treatment[1]	County	2025	$2,764,530

1 SJRWMD was going to fund approximately 40% of construction costs in 2012. This will need to be revisited.

2 The 2012 approximate construction cost is $1,815,000, which was escalated 2% per year for 8 years and a 30% contingency included.

Overall Capital Improvement Projects

Project ID No.	Project Description	Responsibility	Installation Year	CIP Cost
IRC -ORW-1	3.0 MG Reuse EQ/Storage Tank and Pump Station	County	2025	$6,777,942

Bent Pine 3.0 MG Storage Tank

	Unit	Quantity	Unit Price	Total
Mobilization /Demobilization	LS	1	$234,144	$234,144
SWPPP	LS	1	$5,100	$5,100
Testing	LS	1	$10,200	$10,200
Construction Stake As-Built	LS	1	$15,300	$15,300
3.0 MG Tank & Foundation	LS	1	$3,000,000	$3,000,000
Site Clearing & Preparation	LS	1	$1,256	$1,256
Yard Piping	LS	1	$151,266	$151,266
Drainage System & Final Grading	LS	1	$42,290	$42,290
Electrical	LS	1	$27,800	$27,800
Monitoring and Control	LS	1	$33,900	$33,900
Paved Driveway	LS	1	$52,700	$52,700
Project Closeout	LS	1	$5,100	$5,100
Contingency 30%			$1,073,717	$1,073,717
Project Total				$4,652,773

Bent Pine Pump Station

	Unit	Quantity	Unit Price	Total
Mobilization /Demobilization	LS	1	$106,946	$106,946
Pump Station Upgrades	LS	1	$1,395,000	$1,395,000
VFD Controls	LS	1	$20,000	$20,000
Yard Piping	LS	1	$30,000	$30,000
Drainage System & Final Grading	LS	1	$12,000	$12,000
Electrical	LS	1	$27,800	$27,800
Monitoring and Control	LS	1	$33,900	$33,900
Project Closeout	LS	1	$9,100	$9,100
Contingency 30%			$490,424	$490,424
Project Total				$2,125,170

Appendix E

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Appendix F

JLA Geosciences DIW Report

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TECHNICAL MEMORANDUM

To: **Yvonne Picard, P.E., Atkins**

Project: **New Class I Injection Well – General Information and Requirements
Indian River County**

Date: **February 19, 2021**

Prepared By: **Jim Andersen, P.G., JLA Geosciences, Inc.**

The purpose of this Technical Memorandum is to provide an overview of permit requirements, design considerations, and estimated costs for the construction and operation of a new Class I injection well in Indian River County, Florida. It is our understanding that the County is considering the construction of a new, deep injection well (DIW) for the disposal of reclaimed water on the 246 acres adjacent to the West Regional WWTP, located at 8405 8th Street, Vero Beach.

Note that the expected cost range for a new injection well is $7,000,000 to $11,500,000, based on 2020 pricing, with the cost variability a result of well size. A deep injection well will provide absolute disposal assurance regardless of conditions (wet weather). It will also provide a mechanism for the disposal of excess wastewater until more reclaimed water customers become available. Additionally, if there are concerns regarding nutrient addition to the Indian River Lagoon from reclaimed use in coastal or barrier island areas, the DIW provides an alternative. Water injected into a DIW will have no effect on coastal ecosystems.

Permit Requirements for a Class I Injection Well

Injection wells in the United States are regulated under the EPA Safe Drinking Water Act (40 CFR) and are overseen by the federal Underground Injection Control program and the DEP's Aquifer Protection Program. In Florida, the Florida Department of Environmental Protection (FDEP) has primacy under 62-528, Florida Administrative Code (F.A.C.).

There are six different classes of injection wells in Florida (Class I through VI). Class I wells inject waters into Class G-IV groundwater as defined in Chapter 62-520.410 as "groundwater in confined aquifers which has a total dissolved solids content of 10,000 mg/L or greater." Class I injection wells are subcategorized based on the fluids injected. In Florida, a Class I well is typically categorized as either a municipal or non-municipal (industrial) well.

A municipal Class I injection well, which can publicly or privately-owned, is used to inject fluids that have passed through the head of a permitted domestic wastewater treatment facility. As noted in Chapter 62-600.540, all facilities using Class I wells discharging domestic effluent into Class G-IV waters must meet the secondary treatment and pH limitations specified in subsection 62-600.420(3), and Rule 62-600.445, F.A.C. Disinfection is not required before disposal via any Class I well, whether from any new or existing facility except as provided in subsection 62-600.540(2), F.A.C.; however, all Class I well permittees must maintain capability to disinfect at a level that is consistent with the alternate discharge mechanism pursuant to Rule 62-528.415, F.A.C. All facilities using Class I municipal injection wells shall meet the requirements of Rules 62-528.440, 62-528.450, and 62-528.455, F.A.C.

For new construction of Class I injection wells, a construction and testing permit must be secured from FDEP Underground Injection Control (UIC). The application for construction and testing shall include information as noted in Chapter 62-528.450. In general, the construction and testing permit application must include the following components:

- Proposed source of fluid to be injected including laboratory analysis of fluid
- Proposed rate of injection
- Design considerations of the injection well and dual-zone, deep monitor well for protecting the environment and underground sources of drinking water
- Calculations of the estimated injection plume for a 10-year operational period (2 permit cycles) assuming the maximum permitted injection rate, referred to as the "Area of Review" (AOR)
- A study of existing groundwater wells within the area of review (AOR)
- Evaluation of local and regional hydrogeologic conditions
- Proposed construction and testing plan
- Proposed operation and monitoring plan after construction of the injection well is complete
- Proposed alternate disposal plan during times of planned and unplanned outages of the injection well
- Certification that the owner of the injection well system has the financial means to properly plug and abandon the injection well should it be deemed necessary
- Permit processing fee of $12,500.

As part of permit processing, the following activities will be performed:

1. Owner submits permit application and supporting information to FDEP
2. FDEP may or may not issue one or multiple requests for additional information (RAI)
3. Owner has 30 days to respond to RAI(s)
4. When satisfied that the application is complete, FDEP will issue to the Owner a notice that a draft construction and testing permit is being issued
5. Owner is responsible for publishing the notice in a local newspaper that is acceptable to FDEP
6. A public meeting may be required if requested by the public
7. After public comments (if any) are addressed, FDEP will issue to the Owner a notice that the final construction and testing permit is being issued.

FDEP will issue a construction and testing permit for a maximum duration of five years.

Permit Requirements During Construction

The Owner is required to provide weekly report updates to FDEP to keep them apprised of construction and testing progress. Extensive geological, groundwater quality, and construction data must be collected throughout construction. FDEP requires construction oversight by a qualified geologist or engineer for certain activities including casing installation and cementing, geophysical logging, and formation testing (packer testing and injection testing). FDEP approval shall be secured during construction based on the data collected which includes casing settings, proposed monitor zones and injection zone, and proposed plans to perform an injection test.

Permit Requirements After Construction (Operational Testing)

As part of the construction and testing permit, the Owner must perform operational testing of the injection well system. Operational testing is performed upon completion of the following activities:

1. Construction of the injection well and monitor well is complete to the satisfaction of FDEP
2. During construction, the lowermost underground source of drinking water (USDW) was identified
3. Geologic conditions show a level of confinement below the lowermost USDW that will prohibit vertical movement of injected fluids from the injection zone to the USDW
4. A suitable injection zone is located that will accept the injected fluids
5. Testing demonstrates that the injection well has mechanical integrity
6. A short-term injection test (typically a 12-hour test) is successfully performed at the proposed maximum permitted injection rate that demonstrates the injection zone is suitable to accept the proposed injection flows
7. Wellheads, piping, valving, electrical, instrumentation, and other appurtenances are installed as designed
8. Engineer of record provides certification that the injection well system was completed in accordance with FDEP permit requirements and technical specifications
9. As-built record drawings are prepared and submitted to FDEP
10. A draft operation and maintenance (O&M) manual is prepared and submitted to FDEP
11. A report is submitted to FDEP that summarizes the data collected during construction and testing
12. FDEP approval to commence operational testing is secured
13. Notification is submitted to FDEP that operational testing will commence

Upon completion of the items above, the Owner may commence operational testing of the system. During this time, injection of the requested fluids (reclaimed water) may be performed. The Owner must monitor injection rates, pressures, volumes, and water levels in the monitor zones. The Owner also must collect water quality samples for field and laboratory analysis of the injected fluids and waters from the monitor zones on a weekly and monthly basis; dependent on the water quality parameters noted in the permit. A reduction in sampling frequency may be granted by FDEP, upon request, if sample results show no apparent adverse trends in water quality. FDEP typically requires a minimum of 6 months of frequent sample collection before a reduction in frequency is granted. FDEP typically requires a minimum of one year for operational testing. Operational testing may not be performed more than two years. Before two years, an operation permit must be secured.

Permit Requirements for Operation

An operating permit must be secured upon completion of operational testing. The application for an operating permit shall include information as noted in Chapter 62-528.455. In general, the operating permit application must include the following components:

- Reference of information provided in the operational testing request
- Finalized record drawings signed and sealed by the Engineer of Record
- Finalized version of the O&M manual
- Finalized monitoring program
- Tabulated and plotted data collected during operational testing including an interpretation of the data
- Proof that the existence of the injection well and monitoring well has been recorded at the county courthouse.

Permit processing to secure an operating permit is similar to the permit processing to secure a construction and testing permit. Refer to the discussion above. FDEP will issue an operating permit for a maximum duration of five years.

Operation and monitoring of the injection well system shall meet the conditions noted in Chapter 62-528.415 and Chapter 62-528.425. During operation, monthly operating reports (MORs) must be submitted to FDEP. The MORs shall include the following information:

- Daily average, minimum, and maximum injection rates and wellhead pressures; data shall be collected on a continuous basis
- Daily injected volumes
- Monthly and quarterly water quality results of the injected fluids
- Daily average, minimum, and maximum water levels in the upper and lower monitor zones
- Monthly and quarterly water quality results of the upper and lower monitor zones
- Any deviation of the operation and monitoring that fails to meet permit requirements and proposed plan to correct the deviation.

FDEP requires a demonstration that the injection well maintains mechanical integrity. Mechanical integrity shall be demonstrated every five years. To demonstrate integrity the following activities shall be performed:

1. Owner submits a plan for FDEP approval to perform mechanical integrity testing at least ninety (90) days prior to the 5-year deadline to perform the test
2. The plan shall include the following components:
    a. Performance of a downhole video survey
    b. Performance of a one-hour hydrostatic pressure test
    c. Performance of a high-resolution temperature log
    d. Performance of a radioactive tracer survey (RTS) test

3. A report summarizing the testing results must be submitted within 90 days after completion of testing. The report shall also include tabulated and plotted operation and water quality data, with interpretations, of the previous five years of operation.

Estimated Construction and Operating Costs

The cost to construct a Class I injection well system is dependent on many factors including the design/size of the injection well, site accessibility and site constraints, location of the site as it relates to formation conditions, market conditions of steel and other materials, qualification requirements of the bidder, and availability of a qualified bidder. An injection well system with a final casing diameter between 12-inches and 26-inches is estimated to cost between $7 million and $11.5 million. Below is a conceptual cost estimate of an injection well system based on an injection well with a final casing diameter of 26 inches.

Description	Total
General Conditions, Site Preparation, Mobilization, Site Restoration, and Demobilization	$2,100,000
Construction and Testing of Deep Injection Well	$5,900,000
Construction and Testing of Dual-Zone Deep Monitor Well	$1,700,000
Construction of Wellheads, Pads, and Injection Testing	$200,000
Construction of Piping, Valving, Electrical, Instrumentation, and Appurtenances	$800,000
Design, Permitting, Bidding and Construction Management Services	$800,000
Total Estimate of Probable Construction Costs	$11,500,000

Conceptual Cost Estimate For a 26-inch Diameter, Deep Injection Well.

Below is a conceptual cost estimate of water quality sampling, MIT testing, and permit renewal costs for a 5-year permit cycle.

Sampling Frequency	Sampling Event	Estimated Cost
Every Month	Required IW, UMZ, and LMZ Sampling (assumes total of 23 parameters; $100 each)	$2,300
Every Year	Sample Injectate for Primary/Secondary Drinking Water Parameters	$2,500
Every 5 Years	Demonstrate Mechanical Integrity of Well	$65,000
	Renew Permit (Application and Permit Fee)	$25,000
	Total 5-Year Estimated Cost	$95,000

Conceptual Cost Estimate For a 5-Year Permit Cycle For a Deep Injection Well.

Design Considerations: Size, Depths, and Capacities

A brief discussion of Class I injection well designs and regulatory requirements is necessary to provide justification of the size, depth, and capacities of the injection well necessary to accommodate the flow rates needed. As noted in Rule 62-528.415(1)(f).2, the maximum injection velocity of a well shall not exceed a peak hourly flow of ten feet per second (ft/sec), unless the applicant demonstrates that higher velocities will not compromise the integrity or operation of the well. The table below provides flow rates of common casing sizes at an injection velocity of 10 ft/sec.

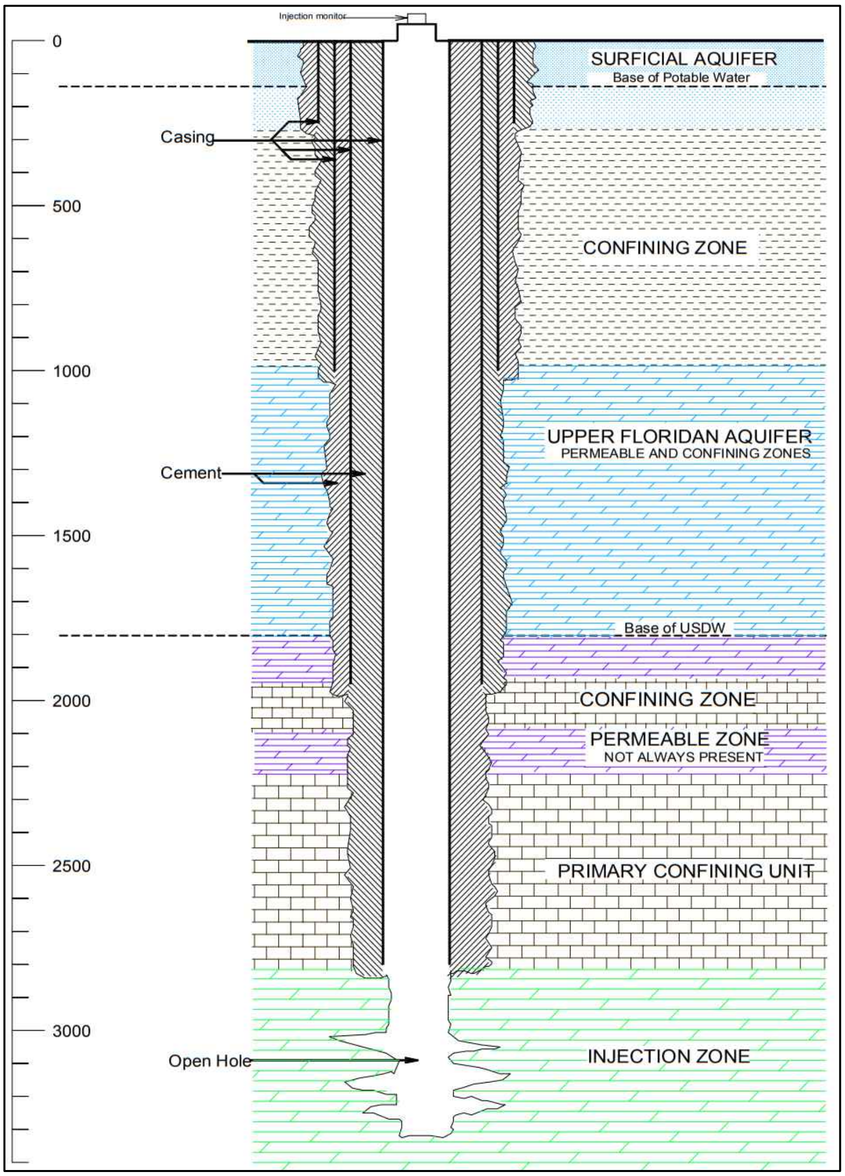
Inside Diameter (inches)	Rate (MGD)	Rate (GPM)
9.75	3.35	2,327
11.75	4.87	3,380
13	5.96	4,137
15	7.93	5,508
17	10.19	7,075
19	12.73	8,837
21	15.55	10,796
23	18.65	12,950
25	22.03	15,300

Flow rates of common casing sizes at an injection velocity of 10 ft/sec.

Casings are required to isolate major formation units as follows:

- Conductor Casing: Outermost casing set to the base of the Surficial Aquifer System.
- Surface Casing: Set to the base Hawthorn Group clays (noted as Confining Zone in illustration) and the top of the Upper Floridan Aquifer.
- Intermediate Casing: Set below the lowermost USDW and typically at the top of the uppermost confining. FDEP requires the diameter of the intermediate casing to be a minimum of 10 inches larger than the diameter of the final casing.
- Final Casing: Set at the base of the primary confining unit within the Floridan Aquifer System and above the injection zone. For a municipal Class I injection well, the final casing is the innermost injection casing of the well. FDEP requires the wall thickness of the final casing to be a minimum of 0.5 inch.

The illustration below provides a typical design of a municipal Class I injection well.



Typical Class I Municipal Injection Well Design.

A review of regional hydrogeologic conditions and nearby deep injection wells is prudent when determining a suitable design for a proposed future injection well. There are three, Class I injection wells located within the vicinity of the West Regional Wastewater Treatment Facility (WWTF). The locations of the Class I wells in relation to the West Regional WWTF are provided in the figure below. The red square represents the location of the WWTF. The yellow diamonds represent the existing, nearby, Class I injection wells.

Location of Class I Injection Wells near the Western Regional WWTF.

The table below provides casing setting depths of the nearby injection wells. It is anticipated that the design of an injection well at the Western Regional WWTF will have approximate casing settings, monitor zone intervals, and open hole injection zones at similar depths.

Casing	Feet Below Land Surface		
	Vero IW1	IRED IW1	FPL OCEC IW1
Conductor	120	116	232
Surface	412	462	430
Intermediate	2,000	1,697	1,819
Final	2,651	2,378	2,235
Base of Open Hole	3,070	3,005	3,210
Upper Monitor Zone	NA	1,390-1,492	1,592-1,673
Lower Monitor Zone	1710-1765	1,900-1,949	1,823-1,915

Well Construction Details for Nearby Injection Wells.

For Class I injection, FDEP requires the installation of a monitoring well(s) to monitor a formation interval at or near the lowermost base of the USDW and to monitor a formation interval below the base of the lowermost USDW. The USDW base is defined as the depth at which the total dissolved solids (TDS) concentration of the formation water exceeds 10,000 milligrams per liter (mg/L). The purpose of monitoring is to ensure that the fluids injected in the injection wells are not migrating upward into a USDW.

Typically, the monitoring is performed by installing a dual-zone monitor well. For spacing between an injection well and the dual-zone monitor well, the following rule applies:

Rule 62-528.425(1)(g): The Department shall require monitor wells above the injection zone near the injection well.

1. The permittee shall be able to monitor the following:
   a. The absence of fluid movement adjacent to the well bore, and
   b. The long-term effectiveness of the confining zone.

Rule 62-528.425(1)(g).3 notes that monitor wells used to meet the requirements of 1.a. above shall be located within 150 feet of the injection well unless the applicant can demonstrate, through a hydrogeologic study, that a monitor well located at a greater distance will be capable of adequately monitoring fluid movement adjacent to the borehole. FDEP restricts the maximum distance between an injection well and a dual-zone monitor well to be 150 feet, and it is recommended that the minimum distance between an injection well and dual-zone monitor well be greater than 90 feet.

Estimated Schedule to Design, Permit, and Construct a Class I Injection Well

A conceptual schedule is provided below. The schedule addresses design, permitting, bidding, construction, and testing of the injection well system. The schedule shows a duration of 2.5 years from the start of design to the commencement of operational testing, when FDEP allows injection into the well to commence. A duration of four years is shown to obtain an operating permit. This schedule incorporates reasonable estimates based on prior experience, but it is not possible to address the numerous scheduling scenarios. The actual duration may be reduced slightly or extended significantly and is primarily contingent upon the availability of the various contractors and issues (or lack thereof) arising during construction.

	Description	Elapsed Time (Months)	Delta Time (Months)
Design, Permit and Bidding Phase	Notice to Proceed	0	0
	Submit Application to FDEP UIC	3	3
	FDEP Issuance of RFI No. 1	4	1
	Response to RFI No. 1	5	1
	FDEP Issuance of RFI No. 2 (if necessary)	6	1
	Response to RFI No. 2 (if necessary)	6.5	0.5
	FDEP Issuance of Draft Permit	8	1.5
	Advertise Draft Permit and Conduct Public Meeting	9.5	1.5
	FDEP Issuance of Notice of Intent and then Final Permit	10	0.5
	Bidding and Award of Contract	13	3
Construction Phase	Submittal Review and Preparation for Mobilization	14	1
	Site Preparation and Mobilization	15	1
	Construction of Injection Well	20	5
	Mobilization & Construction of Dual-Zone Monitor Well	23	3

	Final Testing and Demobilization	25	2
Well Tie-In and Op. Testing	Complete Piping, Electrical, Instrumentation and Other Appurtenances to Injection Well and Monitor Well	29	4
	FDEP authorizes commencement of operational testing	30	1
	FDEP issues Operating Permit	48	18

Estimated Schedule to Design, Permit, and Construct a Class I Injection Well.

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